LOCKHEED MARTIN

ENVIRONMENTAL RESTORATION PROGRAM

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Nuclear Facility Decommissioning and Site Remedial Actions: A Selected Bibliography, Vol. 18

Part 1A. Citations with Abstracts
Sections 1 Through 9

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LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

UCN-17560 (6 8-95)

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**Nuclear Facility Decommissioning
and Site Remedial Actions:
A Selected Bibliography, Vol. 18**

**Part 1A. Citations with Abstracts
Sections 1 Through 9**

Date Issued—September 1997

Prepared by
Remedial Action Program Information Center
and
Information International Associates, Inc.
Oak Ridge, Tennessee
under subcontract 70K-GAM66

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under budget and reporting code EW 20

MASTER

LOCKHEED MARTIN ENERGY SYSTEMS, INC.
managing the
Environmental Management Activities at the
East Tennessee Technology Park Paducah Gaseous Diffusion Plant
Oak Ridge Y-12 Plant Portsmouth Gaseous Diffusion Plant
Oak Ridge National Laboratory
under contract DE-AC05-84OR21400
for the
U.S. DEPARTMENT OF ENERGY

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PREFACE

This report, *Nuclear Facility Decommissioning and Site Remedial Actions: A Selected Bibliography, Vol. 18* (ES/ER/TM-227), was prepared for the U.S. Department of Energy, Office of Environmental Restoration. This work was performed under Activity Data Sheet OR HQ 447. Publication of this document meets a Headquarter-controlled milestone of September 30, 1997.

This document is intended to serve a variety of information needs for individuals with an interest or involvement in environmental restoration activities, nuclear facility decontamination and decommissioning, uranium mill tailings management, and site remedial actions.

In addition to the main bibliographic text with abstracts, indexes of authors, author affiliations, selected title phrases, selected title words, publication descriptions, geographic locations, and keywords are provided.

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ABBREVIATIONS

AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
BRC	below regulatory concern
BWR	boiling water reactor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
D&D	decontamination and decommissioning
DNAPL	dense nonaqueous phase liquid
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
FS	feasibility study
FUSRAP	Formerly Utilized Sites Remedial Action Program
FY	fiscal year
GAO	U.S. General Accounting Office
HEPA	high-efficiency particulate air
IAEA	International Atomic Energy Agency
LWR	light-water reactor
NAPL	nonaqueous phase liquid
NEPA	National Environmental Policy Act
NORM	naturally occurring radioactive materials
NPL	National Priorities List
NPP	nuclear power plant
NRC	U.S. Nuclear Regulatory Commission
OTD	U.S. Office of Technology Development
OU	operable unit
PCB	polychlorinated biphenyl
PWR	pressurized-water reactor
QA	quality assurance
R&D	research and development
RAPIC	Remedial Action Program Information Center
RCRA	Resource Conservation and Recovery Act
RDDT&E	research, development, demonstration, testing, and evaluation
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SITE	Superfund Innovative Technology Evaluation
TRU	transuranic
TSCA	Toxic Substances Control Act
UMTRA	Uranium Mill Tailings Remedial Action
UMTRCA	Uranium Mill Tailings Radiation Control Act
VOC	volatile organic compound
WAG	waste area grouping

ABSTRACT

This bibliography contains 3638 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D&D), uranium mill tailings management, and site remedial actions. This report is the eighteenth in a series of bibliographies prepared annually for the U.S. Department of Energy (DOE) Office of Environmental Restoration. Citations to foreign and domestic literature of all types—technical reports, progress reports, journal articles, symposia proceedings, theses, books, patents, legislation, and research project descriptions—have been included in Part 1 of the report. The bibliography contains scientific, technical, financial, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including (1) DOE Environmental Restoration Program; (2) DOE D&D Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Program; (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues. Within the 16 sections, the citations are sorted by geographic location. If a geographic location is not specified, the citations are sorted according to the document title. In Part 2 of the report, indexes are provided for author, author affiliation, selected title phrase, selected title word, publication description, geographic location, and keyword.

This bibliography is published annually by the Remedial Action Program Information Center (RAPIC), which selects, analyzes, and disseminates information on environmental restoration, D&D, and site remedial actions. RAPIC staff and resources are available to meet a variety of information needs. Contact the center at (423) 576-6500 or by e-mail at rapic@ornl.gov. For updates to this publication, please access RAPIC's site on the web at <http://www.em.doe.gov/rapic>.

INTRODUCTION

This bibliography is published by the Remedial Action Program Information Center (RAPIC). RAPIC is funded by the U.S. Department of Energy (DOE) Office of Environmental Restoration, Program Integration Division, to provide technical information support to DOE Environmental Restoration Program activities.

RAPIC serves as a central clearinghouse for information, derived from both foreign and domestic publications, that concerns the scientific, technical, regulatory, and socioeconomic aspects of environmental restoration at contaminated facilities and sites. Environmental restoration encompasses activities such as the following:

- performing characterization surveys of contaminated facilities or sites,
- conducting ongoing security and surveillance programs,
- performing preventive maintenance actions to ensure the containment of contamination until permanent facility disposition,
- assessing the environmental and engineering aspects of proposed remediation alternatives,
- drafting detailed project plans and procedures for remediation,
- performing decommissioning and remedial actions to make facilities or sites available for restricted or unrestricted use,
- developing technologies, and
- complying with applicable laws and regulations.

The 3638 citations with abstracts in this report constitute the 18th annual publication with the same title and topic coverage. The contents of all 18 volumes of this bibliography are stored in an on-line database that undergoes frequent updating. The bibliography is intended for use as a "first-line" reference tool. RAPIC can perform on-line searches of the entire database to identify recent additions to the database or to conduct a comprehensive search.

TOPIC COVERAGE

The major topics covered by this bibliography are presented in 16 sections: (1) DOE Environmental Restoration Program; (2) DOE Decontamination and Decommissioning (D&D) Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Program (FUSRAP); (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action (UMTRA) Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and

(16) Environmental Management Issues. The topic coverage of each section is explained in the following pages.

The first section, **DOE Environmental Restoration Program**, cites programmatic planning and management documents prepared by or for the DOE Office of Environmental Restoration. Documents that affect or relate to DOE's environmental restoration effort as a whole are included here.

The **DOE Decontamination and Decommissioning (D&D) Program** section includes citations pertaining to the D&D of buildings and structures located primarily on federal reservations.

The section on **Nuclear Facilities Decommissioning** presents citations relating to D&D at non-DOE nuclear facilities, including those outside the United States.

The **DOE Formerly Utilized Sites Remedial Action Program (FUSRAP)** section cites documents generated by or related to the DOE FUSRAP program. FUSRAP sites were used by the Manhattan Engineer District or by the Atomic Energy Commission from the 1940s through the 1960s for the processing, handling, storage, or shipment of radioactive materials.

The section on **NORM-Contaminated Site Restoration** contains citations of documents about remediation efforts at non-DOE sites contaminated with naturally occurring radioactive materials (NORM).

The **DOE Uranium Mill Tailings Remedial Action (UMTRA) Project** section cites information pertinent to UMTRA project management or to the 24 UMTRA sites, located primarily in the western United States. These sites are inactive uranium mill sites that were operated under government contract.

The section on **Uranium Mill Tailings Management** includes citations to foreign and domestic mill tailings documents and basic and applied mill tailings research reports that are not part of UMTRA.

The section on **DOE Site-Wide Remedial Actions** is composed of citations on remediation issues that affect an individual DOE facility or the entire DOE reservation.

The section on **DOE Onsite Remedial Action Projects** contains citations to documents about cleanup activities at operable units, waste area groupings, or other specific sites within a DOE facility or environmental contamination originating from a DOE facility.

The section on **Contaminated Site Remedial Actions** presents citations relating to remedial actions on environmental areas that are not a part of DOE's Environmental Restoration Program. These sites may include other governmental agencies, private sector, or countries other than the United States.

The **DOE Underground Storage Tank Remediation** section contains citations to documents relevant to the characterization and remediation of the underground storage tanks and tank contents awaiting final disposition at DOE sites.

The section on **DOE Technology Development, Demonstration, and Evaluation** cites documents originating from or directly relating to DOE Office of Technology Development

programs for research and development, demonstration, testing, and evaluation of new technologies for environmental restoration and waste management.

The **Soil Remediation** section consists of citations to studies relating to characterizing, monitoring, and remediating soil contaminated with radioactive or hazardous materials.

The **Groundwater Remediation** section consists of citations to studies relating to characterizing, monitoring, and remediating groundwater contaminated with radioactive or hazardous materials.

The section titled **Environmental Measurements, Analysis, and Decision-Making** includes citations to documents on instrumentation for measuring radioactive or hazardous materials; sampling protocols; methods for data collection, validation, and analysis; quality assurance; risk assessment; and models for evaluating environmental restoration projects.

The final section, **Environmental Management Issues**, contains citations to requirements or regulatory drivers affecting DOE's remediation activities. Also included is information relevant to the conduct of program activities.

INDEXES

The indexes found in Part 2 of this report are color-coded to assist the user in identifying documents of interest. The numbers that appear after each listing in the indexes are the sequential numbers of the individual citations in Part 1A, Sections 1 through 9, and Part 1B, Section 10 through 16. The indexes appear as follows:

- ***Pink pages***—the **Author Index** lists all authors for each citation
- ***Blue pages***—the **Author Affiliation Index** is an alphabetical listing of the institutions with which the authors are affiliated
- ***Salmon pages***—the **Selected Title Phrase Index** is an index of selected significant phrases in document titles
- ***Yellow pages***—the **Selected Title Word Index** provides an index of selected significant words in document titles
- ***Green pages***—the **Publication Description Index** alphabetically lists all journal citations, conference descriptions, report numbers, or other unique document descriptions that identify the publication. The title of the document is listed below each entry in the publication description index
- ***Gold pages***—the **Geographic Location Index** provides an alphabetical listing of the geographic descriptions of sites referenced in the bibliography; these are divided into domestic sites and foreign sites
- ***Buff pages***—the **Keyword Index** is an index of descriptors selected from a controlled thesaurus to characterize specific concepts in each record.

CITATION FORM

Each citation in this volume of the bibliography is numbered sequentially. Within each section, the citations are grouped by geographic location. For example, in the section on DOE Site-Wide Remedial Actions, all citations concerning the Hanford Site are grouped together. Within these geographic groupings, the citations are listed alphabetically by the document title. Citations that do not refer to a specific geographic location appear at the end of each section and are sorted by the title.

Under the citation number, the document title appears in **bold print**. Author(s) of the document, are listed next, followed by the corporate affiliation(s) of the author(s). Finally, publication description, publication date, and the abstract are listed. A sample citation with abstract is shown below.

SAMPLE CITATION WITH ABSTRACT

This is an example of the format for the descriptive fields used in this bibliography:

1 — Page Number	5 — Document Title
2 — Section Heading	6 — Author(s)
3 — Citation Number	7 — Corporate Affiliation(s)
(sequential number in this volume)	8 — Publication Description
4 — Volume number and database record	9 — Publication Date
number	10 — Abstract

¹131

² **DOE Onsite Remedial Action Projects**

³191

⁴ V18/020665

⁵ **Summary of Hydrogeologic Controls on Groundwater Flow at the Nevada Test Site, Nye County, Nevada**

⁶Laczniak, F.J.; Cole, J.C.; Sawyer, D.A.; Trudeau, D.A.

⁷U.S. Geological Survey, Carson City, NV

⁸DOE/NV/11040-T1; 128 pp. ⁹(1996)

¹⁰The underground testing of nuclear devices has generated substantial volumes of radioactive and other chemical contaminants below ground at the Nevada Test Site (NTS). Many of the more radioactive contaminants are highly toxic and are known to persist in the environment for thousands of years. In response to concerns about potential health hazards, the U.S. Department of Energy, under its Environmental Restoration Program, has made NTS the subject of a long-term investigation. Efforts will assess whether byproducts of underground testing pose a potential hazard to the health and safety of the public and, if necessary, will evaluate and implement steps to remediate any of the identified dangers. Unique to the hydrology of NTS are the effects of the underground testing, which severely alter local rock characteristics and affect hydrologic conditions throughout the region. This report summarizes what is known and inferred about groundwater flow throughout the NTS region. The report identifies and updates what is known about some of the major controls on groundwater flow, highlights some of the uncertainties in the current understanding, and prioritizes some of the technical needs as related to the Environmental Restoration Program.

SCIENTIFIC NOTATIONS AND ABBREVIATIONS

Below is an explanation of scientific notations and abbreviations used in the text of this bibliography:

1. X sub t means X_t or X subscript t.
2. For chemical compounds and elements, NaIO_3 means NaIO_3 .
3. $10(\text{E}+3)$ or $X(\text{E}-3)$ (E denoting exponent) means 10^3 or X^{-3} , respectively.
4. Cubic or square dimensions of measurements are shown as 6 cu cm (for 6 cubic centimeters) or 3 sq km (for 3 square kilometers).
5. The following prefixes have been used to indicate multiples or subdivisions of units of measurement:

a	atto	(10^{-18})	da	deca	(10^1)
f	femto	(10^{-15})	h	hecto	(10^2)
p	pico	(10^{-12})	k	kilo	(10^3)
n	nano	(10^{-9})	M	mega	(10^6)
u	micro	(10^{-6})	G	giga	(10^9)
m	milli	(10^{-3})	T	tera	(10^{12})
c	centi	(10^{-2})	P	peta	(10^{15})
d	deci	(10^{-1})	E	exa	(10^{18})

6. The following abbreviations have been used for unit measurements:

a	acre	l	liter
A	ampere	lb	pound
Bq	becquerel (activity of source)	m	meter
C	Celsius	MeV	megaelectronvolt
cd	current density	min	minute
Ci	curie	mol	mole (amount)
cpm	counts per minute	N	newton
cps	counts per second	oz	ounce
deg	degree	Pa	Pascal
dpm	disintegrations per minute	ppb	parts per billion
dps	disintegrations per second	ppm	parts per million
F	Fahrenheit	R	roentgen (gamma exposure)
ft	feet	rad	radiation absorbed dose
g	gram	rem	roentgen-equivalent-man
gal	gallon	s	second
Gy	gray (absorbed radiation dose)	Sv	sievert (dose equivalent)
ha	hectare	t	tonne (mass)
hr	hour	V	volt
Hz	hertz	W	watt
in.	inch	W(e)	watt (electrical)
J	joule	W(t)	watt (thermal)
K	Kelvin	yd	yard
keV	kiloelectron volt	yr	year

SERVICES

Copies of most documents cited in this bibliography can be obtained through either the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161, or the Office of Scientific and Technical Information, U.S. Department of Energy, P.O. Box 62, Oak Ridge, Tennessee 37831-0062.

RAPIC offers information support to researchers involved in many fields of environmental restoration. Services that are free of charge to DOE Environmental Restoration staff and their subcontractors include providing information from RAPIC resources, searching computerized databases, and assisting in locating and obtaining copies of documents cited in the RAPIC bibliographies. All inquiries about these and other RAPIC services should be addressed to:

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E-Mail: rapic@ornl.gov

Web Site: <http://www.em.doe.gov/rapic>

**U.S. DEPARTMENT OF ENERGY (DOE)
ENVIRONMENTAL RESTORATION PROGRAM**

1

V18/020739

Minimizing Waste in Environmental Restoration [July 1996]

Moos, L.P.; Thuot, J.R.

Argonne National Laboratory, Argonne, IL

ANL/EMO/CP-90483; CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (5 pp.) (1996)

Environmental restoration, decontamination and decommissioning, and facility dismantlement projects are not typically known for their waste minimization and pollution prevention efforts. Typical projects are driven by schedules and milestones with little attention given to cost or waste minimization. Conventional wisdom in these projects is that the waste already exists and cannot be reduced or minimized. In fact, however, there are three significant areas where waste and cost can be reduced. Waste reduction can occur in three ways: beneficial reuse or recycling, segregation of waste types, and reducing generation of secondary waste. This paper will discuss several examples of reuse, recycle, segregation, and secondary waste reduction at Argonne National Laboratory restoration programs.

2

V18/023762

Pollution Prevention in Environmental Restoration Projects: Communication, Innovation, and Implementation

Wilczek, T.A.

Reynolds Electrical and Engineering Company, Inc., Las Vegas, NV

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 198-200) (November 1995)

Pollution Prevention is best recognized as being a process-driven practice. Its usage has been traditionally applied to continuous and/or cyclic operations within the DOE complex. Pollution Prevention practices are well-suited to these processes which operate over extended periods of time and in a static environment. Successes are achieved because process inputs and outputs can be quantified. Additionally, reductions in process materials usage and/or waste streams generation can be measured over time. An Environmental Restoration (ER) project, however, is not static but a continuously changing series of smaller activities operating with a scheduled time frame projected beginning and completion. The final objective is successful stabilization and/or remediation of the contaminated area. ER personnel are greatly attuned to both the importance of quantifiable results and costs of remedial activities. In most cases, data from remedial activities undergo extensive scrutiny in the validation process before it can be considered meaningful to the project. In activities where much about the site condition is unknown, it is not uncommon for project baseline costs to be revised as additional site data are obtained through the characterization process. Unlike static production operations, the only constant in ER is change. In both cases, the application of Pollution Prevention principles is strongly encouraged as a best management practice and to minimize waste in order to meet DOE

reduction goals. The challenge is how to best apply pollution prevention practices to ER projects and obtain quantifiable waste reductions as a result. ER personnel are an excellent resource. From project managers to field personnel, each is capable of implementing Pollution Prevention practices into ER processes.

3

V18/021697

Amarillo National Resource Center for Plutonium: Quarterly Technical Progress Report - May 1, 1996-July 31, 1996

Amarillo National Resource Center for Plutonium, Amarillo, TX

DOE/AL/85832-T10; 166 pp. (1996)

This report describes activities associated with the Amarillo National Resource Center for Plutonium. Research is in a variety of areas concerned with the management of plutonium, and also highly enriched uranium, explosives, remedial action, and information systems. Educational efforts are also described.

4

V18/022412

10-Year Plan: Bridging the Present to the Year 2006

Alm, A.

U.S. Department of Energy, Washington, DC

EM-Environmental Manager:10 (November 1996)

Over the past several months, the Department of Energy's (DOE) Environmental Management program has focused on collecting data to assimilate into a 10-year plan for completing cleanup at most sites within a decade. This 10-year plan is central to bridging efforts of the past few years to the types of cleanups and time frames the program will encounter through 2006. Major changes have taken place over the past three years to improve the pace of cleanup, manage projects more effectively, shave inefficiencies, and incorporate risk into decision making. All of those efforts have made the Environmental Management program more successful at producing on-the-ground tangible results.

5

V18/021105

1996 Baseline Environmental Management Report: Executive Summary

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0290; 32 pp. (June 1996)

The 1996 Baseline Environmental Management Report provides a total life-cycle cost estimate and anticipated schedule of the projects and activities necessary to carry out the Environmental Management program's missions for environmental remediation, waste management, science and technology development, the transition of operational facilities to safe shutdown status, and the safeguarding and securing of special nuclear materials. This report is prepared as an analytical tool to help guide departmental decisions and to provide an accounting of the Department's progress, spending, and plans. The 1996 Baseline Report is based on current (as of late 1995) national and site-level assumptions regarding the actions or activities that are most likely to occur in the future, and it estimates the costs of these actions or activities. It is expected

that these projected activities will change in the future. In fact, one of the principal purposes of this report is to inform a national debate on what the best future course should be. In addition to this Summary which provides a brief, nontechnical overview of the report, the Report consists of three volumes: Volume 1 - the 1996 Baseline Environmental Management Report, and Volumes 2 and 3 - Site Summaries covering Alaska through New Jersey and New Mexico through Wyoming respectively. All volumes have been indexed in this database.

6 V18/021106

**1996 Baseline Environmental Management Report:
Volume 1**

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0290 (Vol. 1); 175 pp. (June 1996)

The 1996 Baseline Environmental Management Report provides a total life-cycle cost estimate and anticipated schedule of the projects and activities necessary to carry out the Environmental Management program's missions for environmental remediation, waste management, science and technology development, the transition of operational facilities to safe shutdown status, and the safeguarding and securing of special nuclear materials. This report is prepared as an analytical tool to help guide departmental decisions and to provide an accounting of the Department's progress, spending, and plans. The 1996 Baseline Report is based on current (as of late 1995) national and site-level assumptions regarding the actions or activities that are most likely to occur in the future, and it estimates the costs of these actions or activities. It is expected that these projected activities will change in the future. In fact, one of the principal purposes of this report is to inform a national debate on what the best future course should be. The Report consists of three volumes and an Executive Summary: Volume 1 - the 1996 Baseline Environmental Management Report, and Volumes 2 and 3 - Site Summaries covering Alaska through New Jersey and New Mexico through Wyoming respectively. All volumes have been indexed in this database.

7 V18/021107

**1996 Baseline Environmental Management Report:
Volume 2 - Alaska-New Jersey**

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0290 (Vol. 2); 385 pp. (June 1996)

Volumes 2 and 3 present the site data and assumptions used to develop the Base Case for the 1996 Baseline Environmental Management Report. Department of Energy field personnel obtained the raw data from existing information sources and employed site-specific assumptions in concert with programmatic assumptions and guidance developed by Headquarters personnel. Headquarters personnel then integrated and modified the data to ensure that it addressed complex-wide constraints, such as funding and waste management capacity. The site summaries are presented by state in two volumes. Volume 2 covers Alaska through New Jersey and Volume 3 covers New Mexico through Wyoming. The information represents the best data and assumptions available as of October 1995. The assumptions have a significant influence on the

scope, schedule, and total cost of the Environmental Management program; however, they can change for a variety of reasons: (1) Continuing reductions in the Department's budgets; (2) Revisions to current federal, state, or local regulations; (3) Renegotiation of compliance agreements; (4) Modification of future land-use goals; (5) Shifts in national priorities; and (6) Discovery or application of new technologies. Consequently, the numbers presented in the site summaries do not represent outyear budget requests by the field installations. All volumes, along with the Executive Summary, have been indexed in this database.

8 V18/021108

**1996 Baseline Environmental Management Report:
Volume 3 - New Mexico-Wyoming**

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0290 (Vol. 3); 1200 pp. (June 1996)

Volumes 2 and 3 present the site data and assumptions used to develop the Base Case for the 1996 Baseline Environmental Management Report. Department of Energy field personnel obtained the raw data from existing information sources and employed site-specific assumptions in concert with programmatic assumptions and guidance developed by Headquarters personnel. Headquarters personnel then integrated and modified the data to ensure that it addressed complex-wide constraints, such as funding and waste management capacity. The site summaries are presented by state in two volumes. Volume 2 covers Alaska through New Jersey and Volume 3 covers New Mexico through Wyoming. The information represents the best data and assumptions available as of October 1995. The assumptions have a significant influence on the scope, schedule, and total cost of the Environmental Management program; however, they can change for a variety of reasons: (1) Continuing reductions in the Department's budgets; (2) Revisions to current federal, state, or local regulations; (3) Renegotiation of compliance agreements; (4) Modification of future land-use goals; (5) Shifts in national priorities; and (6) Discovery or application of new technologies. Consequently, the numbers presented in the site summaries do not represent out year budget requests by the field installations. All volumes, along with the Executive Summary, have been indexed in this database.

9 V18/024033

Accelerated Retraining Curriculum

TIE Quarterly 5(2):12 (Fall 1996/Winter 1997)

Under the guidance of the DOE Office of Worker and Community Transition, the Accelerated Retraining Curriculum (ARC) for Environmental Management was designed to respond to Section 3161 of the National Defense Authorization Act of 1993 to retain DOE's defense workers to meet the qualifications of environmental technicians and other environmental restoration- and waste-management-related jobs at former DOE production facilities. This curriculum was developed by members of the DOE-sponsored Community College Network (C2Net), an informal consortium of 20 colleges located near DOE facilities with environmental management programs and missions. In developing ARC, members of C2NET worked toward two primary goals: (1) The curriculum should contain the technical competencies of an associate's degree

program for a generalist or broad-based environmental technician and (2) The curriculum should be constructed so it can be completed in a 16-week period, if required, to respond to the 120-day notification period referred to Section 3161 of the National Defense Authorization Act of 1993.

10 V18/022994

Accessing the Federal Government: Site Remediation Technology Programs and Initiatives, First Edition

Federal Remediation Technologies Roundtable, Washington, DC

EPA/542/B-95/006; 46 pp. (July 1996)

This document includes information profiles on programs and initiatives that promote the development and use of innovative site remediation technologies, including joint ventures and public-private partnerships, available through Federal agencies interested in the development and use of emerging innovative site remediation technologies. These include site characterization and hazardous waste treatment technologies. This document contains descriptions of programs operated or sponsored by the U.S. Environmental Protection Agency (EPA), the U.S. Army, the U.S. Navy, the U.S. Air force, the U.S. Department of Energy (DOE), and the U.S. Department of the Interior (DOI). Each profile also includes at least one program contact, with specific project contacts included where available, to help interested developers gather more information and initiate contact with the program. The appendix to this document contains more general contact information on Federal remediation technology research and development programs and initiatives.

11 V18/025399

Accountability in Public Participation in Federal Facility Environmental Restoration

Tano, M.L.

Tano & Associates, Denver, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (3 pp.) (1997)

The report of the Federal Facilities Environmental Restoration Dialogue Committee encouraged the creation of site-specific advisory boards at Department of Defense, Department of Energy, and other federal facilities involved in environmental cleanup. Since then, these advisory boards have become a standard part of federal facilities environmental restoration programs. Mr. Tano argues that the scope of these advisory boards' responsibilities to the general public is unclear and encourages federal agencies to clean up those ambiguities and to provide the training, cross-fertilization, and evaluative criteria that will increase the accountability of federal facilities environmental restoration public participation programs.

12 V18/021954

Assessing DOE's Success in Implementing the FFC Act: A Federal and State Partnership to Develop Treatment Plans

Letourneau, M.J.; Bubar, P.M.

U.S. Department of Energy, Office of Planning and Analysis, Environmental Management, Germantown, MD

CONF-951209; Proceedings of the 17th Annual U.S. Department of Energy Low-Level Radioactive Waste Management Conference, D. Lake (ed.), Phoenix, AZ, December 12-14, 1995, 480 pp.; (8 pp.) (1995)

Implementation of the Federal Facility Compliance Act (FFCA) required total cooperation among the Department of Energy (DOE), the involved States and interested stakeholders. Although the effort was time consuming, tedious and (at times) trying, the results obtained [Site Treatment Plans (STP)] were an unprecedented success. Through long-range planning, attention to details and organization of effort, a coordinated, cohesive, focused team was developed that included the DOE Headquarters, the Environmental Protection Agency (EPA), 40 DOE sites, 20 states and multiple interested stakeholders. The efforts of the FFCA team resulted in the preparation of 37 STPs which outline the methods, locations and schedules for the treatment and disposal of DOE's mixed wastes. The Plans provided a strong foundation upon which consent orders were prepared and approved. The FFCA approach also resulted in the development of working relationships that will prove not only useful but vital to the planning and implementation necessary to the successful clean-up and disposal of DOE's mixed waste.

13 V18/025397

Big "R-Weapons" Against the New Threat to Economic Security: Reindustrialization, Remanufacturing, and Reuse

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (5 pp.) (1997)

Waste management is a topic that becomes increasingly more important as markets become global. Organizations that are able to merge waste management objectives with their competitive strategies should attain a competitive advantage by lowering their product costs. Three strategic weapons can be used in today's business environment to obtain this desirable competitive advantage: reindustrialization, remanufacturing, and reuse. This paper discusses not only each of these weapons but also reasons for government assistance in private waste management. For this paper, the authors consider "waste" to be any materials input to the process that would not be required if the process were 100% efficient. In manufacturing, for example, a process that is 100% efficient transforms raw materials and energy into finished products containing no defects and has no raw materials or energy to spare.

14 V18/022794

Bringing the World Home: International Activities at the Department of Energy's Environmental Management Sites

Slate, S.; Flage, E.

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CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1487-1493) (1996)

The U.S. Department of Energy (DOE) has undertaken the monumental task of environmental cleanup at its many sites and facilities. To accomplish this effort more efficiently, the DOE has embarked on a program to develop new environmental technologies through private industry, its national laboratories, and its contractors. These new technologies will be lower cost, faster, or more effective than technologies currently available. DOE also realizes that many foreign countries have similar problems and possess developed technologies and scientific capabilities which are not available in the United States. The Department has made a wide variety of investments to access these technologies and capabilities and to work with the international community on several common environmental problems. This paper summarizes a set of papers that will be presented at a special session at Spectrum '96. These papers will describe recently completed and current international activities at each of the major DOE sites and at Headquarters, plans for additional activities, and lessons learned. They will also provide recommendations for improving the effectiveness of DOE's international initiatives.

15 V18/025508

CRESP at One Year

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CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 3-21) (1996)

The Consortium for Risk Evaluation with Stakeholder Participation (CRESP) is a university-based consortium led by the Environmental and Occupational Health Sciences Institute (EOHSI) in New Jersey and the School of Public Health and Community Medicine of the University of Washington (UW) in Seattle. Designed to be an independent, outside integrating institution on risk, CRESP was selected in DOE's 1994 Notice of Proposed Interest competition and awarded a five-year cooperative agreement on March 13, 1995. CRESP's mission is to inform protective and cost-effective cleanup and enhance stakeholder understanding of the nation's nuclear weapons production waste sites by improving the scientific and technical basis of environmental management decisions. Eight separate task groups, drawn from the two universities, have been established to organize research and operations for CRESP. One senior researcher from one of the two schools directs the overall CRESP effort for that task group. Each university is currently focusing its site-specific research on issues and concerns raised at either Hanford or Savannah River. CRESP's Independent Peer Review group, peer reviews CRESP's work and has agreed to provide a review of major risk-evaluation processes within Environmental Management at DOE.

16 V18/023545

Can Systematic, Integrated Risk Assessment with Full Stakeholder Participation Enhance Cleanup at DOE's Sites?

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CONF-941124; Insitu Remediation: Scientific Basis for Current and Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 25-30) (1994)

This paper was delivered as the 1994 Herbert M. Parker Lecture, the keynote address for the 33rd Hanford Symposium on Health and the Environment. It describes the proposed Consortium for Risk Evaluation and Stakeholder Participation (CRESP). The overall goal for the proposed Consortium is to help DOE meet its long-term needs for credible, neutral, systematic, iterative and integrated processes and methods for risk assessment, risk communication, and risk management decisions rooted in meaningful and respectful involvement of stakeholders. This kind of university-based consortium can be a methodological driver for responsiveness and for long-term change through an effective partnership with DOE and with the stakeholders. CRESP provides a systematic, integrated, comprehensive approach rather than a fragmented task-by-task approach managed directly by the program officials within DOE. Eight Task Groups are proposed, which are described in this paper: Stakeholder Communications, Health Hazard Identification; Ecological Hazard Identification; Exposure Assessment; Data Characterization and Statistics; Occupational Health; Remediation Technology and Evaluation; and, Risk Characterization

17 V18/021826

Case Studies of Regulatory Acceptance: Insitu Bioremediation Technologies

Colorado Center for Environmental Management, Denver, CO; Case Studies Task Group of the Interstate Technology and Regulatory Cooperation Working Group, Denver, CO Report; 55 pp. (February 1996)

This report is one of a series prepared by the federal advisory committee to Develop Onsite Innovative Technologies (DOIT). It discusses case studies in six states where institutional and regulatory barriers to implementation of insitu bioremediation (ISB) were overcome. The concept for this project arose out of the Interstate Technology and Regulatory Coordination (ITRC) Work Group, whose mission is to facilitate cooperation among the states when dealing with implementation of innovative technologies. The objectives for the conduct of the case studies are two-fold. The primary objective is to document and report how state regulatory agencies encourage use of innovative technologies for environmental restoration. The secondary objective is to determine whether the case study approach adopted by the Task Group would yield information useful to the states.

18 V18/024141

Catalytic Oxidation of Trichloroethylene and Perchloroethylene Mixtures

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ECOVA Corporation, Redmond, WA

CONF-9308137; Proceedings of the American Institute of Chemical Engineers 1993 Summer National Meeting, Seattle, Washington, August 15-18, 1993; (15 pp.) (1993)

Catalytic oxidation is one of the demonstrated treatment alternatives currently available for treatment of air born contaminants. Halogenated hydrocarbons, however, have been difficult to treat by catalytic oxidation due to the poisoning effects of halogens on conventional catalysts. Improvements in catalyst technology using precious metal hybrid formulations have increased the capability to treat halogens. The recalcitrant nature of perchloroethylene (PCE) has remained a challenge for catalytic treatment, until recently. Allied Signal has recently developed a new formulation to address the challenge of oxidizing PCE. In January 1993 this new catalyst was installed and tested in an oxidizer at the Savannah River Site in South Carolina. The catalytic oxidizer was connected to a vapor extraction system treating a mixture of trichloroethylene (TCE) at a concentration of approximately 80 ppm and PCE at approximately 150 ppm. Results of this operation verify the effectiveness of the new catalytic material in treating halogenated compounds in general, and PCE in particular.

19

V18/021528

Clean-Up at Nuclear Waste Sites

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CONF-960376 (Part 1); Proceedings of the 211th American Chemical Society (ACS) National Meeting, New Orleans, LA, March 24-28, 1996. ACS, Washington, DC, Part 1, 1172 pp.; (p. 129, Paper ANYL 3) (1996)

The radioactive and chemical waste generated from nuclear material production at Department of Energy sites over the last 50 years has created an uncertain environmental legacy. Special nuclear isotopes were produced with little regard for future cleanup cost, waste treatment and storage, and potential human and environmental damage. Today, this waste is found in underground tanks, buildings, and concrete basins, as well as in the soils and groundwater surrounding past nuclear fuel reprocessing plants and reactors. To remediate these sites, new strategies must be established that are anchored in environmental science and balance potential biological impacts with social benefits and cost. This talk summarizes the U.S. nuclear waste problems, the potential cost of cleanup, regulatory drivers, and the critical role scientists must play in developing sound cleanup policies and approaches. (Complete text)

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V18/023728

Complex-Wide Study on the Successful Integration of Pollution Prevention into the Environmental Restoration Program of DOE

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CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (15 pp.) (1996)

The U.S. Department of Energy (DOE) Environmental Restoration Program (EM-40) has generally produced an increase in waste generation rates at sites across the DOE complex. The contaminated media volume projections, as stated in the Baseline Environmental Management Report (BEMR), illustrate that the waste from EM-40 activities will dwarf the current DOE operational volumes if generated at the projected rate. EM-40 has recognized the need to reduce the waste volumes in order to reduce risks and costs associated with waste management. The most effective method to reduce waste volumes is to integrate pollution prevention (P2) principles into each remediation and decommissioning project. This study was performed to give a "snapshot" view of DOE's efforts to apply P2 to environmental restoration (ER). The study focused on fiscal years 1994 and 1995. Twenty-six DOE sites provided ninety-two case studies on successful integration efforts from the planning through the implementation phases of projects. Nineteen DOE sites provided a summary of P2 programmatic elements within the ER program at their site. These case studies and summaries were used to form conclusions and recommendations regarding the priority of P2 in ER programs and strategies to more effectively use P2 to reduce ER project wastes, costs, and liabilities. The results and conclusions presented in the following report are in draft stage. The final report will be issued after final reviews and concurrence by EM-40 management.

21

V18/023556

Cover and Liner System Designs for Mixed-Waste Disposal

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CONF-941124; Insitu Remediation: Scientific Basis for Current and Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 593-611) (1994)

Land disposal of mixed waste is subject to a variety of regulations and requirements. Landfills will continue to be a part of waste management plans at virtually all facilities. New landfills are planned to serve the ongoing needs of the national laboratories and U.S. Department of Energy (DOE) facilities, and environmental restoration wastes will ultimately need to be disposed in these landfills. This paper reviews the basic objectives of mixed-wastes disposal and summarizes key constraints facing planners and designers of these facilities. Possible objectives of cover systems include infiltration reduction; maximization of evapotranspiration; use of capillary barriers or low-permeability layers (or combinations of all these); lateral drainage transmission; plant, animal, and/or human intrusion control; vapor/gas control; and wind and water erosion control. Liner system objectives will be presented, and will be compared to the U.S. Environmental Protection Agency-U.S. Nuclear Regulatory Commission guidance for mixed-waste landfills. The measures to accomplish each objective will be reviewed. Then, the design of several existing or planned mixed-waste facilities (DOE and commercial) will be reviewed to illustrate the application

of the various functional objectives. Key issues will include design life and performance period as compared/contrasted to postclosure care periods, the use (or avoidance) of geosynthetics or clays, intermediate or interim cover systems, and soil erosion protection in contrast to vegetative enhancement. Possible monitoring approaches to cover systems and landfill installations will be summarized as well.

22

V18/021756

Crystalline Silicotitanates: New Ion Exchanger for Selective Removal of Cesium and Strontium from Radwastes

Dosch, R.G.; Klavetter, E.A.; Stephens, H.P.; Brown, N.E.; Anthony, R.G.

Sandia National Laboratories, Process Research Department, Albuquerque, NM; Texas A&M University, College Station, TX

SAND96-1929; 15 pp. (August 1996)

A new class of inorganic ion exchange material called crystalline silicotitanates (CST) has been developed for radioactive waste treatment in a collaborative effort between Sandia National Laboratories and Texas A&M University. The Sandia National Laboratories Laboratory Directed Research and Development program provided the initial funding for this effort and this report summarizes the rapid progress that was achieved. A wide range of compositions were synthesized, evaluated for cesium (Cs) removal efficiency, and a composition called TAM-5 was developed that exhibits high selectivity and affinity for Cs and strontium (Sr). Tests show it can remove parts per million concentrations of Cs(1+) from highly alkaline, high-sodium, simulated radioactive waste solutions modeled after those at Hanford, Oak Ridge, and Savannah River. In experiments with solutions that simulate highly alkaline Hanford defense wastes, the crystalline silicotitanates exhibit distribution coefficients for Cs+ of greater than 2,000 ml/g, and distribution coefficients greater than 10,000 ml/g for solutions adjusted to a pH between 1 and 10. In addition, the CSTs were found to exhibit distribution coefficients for Sr(2+) greater than 100,000 ml/g and for plutonium of 2,000 ml/g from simulated Hanford waste. Procedures for synthesis of the CST powder were scaled up from lab quantities to 800 grams per lot with material performance comparable to developmental materials. The technology for preparing TAM-5 CST was transferred through a Cooperative Research and Development Agreement to UOP, Des Plaines, IL. With minimal changes to the synthesis process, UOP scaled up the synthesis and produced a commercial 1,800-pound lot with ion exchange and chemical properties comparable to lab-prepared materials. The CST crystal structure was determined and positions of individual atoms identified using x-ray and neutron diffraction. The structural information has permitted identification of the ion exchange sites and provided insights into the strong effect of pH on Cs ion exchange. Information on the synthesis, composition, and structure of CST is considered proprietary and is not discussed in this report.

23

V18/023833

Current Status of the Federal Superfund Indemnification and Discussion of Trends in DOE and DOD Indemnification Practices

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Willis Corroon Environmental Risk Management Services, Nashville, TN

CONF-9306269; HazMat '93 International, Proceedings of the Eleventh Annual Environmental Management and Technology Conference and Exhibition, Atlantic City, NJ, June 9-11, 1993. Advanstar Expositions, Glen Ellyn, IL, 731 pp.; (pp. 592-601) (1993)

The enactment of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund) (CERCLA) (Public Law 96-510) following closely on the heels of the Resource Conservation Act (RCRA) of 1976 (Public Law 94-580) established a new realm of opportunities and exposures for environmental engineers and contractors. The mandated management and cleanup of hazardous waste sites under these laws established tremendous business opportunities for firms willing to provide hazardous waste services. However, an unwanted side effect of their push for environmental protection was the exposure of contractors to potentially, unlimited liabilities during the performance of clean-up activities. Contractors normally assess and manage risks associated with specific projects through insurance and the pricing of their work. Unfortunately, the field of hazardous waste remediation is still in its infancy and accurately assessing the potentially catastrophic risks is still a developing art form. To compound the risk management problem, the normal insurance products used to transfer risk, Commercial General Liability (CGL) and Professional Errors and Omissions (E&O), started to exclude coverage for pollution incidents about the same time. This left the remediation firms without a satisfactory method to handle the risks. The contractors' response was to request indemnification for pollution liabilities arising from the remediation work. The responses from the various Federal Agencies have been mixed and have varied over the years. The body of this paper will explore the different approaches to sharing pollution liability risks taken by the major Federal Agencies involved in clean-up activities.

24

V18/024235

DOE Forges Partnerships for Environmental Cleanup

Sink, C.H.; Frank, C.W.

U.S. Department of Energy, Washington, DC

Forum for Applied Research and Public Policy 11(3):65-69 (Fall 1996)

After 45 years of weapons production, the U.S. Department of Energy faces the daunting challenge of cleaning up its hazardous, radioactive, and mixed wastes. But it is not facing the task alone. Instead, DOE is calling on the private sector to help develop new, innovative technologies, say Claire H. Sink, senior technology policy advisor, and Clyde W. Frank, deputy assistant secretary for science and technology with DOE's Office of Environmental Management in Washington, D.C. "Such collaboration...provides opportunities for the nation's research sector to make valuable contributions to U.S. economic competitiveness through development of technologies with extensive applications both in the United States and abroad," the authors maintain. Ideally, new technologies created in the private sector will allow companies to compete globally in the growing market for environmental cleanup.

25

V18/022286

DOE Pollution Prevention in the 21st Century - Proceedings of the Twelfth Pollution Prevention Conference, Chicago, IL, July 9-11, 1996

Argonne National Laboratory, Argonne, IL; U.S. Department of Energy, Office of Environmental Management, Washington, DC; U.S. Department of Energy, Chicago Operations Office, Argonne, IL

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996 (1996)

This document presents abstracts from the conference, DOE Pollution Prevention in the 21st Century. The organizers attempted to bring together people from DOE; DOE contractors; private industry; and federal, state, and local government to identify the path to the next century. The DOE Forum presented a unique discussion of the future of the waste management organization within DOE. Topics included: model facilities; Federal/NEPA/stakeholders; microchemistry; solvents and reduction; education and outreach; return on investments; energy management; decontamination and decommissioning; planning and regulations; environmental restoration; recycling; affirmative procurement in the executive branch; construction and demolition; materials exchange; and ISO 2000. This year's conference presented a wide variety of ideas, concepts, and technology for participants to take home and implement and develop. In keeping with the philosophy of pollution prevention, most of the correspondence and paper reviews was conducted electronically. The proceedings are being published on CD-ROM. The format of the meeting differed from that of previous years - two poster sessions were added, and four forums or panel discussions highlighted important issues.

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V18/023398

Department of Energy's Remediation Program: New Strategies and Progress

Lehr, J.C.

U.S. Department of Energy, Washington, DC

CONF-9606300; HazMat International '96, Proceedings of the 14th Annual Environmental Management and Technology International Conference, Atlantic City, NJ, June 18-20, 1996. Advanstar Expositions, Duluth, MN, 527 pp.; (pp. 487-496) (1996)

The Department of Energy's (DOE's) Office of Environmental Restoration addresses radioactive, hazardous, and mixed wastes at more than 130 locations in 33 states. These wastes are the legacy of the cold war, resulting from nuclear materials research, development, production, or processing activities, and early activities in support of the commercialization of nuclear power. These wastes include: soil contaminated from spills or previous disposal practices which were acceptable in their day, but do not meet today's more stringent requirements; groundwater that may have been contaminated as a result of these spills or previous disposal practices; and buildings that no longer serve a useful function. More than 2.2 million acres of land and more than 2,700 acres of buildings have been or are scheduled to be addressed by the Environmental Restoration Program. The mission of the Environmental Restoration Program is to protect human health and

the environment from risks posed by inactive and surplus DOE facilities and contaminated areas, and remediate sites and facilities in the most cost efficient and responsible manner possible for future beneficial use.

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V18/022707

Design and Implementation of the Protective Cap/Biobarrier Experiment at the Idaho National Engineering Laboratory

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CONF-941124; Insitu Remediation: Scientific Basis for Current and Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 359-377) (1994)

The Protective Cap/Biobarrier Experiment (PCBE), initiated in 1993 at the Idaho National Engineering Laboratory (INEL), is a strip-split plot experiment with three replications designed to rigorously test a 2.0-m loessal soil cap against a cap recommended by the US Environmental Protection Agency and two caps with biological intrusion barriers. Past research at INEL indicates that it should be possible to exclude water from buried wastes using natural materials and natural processes in arid environments rather than expensive materials (*geotextiles*) and highly engineered caps. The PCBE will also test the effects of two vegetal covers and three irrigation levels on cap performance. Drainage pans, located at the bottom of each plot, will monitor cap failure. Soil water profiles will be monitored biweekly by neutron probe and continuously by time domain reflectometry. The performance of each cap design will be monitored under a variety of conditions through 1998. From 1994 to 1996, the authors will assess plant establishment, rooting depths, patterns of moisture extraction and their interactions among caps, vegetal covers, and irrigation levels. In 1996, they will introduce ants and burrowing mammals to test the structural integrity of each cap design. In 1998, the authors will apply sufficient water to determine the failure limit for each cap design. The PCBE should provide reliable knowledge of the performances of the four cap designs under a variety of conditions and aid in making hazardous-waste management decisions at INEL and at disposal sites in similar environments.

28

V18/022791

Dynamic Partnership: A New Approach to EM Technology Commercialization and Deployment

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DOE/MC/31388-97/C0832; CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.;

(pp. 1452-1456) (1996)

The cleanup of nuclear defense complex sites under the U.S. Department of Energy (DOE) Environmental Management (EM) Program presents an unprecedented challenge to the environmental sector. Effective and efficient cleanup of EM sites requires the timely development of modification of cleanup technologies. Facilitating the development of technologies to meet DOE goals for site cleanup is the responsibility of EM-50, the EM Program Office of Science and Technology. However, efforts are often arrested at the "valley of death," the general term for barriers to demonstration, commercialization, and deployment. The Energy & Environmental Research Center (EERC), a not-for-profit, contract-supported organization focused on research, development, demonstration, and commercialization (RDD&C) of energy and environmental technologies, is in the second year of a Cooperative Agreement with DOE's Morgantown Energy Technology Center (METC) designed to deliver EM technologies into the commercial marketplace through a unique combination of technical support, real-world demonstration, and brokering. This paper profiles this novel approach, termed "Dynamic Partnership," and reviews the application of this concept to the ongoing commercialization and deployment of four innovative cleanup technologies.

29 V18/023516

Environmental Cleanup Privatization Products and Services Directory: Treatment, Characterization, and Extraction/Delivery/Materials Handling - Second Edition

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM; U.S. Department of Energy, Grand Junction Office, Grand Junction, CO

GJO-96-3TAR; GJO-122; 835 pp. (January 1997)

The U.S. Department of Energy has undertaken an ambitious "Ten Year Plan" for the Weapons Complex, an initiative to complete cleanup at most nuclear sites within a decade. This Second Edition of the Directory is designed to facilitate privatization which is a key to the success of the Plan. The Directory is patterned after the telephone Yellow Pages. Like the Yellow Pages, it provides the user with points of contact for inquiring further into the capabilities of the listed companies. This edition retains the original format of three major sections under the broad headings: Treatment, Characterization, and Extraction/Delivery/Materials Handling. Within each section, companies are listed alphabetically. Also, "company name" and "process type" indices are provided at the beginning of each section to allow the user quick access to listings of particular interest. This edition has been expanded to include more than 500 domestic and international commercial firms currently operating in the environmental cleanup market. Both the number of listings and the breadth of products and services included will be increased in future editions, as information about the rapidly growing cleanup industry becomes available.

30 V18/025365

Environmental Justice and Federal Facility Environmental Restoration: An Emerging Partnership

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

The environmental protection policy in the United States was challenged by studies of solid waste facilities in Houston conducted by Dr. Robert D. Bullard of Texas Southern University in 1979 and a series of events that began in the early 1980s. Professor Bullard found that nearly all of the solid waste facilities in Houston were located in predominantly black neighborhoods. In 1983, the General Accounting Office surveyed locations of hazardous waste landfills in the southeastern United States. The GAO found that blacks make up the majority of the population in three of the four communities where the landfills are located. The GAO also found that at least 26 percent of the population in all four communities have incomes below the poverty level and that most of this population is black. In 1987 the Commission for Racial Justice of the United Church of Christ released "Toxic Waste and Race in the United States: A National Report on the Racial and Socio-Economic Characteristics of Communities with Hazardous Waste Sites." That report was the first national study to establish a clear link between race and the siting of toxic waste facilities. It found that people and communities of color face a disproportionate risk of exposure to toxic materials and hazardous waste sites. The findings include: (1) Race proved to be the most significant factor among variables tested in association with the location of commercial hazardous waste facilities; (2) Communities with the greatest number of commercial hazardous waste facilities had the highest composition of residents of racial and ethnic minorities; and (3) Three of the five largest commercial hazardous landfills in the United States are located in predominantly Black or Hispanic communities. The most prominent response to the GAO and UUC studies was a conference held at the University of Michigan in January 1990 in which grassroots activists, academics, mainstream environmentalists and government officials from across the country presented and discussed papers concerning environmental justice issues from a variety of perspectives.

31 V18/021527

Environmental Restoration Contractor Resource Conservation and Recovery Act Permit Implementation Plan [Rev. 1]

Lewis, R.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00217-Rev.1; 21 pp. (May 1996)

This document contains the revised Environmental Restoration Contractor (ERC) Implementation Plan for compliance with the Dangerous Waste and Hazardous and Solid Waste Amendment portions of the Resource Conservation and Recovery Act (RCRA) Permit for the Treatment, Storage, and Disposal of Dangerous Waste (hereafter referred to as the "Permit"). The Permit became effective on September 28, 1994. The ERC has developed the Permit Implementation Plan to ensure that the Permit is properly implemented within the ERC project and functions. The plan contains a list of applicable permit conditions, descriptions, responsible organizations, and the status of compliance. The ERC's responsibilities for Permit implementation are identified within both project and functional organizations. Project Managers are responsible for complying with conditions specific to a particular

treatment, storage, or disposal (TSD) unit. TSD-specific compliance include items such as closure plan deliverables, reporting and record keeping requirements, or compliance with non-unit-specific tasks such as spill reporting and emergency response. Functional organizations are responsible for sitewide activities, such as coordinating Permit modifications and developing personnel training programs.

32 V18/022352

Environmental Restoration Program - Project Manager's Handbook: Volume 1 - Management Control System Description for Environmental Restoration Projects

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN
ES/ER/TM-139/V1; 110 pp. (October 1996)

This Management Control System (MCS) description addresses the application of the fundamental management elements necessary for appropriate planning and control of ER projects. MCS elements include program development, budget formulation, task development, task performance, reporting, and task revisions. These elements encompass the areas of planning; budgeting; scheduling; establishing technical, schedule and cost baselines, work authorizations; accounting practices; funds management; performance measurement; reporting and evaluation of data; and technical, schedule, and cost baseline change control. The integrated execution of these management controls provides a hierarchical set of reports for analysis, control actions, and historical records which can be used for technical, schedule, and financial decision making. The primary purpose of the MCS is to provide a tool to help meet the technical performance objectives of the ER Program within cost and schedule commitments. This MCS description provides a series of steps and methodologies to effectively manage ER projects and tasks. The MCS provides the Energy Systems project manager and the project team with tools to manage assigned work within the requirements of the ER Program. Collectively, these tools are designed to provide essential data, system discipline, and reporting timeliness necessary to satisfy internal Energy Systems management needs and external reporting requirements.

33 V18/022956

Environmental Restoration Program - Project Manager's Handbook: Volume 3 - Development and Execution of Incentive Task Order Contracts for Environmental Restoration Projects

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN
ES/ER/TM-139/V3; 125 pp. (February 1997)

The third volume of the Environmental Restoration (ER) Project Manager's Handbook is a guide for project managers in the Lockheed Martin Energy Systems, Inc., ER Program to use in the development and execution of Incentive Task Order (ITO) contracts. Along with Volumes 1 and 2 of the Project Manager's Handbook, which address funding and project finance issues and Comprehensive Environmental Response, Compensation, and Liability Act compliance aspects of ER projects, respectively, the information presented in Volume 3 provides a step-by-step description of the requirements for successful project development and implementation using ITOs. Chapters 1-11 discuss the various aspects of ITO development and implementation; Appendixes A, C,

D, E, F, and H provide examples of ITO-related materials; and Appendix B is a complete ITO project plan template.

34 V18/021938

Environmental Restoration Remedial Action Work Breakdown Structure

Logistics Management Institute, McLean, VA
Report; 125 pp. (December 1994)

This document presents a standard work breakdown structure (WBS) for the remedial action (RA) portion of the environmental restoration process. It is designated the RA-WBS. A standard WBS is a comprehensive list of elements (tasks, items, or products) that may be required to accomplish a project. Typically, that list defines each element, including its unit of measure, and assigns it a number. The list organizes the elements in a way that looks much like a family tree. That is, related items are grouped together to form a hierarchy. The lower the level on the hierarchy, the more detailed the elements become. With a tool such as a standard WBS, a user can identify the scope of a particular project by selecting from the standard WBS only those elements appropriate for that project. The resulting project-specific WBS can then be used as the basis for estimating costs and planning schedules and later for managing and controlling the project.

35 V18/022561

Environmental Sciences Division: Summaries of Research in FY 1995

U.S. Department of Energy, Office of Energy Research,
Washington, DC

DOE/ER-0693T; 321 pp. (September 1996)

This report focuses on research in global change, as well as environmental remediation. Global change research investigates: distribution and balance of radiative heat energy, identification of the sources and sinks of greenhouse gases, and prediction of changes in the climate and concomitant ecological effects. Environmental remediation develops the basic understanding needed to remediate soils, sediments, and groundwater that have undergone radioactive and chemical contamination. The environmental remediation section of this document covers the Subsurface Science Program (SSP), Microbial Genome Research, and the Environmental Radon Program, and describes individual projects within these categories.

36 V18/025321

Evolution of the Environmental Management Ten-Year Plan Initiative

Bubar, P.M.; Schmitt, E.; Tonkay, D.

U.S. Department of Energy, Washington, DC

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (4 pp.) (1997)

The Environmental Management (EM) Program has developed a Ten-Year Plan based on a vision that cleanup at most sites can be achieved in a decade, with some remaining waste streams (primarily high-level waste and transuranic waste) at a few sites. The Plan sets

forth specific time tables and costs, restructuring most work in projects that contribute directly to achieving site cleanup. The Plan builds on previous strategic planning, such as the Baseline Environmental Management Report, taking advantage of breakthrough opportunities to achieve the vision. The new vision and Ten-Year Plan are guiding strategic thinking and decision making. The Plan will serve as a baseline to monitor progress throughout the next decade. Each EM site is currently developing a Ten-Year Plan, which collectively will make up the EM Ten-Year Plan. The EM Ten-Year Plan will provide a cross-cutting program view. This paper discusses the origin and evolution of the Ten-Year Plan initiative from a Headquarters perspective. Next steps include further implementation of the integrated strategic planning, budgeting, and management system of which the Plan is a cornerstone. The Plan will be revised annually to reflect future budget and scope changes.

37 V18/021984

Expedited Site Characterization

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CONF-9509139; Emerging Technologies in Hazardous Waste Management VII, D.W. Tedder (ed.), Proceedings of the Seventh American Chemical Society Industrial and Engineering Chemistry Division Special Symposium, Atlanta, GA, September 17-20, 1995. American Chemical Society, Washington, DC, 1291 pp.; (pp. 105-109) (1995)

Expedited Site Characterization (ESC) is a scientific methodology for determining the distribution of hazardous substances and the most probable fate of those substances at a contaminated site. The DOE's Office of Technology Development has supported application of ESC to DOE sites because of its effectiveness integrating new technologies into real world site characterizations. ESC begins with a thorough evaluation of existing data and the formulation of a site conceptual model. Site hydrogeology is then determined from geophysical, geochemical, and other measurements. Hydrogeologic understanding guides the search for free and aqueous phase contaminants in the subsurface. Non- and minimally-invasive measurement technologies and field contaminant analysis are stressed. ESC is performed by an experienced, multidisciplinary team that conducts field investigations as a team. The field investigation follows a dynamic workplan that retains a maximum of flexibility to optimize measurements in the field. Measurement results are integrated and modeled in real time in the field. ESC has been successfully applied to USDA, DOE/BLM, DOE, and DoD sites. It is 50-70% less costly and requires 50-60% less time than traditional site characterization. ESC is an evolving methodology developed by Argonne National Laboratory under the sponsorship of the U.S. Department of Agriculture.

38 V18/021790

Feasibility Testing for the Onsite Bioremediation of Organic Wastes by Native Microbial Consortia

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Ringelberg, D.B.; Bienkowski, P.R.; White, D.C.

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International Biodeterioration and Biodegradation 33:41-59 (1994)

Microbial consortia capable of degrading chlorinated hydrocarbons and organic solvents may exist in many contaminated sediments. These native microbial communities with the capability to bioremediate toxicants on-site may prove to be a resource during remediation efforts. For this study, microbial consortia capable of degrading trichloroethylene (TCE) and mixtures of chlorinated and aromatic toxicants were enriched from contaminated sediments and the feasibility of their participation in on-site bioremediation was examined. Batch studies were used to monitor changes in the microbial community structure by monitoring signature fatty acid biomarker trends during TCE degradation. Experimental bioreactors, which utilized sand as a support matrix for the microbial community, were constructed to study TCE and organic mixed waste degradation. In continuously recycled expanded-bed bioreactors and a single-pass packed-bed reactor, mixtures of organic wastes were degraded including: benzene, xylene, toluene, tetrachloroethylene, trichloroethylene, dichloroethylenes and vinyl chloride. Degradation proceeded to greater than 99% depletion for many contaminants. Bioreactors were stable over an 18-month period of operation while using propane or methane plus propane as energy sources and oxygen as the electron acceptor. Biodegradation was most efficient when the bioreactors were pulsed-fed, maintaining the consortia in suboptimal conditions. For the single-pass packed-bed reactor, metabolic efficiencies of 20-70 μmol substrate per μmol TCE degraded were observed for pulse-feeding regimes while continuous substrate availability experiments required more than 180 μmol substrate per μmol TCE. Continuous feeding experiments utilizing mixtures of organic wastes showed metabolic efficiencies of 83-240 μmol substrate utilization per μmol total organic wastes degraded. These results demonstrated efficient and simultaneous degradation of organic solvents and chlorinated hydrocarbons by environmentally derived microorganisms in laboratory reactors.

39 V18/022465

Focused Remedial Investigations: A Discussion of Emerging Approaches for HTRW Sites

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CONF-9403133; Innovative Solutions for Contaminated Site Management, Proceedings of a Water Environmental Federation Conference, Miami, FL, March 6-9, 1994; (pp. 1-9) (1994)

The original intent of the cleanup requirements in Comprehensive Environmental Response, Compensation, and Liability Act issued in 1980 and Resource Conservation and Recovery Act issued in 1976 was to document planning, implementation, and reporting in support of the final remedial action at hazardous waste sites. During the implementation of these two programs it has been realized by regulators, private sector, and federal agencies that a lot of money

is being spent and not enough remediation/site cleanup is being accomplished. Funds were being spent primarily to investigate and document the problem instead of remediation/site cleanup with increasing cost of research and development for new and innovative technologies. In February 1989 a directive (9355.3-06) was issued by the Environmental Protection Agency (EPA) on Remedial Investigation/Feasibility Study streamlining which recognized the need for improving this process so that remediation/site cleanup could occur quicker at a Superfund site. This directive endorses the observational method or more frequently called "observational approach" which will be the primary focus of this article. The use of the observational approach in RI planning at a site located at a Department of Energy (DOE) facility is discussed to demonstrate its use and contrast to the "traditional approach." There is also discussion of DOE's Streamlined Approach for Environmental Restoration and EPA's Superfund Accelerated Cleanup Model.

40 V18/021404

Guide to Stakeholder Participation Processes for Site Cleanup, Technology Demonstrations, and Other Environmental Projects

Marcel, K.W.; Belsten, L.A.

Colorado Center for Environmental Management, Denver, CO

Report; 80 pp. (1995)

This report is one of a series prepared by the Colorado Center for Environmental Management (CCEM) to incorporate stakeholders into environmental activities. Stakeholder processes are increasingly being used in remediation, siting, technology demonstration, and other environmental projects. The purpose of this report is to offer guidance to parties seeking to develop site-specific stakeholder participation processes. A stakeholder process must be adapted to the goals, needs, and conditions of a particular site. This report describes four stakeholder approaches currently being used in the environmental remediation and technology selection and demonstration contexts. While similar in theme and purpose, the processes differ in structure, organization, and the concerns that led to specific procedural choices. The four approaches described here are: The Technology/Regulatory Integration Project (TRIP) developed by the CCEM for the DOE Office of Technology Development, The Western Governors' Association's (WGA) Committee to Develop Onsite Innovative Technology (DOIT) Stakeholder Involvement Process; Recommendations for stakeholder approaches at contaminated federal facility sites from the Interim Report of the Federal Facilities Environmental Restoration Dialogue Committee (FFERDC), and The Battelle/Pacific Northwest Laboratory (Battelle) for the US DOE, Office of Technology Development, developed for the Volatile Organic Compound (VOC) Arid Site (VOC-ARID) Integrated Demonstration. These approaches offer an array of options from which to choose and factors to consider in designing and implementing an effective process.

41 V18/022147

How the US DOE is Absorbing ER Budget Cuts

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U.S. Department of Energy, Office of Environmental

Management, Washington, DC

Nuclear Engineering International 40(495):14-16 (October 1995)

Although it is still fairly young, the Environmental Restoration (ER) program within the Office of Environmental Management in the US DOE has seen many changes since its creation in 1989. It is currently being re-focused to meet the President's objective to decrease budgets and is directing its emphasis to cost controls and cost-effectiveness, while addressing the legacy of the Cold War.

42 V18/022762

Identifying and Overcoming Barriers to Technology Implementation

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CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1150-1158) (1996)

In a recent General Accounting Office report, the Department of Energy's (DOE) Office of Environmental Management was found to be ineffective in integrating their environmental technology development efforts with the cleanup actions. As a result of these findings, a study of remediation documents was performed by the Technology Applications Team within DOE's Office of Environmental Restoration (EM-40) to validate this finding and to understand why it was occurring. A second initiative built on the foundation of the remediation document study and evaluated solutions to the ineffective implementation of improved technologies. The Technology Applications Team examined over 50 remediation documents (17 projects) which included nearly 600 proposed remediation technologies. It was determined that very few technologies are reaching the Records of Decision documents. In fact, most are eliminated in the early stages of consideration. In addition, nearly half of the "document trains" analyzed did not include an evaluation of an innovative technology during any phase of the decision process. These observations stem from regulators' and stakeholders' uncertainties in cost and performance of the technology and the inability of the technology to meet site specific conditions. The Technology Applications Team also set out to identify and evaluate solutions to barriers to implementing innovative technology into the DOE's environmental management activities. Through the combined efforts of DOE and the Hazardous Waste Action Coalition (HWAC), a full day workshop was conducted at the annual HWAC meeting in June 1995 to solve barriers to innovative technology implementation. Three barriers were identified as widespread throughout the DOE complex and industry, and the barriers were ones for which solutions could be readily defined and developed. Identified barriers included a lack of verified or certified cost and performance data for innovative technologies; risk of failure to reach cleanup goals using innovative technologies; and communication barriers that are present at virtually every stage of the characterization/remediation process from development through implementation. Based on the results of the HWAC conference, the Technology Applications Team is

currently working to overcome barriers using the solutions identified at the forum. Several activities have been initiated including an evaluation on providing incentives; an examination of possible organizations that could provide innovative technology verification/certification; and effective identification and delineation of problems before developing innovative solutions.

43

V18/025364

Implementation of the U.S. Department of Energy's Environmental Justice Strategy Executive Order 12898

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U.S. Department of Energy, Washington, DC

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (5 pp.) (1997)

This paper presents an outline of ongoing program activities to implement the Department of Energy's (DOE) Environmental Justice Strategy. The relationship to existing legislation and regulations, as well as methods to institutionalize environmental justice into DOE's public participation activities, the recognition of appropriate government entities, human health research, safety and risk reduction and effective methods of communicating environmental issues and risk information to our stakeholders are described.

44

V18/025345

Increasing Role of State-Developed, Contaminant-Specific Standards in Remediation of Nuclear Waste Sites

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (10 pp.) (1997)

This paper reviews the increasing role of state-established, contaminant-specific remediation standards in environmental cleanup of nuclear waste sites and discusses how the development of such standards has varied from U.S. Environmental Protection Agency (EPA) standards and guidelines. The paper describes the overall regulatory processes applicable to environmental cleanup at U.S. Department of Energy (DOE) Weapons Complex sites; describes the regulatory criteria which provide the framework for the development of preliminary remediation goals and final remediation levels under the Comprehensive Environmental Response, Compensation, and Liability Act, and for the development of action levels and media cleanup standards under the Resource Conservation and Recovery Act; and describes the role of states and state-derived standards in these processes. States which have to date established their own numeric standards and/or guidance regarding contaminant-specific exposures by media and their human use are identified, and a description is provided regarding how the various state-developed standards and/or guidance differ from and/or supplement EPA standards. The paper then provides examples of methodological approaches that have been used by states to develop

general and DOE site-specific cleanup standards, and describes how such approaches are similar to and/or different from established methodologies recommended by EPA.

45

V18/020978

Integrated, Flexible Approach to Health and Safety in an Environmental Restoration Program

Danz, R.; Klenk, B.G.

U.S. Department of Energy, Washington, DC

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (9 pp.) (1996)

The Department of Energy (DOE)/Nevada Environmental Restoration Project is comprised of several subprojects which include many dissimilar activities ranging from remediating radioactively contaminated soils on Alaska's western coast, to decontamination and decommissioning activities at the Nevada Test Site. In order to include all these activities in the same health and safety program, the Environmental Restoration Division of the DOE Nevada Operations Office has developed a tiered approach to its health and safety plans. There is an "umbrella" health and safety plan that provides background details of the program and procedures, which is then integrated with site-specific health and safety plans that cover details such as site hazards, history, and personal protective equipment. Working together, these two plans provide the necessary framework to do work safely. The site-specific health and safety plan contains all information required by 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response," in abbreviated form. This "user friendly" format is computerized and is completed by checking boxes, filling in blanks, and making brief statements. The site-specific plan is deliberately designed to exclude details that have no relevance to specific information about an individual location. The site-specific health and safety plan format is deliberately simple and is not easily adaptable to complex operations. Therefore, multiple, task-specific, site-specific health and safety plan forms may need to be compiled to address individual activities for complex operations. However, similar activities at different sites may be grouped under a single, site-specific health and safety plan if the hazards and protective measures are closely related. This integrated approach has been applied to both large and small federal sites; treatment, storage, and disposal facilities; and commercial hazardous waste operations with equal success. The articulated health and safety plan is a cost-effective solution to the drivers of environmental restoration activities associated with multiple regulatory requirements, complex combinations of large- and small-scope operations, and diverse organizations.

46

V18/023757

Integrating Waste Minimization/Waste Management Functions into the Remediation Process

Frink, N.; Allmon-Burns, L.A.

Fernald Environmental Restoration Management Corporation, Cincinnati, OH

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the

Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (p. 78) (November 1995)

Applying waste minimization principles at a remediation site is a challenge for many companies. We are required to practice waste minimization and pollution prevention, but how is it achieved at a site where waste generation is thought to be a key product? Environmental remediation is designed to correct adverse impacts to the environment from past operations and will generate significant amounts of waste requiring management. The premise of pollution prevention is to not generate waste, thus remediation is in direct conflict with this premise. Innovative applications must be utilized to achieve a reduction in the amount of waste that must be managed or dispositioned. The challenge is to shift the waste minimization paradigm from focusing efforts on source reduction to focusing on recycle/reuse by inverting the EPA waste management hierarchy. A fundamental difference at remediation sites is that source reduction has limited applicability to legacy wastes but can be applied successfully on secondary waste generation. The bulk of measurable waste reduction will be achieved by the recycle/reuse of primary wastes and by segregation and decontamination of other wastestreams. Each effort must be carefully measured in terms of being economically and ecologically beneficial. Structuring a successful, dynamic Waste Minimization Program produces a mechanism to set the paradigm shift in motion. The program must be comprehensive, integrated, and proactive in order to capture opportunities early in the CERCLA/RCRA process. The program must also develop meaningful performance measures to accurately account for reductions in secondary waste. Waste minimization opportunities are identified during each phase of the CERCLA/RCRA process. Integration of key elements of the waste management program into these processes provide the catalyst to implement the waste minimization actions. Waste minimization personnel are involved in all phases of the project to coordinate, promote, identify, plan, and implement in the field all waste minimization opportunities. Design, Engineer, and Construction Teams offer invaluable access to all aspects of the remediation project. Source reduction opportunities are identified in the remedial design phase for secondary wastes generated from decontamination activities, radiological area access control, waste packaging activities, and procurement of materials/chemicals. Implementation of these opportunities dramatically reduces the amount of wastes generated during decontamination and decommissioning (D&D) activities. Recycle/reuse opportunities are identified for the majority of primary wastes including structural steel, lead flashing, transite, and concrete. The decision to recycle is based on the life-cycle cost of the waste to the Department of Energy including disposal costs and on the decision to be responsible, ecologically, for waste management.

47

V18/023580

Involving the Public in Decision-Making at Federal Facilities: The Department of Energy Experience

Gesalman, C.M.

CONF-951023 (Vol. 8); WEFTEC '95, Proceedings of the 68th Annual Conference and Exposition of the Water Environment Federation, Miami Beach, FL, October 21-25, 1995. Water Environment Federation, Alexandria, VA, Vol. 8, 498 pp.; (p. 479) (1995)

The Department of Energy is involved in cleanup of a wide variety of sites used in the development and production of nuclear weapons. Substantial and increasing efforts have been made to involve the public in the planning and implementation of the cleanup projects. Early in the program, public participation was mainly an information transfer effort. More recently, innovative techniques have been used to increase public understanding of the tradeoffs required in making cleanup decisions (e.g., more stringent cleanup standards lead to higher costs). Sites now realize that relationships are key and are working to develop them. Advisory boards have been established at several sites. The methods of forming the boards have varied from site to site, as have the size of the group and the issues addressed. The effectiveness of the boards in their goal of improving public participation at the sites will be evaluated in the next fiscal year. DOE has sought public input on an increasing number of issues, such as future use of its facilities, environmental justice concerns, and budget development. Assumptions about future use of sites are crucial to setting realistic cleanup standards and controlling costs. Decisions made in the early phases of the budget process are now based in part on stakeholder input regarding priorities; for example, stakeholder concerns about and support for emphasizing plutonium cleanup at Rocky Flats have led to changes in priorities between the materials stabilization and environmental restoration programs. Environmental justice has become an increasing issue; sites must ensure that public participation programs effectively reach minority and low-income populations. (Complete text)

48

V18/021139

Lack of Consistency in State RCRA Programs: A Threat to Regulatory Reform Affecting DOE

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (12 pp.) (1996)

The Resource Conservation and Recovery Act (RCRA) regulatory reform process is threatened by the failure of the Environmental Protection Agency (EPA), States, and the regulated community to address the contradiction between: (1) the requirement that RCRA regulations in authorized State programs be consistent with the Federal program and other authorized State programs, and the prerogative of States to promulgate RCRA regulations that are more stringent and broader in scope than the Federal RCRA regulations. Assigning primacy to stringency, which has been EPA's practice in recent RCRA rules containing regulatory reform elements, appears to ignore the legislative history of RCRA, EPA's own regulations, and relevant court decisions. Failure to address this problem jeopardizes the possibility that certain forms of the Department of Energy's mixed waste may qualify for disposal at radioactive waste disposal facilities. As a first step, this paper recommends that the contradiction between consistency and stringency be addressed in regulatory preambles and other appropriate forums. If the contradiction is not addressed, RCRA's ultimate goal, protection of human health and the environment, may be compromised.

49

V18/025305

Leveraging Resources Across DOE Sites for Faster and More Economical Cleanups

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (4 pp.) (1997)

Leveraging resources across DOE sites means sharing resources, avoiding duplication, and taking advantage of technology irrespective of where it was invented. Historically, DOE's numerous sites have been operated like independent silos; however, with the evolving mission of these sites and with more focus on cleanup rather than on production, opportunities for leveraging resources are right in front of us. Two factors that allow for resource leveraging are the DOE's Contract Reform initiatives and the entry of firms like ours into this growing market - firms that have the experience to integrate activities at multiple sites, leveraging the resources of those sites to create more business opportunities for the customer at that site, for other customers in our business, and, most importantly, for our employees. We will meet the challenge of faster and more economical cleanups by taking advantage of the human potential at these sites, motivating people, and creating a vision for the future. Only through working together will we, the contractor community, labor, and DOE, achieve our goal of "doing more for less."

50

V18/023844

Linking Legacies: Connecting the Cold War Nuclear Weapons Production Processes to Their Environmental Consequences

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0319; 230 pp. (January 1997)

In the aftermath of the Cold War, the United States has begun addressing the environmental consequences of five decades of nuclear weapons production. In support of this effort, the National Defense Authorization Act for Fiscal Year 1995 directed the Department of Energy (DOE) to describe the waste streams generated during each step in the production of nuclear weapons. Accordingly, this report responds to this mandate, and it is the Department's first comprehensive analysis of the sources of waste and contamination generated by the production of nuclear weapons. The report also contains information on the missions and functions of nuclear weapons facilities, on the inventories of waste and materials remaining at these facilities, as well as on the extent and characteristics of contamination in and around these facilities.

51

V18/021529

Nuclear Waste: Greater Use of Removal Actions Could Cut Time and Cost for Cleanups - Report to the Chairman, Subcommittee on Military Procurement, Committee on National Security, House of Representatives

U.S. General Accounting Office, Resources, Community and Economic Development Division, Washington, DC

GAO/RCED-96-124; 25 pp. (May 1996)

The authors examined DOE's use of removal actions to reduce the cost and accelerate the pace of environmental restoration. Specifically, the authors examined whether removal actions have been successful as an alternative to other environmental restoration processes in reducing time, reducing costs, or providing other benefits. The authors also examined the extent to which DOE is using removal actions at its facilities and the factors that limit the greater use of this approach. The authors focused their review on five DOE facilities - Hanford in Washington State, Savannah River in South Carolina, Oak Ridge in Tennessee, Rocky Flats in Colorado, and the Idaho National Engineering Laboratory in Idaho.

52

V18/025444

Nuclear Weapons Production Complex: Environmental Compliance and Waste Management (90074)

Holt, M.

Congressional Research Service, Washington, DC

Report; 15 pp. (January 17, 1997)

The aging nuclear weapons production complex, managed by the Department of Energy (DOE), faces enormous environmental and waste management problems. Several hundred billion dollars may be needed to clean up leaking waste pits, groundwater contamination, growing accumulations of radioactive waste, and uncontrolled liquid discharges at DOE facilities. DOE's cleanup program is carried out by the Office of Environmental Management (EM). Cleanup funding escalated rapidly after the end of the Cold War, although it has leveled out at about \$6 billion per year under the Clinton Administration. Congress has expressed growing concern about the rising costs of DOE's cleanup program. A major cost driver has been environmental regulations and cleanup schedules that the Department is required to meet, although DOE also has been accused of poorly managing many projects and allowing costs to escalate unnecessarily. DOE's environmental program consists of a variety of major activities, including environmental restoration, waste management, development of new cleanup technology, and stabilization of surplus nuclear material and facilities. Environmental restoration involves cleanup and mitigation of past environmental contamination and uncontained waste sites, including decontamination and decommissioning of permanently closed DOE facilities.

53

V18/020847

Office of Environmental Management Technical Reports: Bibliography

U.S. Department of Energy, Office of Scientific and Technical Information, Oak Ridge, TN

DOE/OSTI-3411/1; 1035 pp. (January 1996)

The Office of Environmental Management's (EM) technical reports bibliography is an annual publication that contains information on scientific and technical reports sponsored by the Office of Environmental Management added to the Energy Science and Technology Database from July 1, 1994 - June 30, 1995. This information is divided into the following categories: Focus Areas, Crosscutting Programs, and Support Programs. In addition, a category for general information is included. EM's Office of Science

and Technology sponsors this bibliography.

54 V18/023727

Ounce of Pollution Prevention is Worth a Pound of Remediation Cure: A Focus on Waste Minimization/Pollution Prevention and the CERCLA Process

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Systematic Management Services, Oak Ridge, TN; U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (7 pp.) (1996)

Since the end of the Cold War, the U.S. Department of Energy (DOE) has refocused one of its primary missions from weapons production to environmental restoration. Resources must be maximized because of tight budget constraints; limited or nonexistent treatment, storage, and disposal capacity; and changes in public policy. Waste minimization and pollution prevention activities, such as source reduction, recycling, and treatment, benefit DOE in environmental and financial areas.

55 V18/022263

Performance Measures for Evaluating Public Participation Activities in DOE's Office of Environmental Management

Carnes, S.A.; Schweitzer, M.; Peelle, E.B.; Wolfe, A.K.; Munro, J.F.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL-6905; 75 pp. (August 1996)

Public participation activities in the Office of Environmental Management (EM) in the Department of Energy (DOE) have been estimated to have already resulted in substantial cost savings and other improvements for DOE and the nation. This report provides research support to expand those savings and improvements and facilitate other improvements by developing a set of performance-based indicators for use in evaluating public participation programs and activities in EM, with special emphasis on activities implemented in the field.

56 V18/020929

Plans for and Preliminary Results from the DOE Integrated Non-Thermal Treatment Systems Study

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (24 pp.) (1996)

The U.S. Department of Energy (DOE) has undertaken a study of

Integrated Nonthermal Treatment Systems (INTS) for mixed low level waste to assess the present state of technology and to identify research and development requirements for implementation. For the purposes of this study, nonthermal is defined as processes operating below 660 deg F. Flowsheets and conceptual designs were developed for five systems treating a representative spectrum of mixed waste. Mass balances were performed, residual volumes calculated, and total life cycle costs estimated for each system. This study is patterned after a recently published study of Integrated Thermal Treatment Systems (ITTS). This paper describes the nonthermal systems and preliminary results of the INTS study.

57 V18/023756

Pollution Prevention and Waste Minimization Guidance for Environmental Restoration Activities

Fleming, R.C.; Erne, D.L.

U.S. Department of Energy, Germantown, MD; Booz-Allen & Hamilton, Inc., Germantown, MD

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 73-77) (November 1995)

In recent years, increasing attention has been given to pollution prevention and waste minimization (PP/WMin) within the Federal government as a result of the Pollution Prevention Act of 1990 and Executive Order 12856, Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements. During the same time, one of the Department of Energy's (DOE) main missions has changed from weapons production to environmental restoration which includes decommissioning of facilities. Restoration activities, by their nature, will result in the removal of a large quantity of waste requiring treatment and disposal. It is anticipated that waste resulting from restoration activities will become DOE's largest waste source. No Federal or State guidance exists to assist environmental restoration program and project managers in preventing or reducing waste resulting from environmental restoration activities. Therefore, DOE has developed program guidance to incorporate PP/WMin principles into the restoration process. This paper will discuss the DOE program guidance and provide some examples of successful implementation of PP/WMin to environmental restoration.

58 V18/022565

Pollution Prevention in Environmental Restoration Projects: Communication, Innovation, and Implementation

Wilczek, T.A.

Reynolds Electrical and Engineering Company, Inc., Las Vegas, NV

DOE/NV/11432-T7; 6 pp. (1996)

With the change in the US Department of Energy's (DOE) primary mission from weapons production to complex cleanup, there is an increased emphasis to use proven tools and techniques that, when modified, will assist in this massive remediation effort. Tools and techniques which increase process efficiency while minimizing costs are highly attractive. The introduction of formalized Pollution

Prevention (P2) practices into the DOE Environmental Restoration (ER) program should be encouraged to the measurable degree of success that P2 has obtained in DOE process operations. Most notably, the integration of Pollution Prevention Opportunity Assessments (PPOAs) into the ER process is highly recommended for three reasons: (1) waste stream generation volumes will be minimized; (2) the results of P2 implementation will be properly measured, quantified, and documented for use on other projects; and (3) negative impacts to human health and the environment will be lessened. The application of P2 principles is encouraged as a Best Management Practice (BMP), in addition to minimizing waste generation to achieve DOE waste reduction goals. The challenge is how to apply P2 practices to ER projects and obtain quantifiable waste reductions.

59 V18/023755

Potential Pollution Prevention and Waste Minimization for EM-30, EM-40, and EM-60

Ischay, C.

Lockheed Martin Idaho Technologies Company, Idaho Falls, ID

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 70-72) (November 1995)

The Waste Minimization Division (EM-334) of the U.S. Department of Energy (DOE), directed the Idaho National Engineering Laboratory (INEL) to lead a cross-complex project to determine the potential range of volume reduction for Waste Management (EM-30), Environmental Restoration (EM-40), and Facility Transition and Management (EM-60) due to pollution prevention and waste minimization. A team of WMin/P2 professionals was formed with representatives from: (1) Idaho National Engineering Laboratory (INEL); (2) Kansas City Plant (KCP); (3) Los Alamos National Laboratory; (4) Oak Ridge Reservation. This team collectively developed a method for determining the potential reduction ranges possible from WMin/P2. The interim report contains those potential reduction ranges and provides limited data to identify, prioritize, and estimate the potential volume reductions from waste minimization and pollution prevention activities. While the study results are preliminary, they have served as a good basis for identifying waste minimization actions and provide limited data for achieving the reduction estimates.

60 V18/020984

RCRA Corrective Action and Solid Waste Management Units

Science Applications International Corporation, Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN

ES/ER/TM-183; 15 pp. (July 1996)

This document is intended to provide the reader with definitive information on the regulatory concept of a Solid Waste Management Unit (SWMU) in the context of the Resource Conservation and Recovery Act of 1976 corrective action program. The scope of the paper is limited to providing a regulatory

definition of a solid waste management unit and does not cover the issue of whether the corrective action is warranted. It is based primarily on the U.S. Environmental Protection Agency's (EPA) guidance found in the preambles to rule makings and memorandums explaining the EPA's own view of its corrective authority. Background information on the RCRA corrective action authorities and the definitions of other terms including "release" and "solid waste" are discussed so that the reader may better understand the SWMU concept. Although this paper is not intended as guidance, it may assist in the evaluation of potential SWMUs for purposes of reporting them to EPA, as is typically required by the Hazardous and Solid Waste Amendments (HSWA) portion of RCRA permits issued to the US DOE facilities. A logic diagram, which incorporates the definitive aspects of a SWMU, is attached for that purpose.

61 V18/021526

RCRA Information Brief: Conditional Remedies Under RCRA Correction Action

U.S. Department of Energy, Office of Environment, Safety, and Health, Office of Environmental Policy and Assistance, Washington, DC

DOE/EH-413-064/0696; 3 pp. (June 1996)

This document describes conditional remedies under RCRA corrective action. The definition of conditional remedies, criteria that must be met, applications to DOE facilities, applicable clean-up standards, and implementation of conditional remedies are discussed in the document.

62 V18/021049

RCRA: A Summary of the Regulations with an Update of Recent and Proposed Changes

Mach, J.L.; Haas, L.B.; Steen, C.

EMCON Alaska, Inc., Juneau, AK; EMCON Alaska, Inc., Anchorage, AK

CONF-940499 (Vol. 2); Proceedings of the 1994 Federal Environmental Restoration III and Waste Minimization II Conference and Exhibition, New Orleans, LA, April 27-29, 1994. Hazardous Materials Control Resources Institute, Rockville, MD, Vol. 2, 858 pp.; (pp. 1424-1431) (1994)

The Resource Conservation and Recovery Act (RCRA) regulates hazardous waste management from cradle to grave. Federal facilities generate a variety of wastes governed by RCRA, including discarded chemical products, used oil and petroleum products, solvents, pesticides, and ignitable and reactive wastes. The RCRA hazardous waste management requirements were originally promulgated more than 13 years ago and have changed substantially over time. The revised Toxicity Characteristic and the Toxicity Characteristic Leaching Procedure, land disposal restrictions, provisions for the management of recyclable materials, boiler and industrial furnace requirements, and the used oil management requirements are among the changes that have been adopted since November 1980. Recently adopted changes to the rules include the corrective action management unit (CAMU) rule and new used oil requirements. Recent proposed changes, such as modification of the hazardous waste identification rule, could have significant impacts on the universe of wastes managed under RCRA. Knowing the requirements of the applicable regulations will help the facility managers and

environmental coordinators avoid noncompliance and enforcement actions.

63 V18/022729

Reducing Cleanup Costs Under HWIR-Media: Implications for DOE

Berg, M.J.

ICF Kaiser, Inc., Fairfax, VA

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 690-694) (1996)

On April 29, 1996, the U.S. Environmental Protection Agency (EPA) proposed to amend the Hazardous Waste Identification Rules for Contaminated Media (HWIR-Media) under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This deregulatory initiative has the potential to significantly reduce the cost of cleaning up the U.S. Department of Energy (DOE) nuclear weapons complex. Soil, groundwater, and sediment with lower levels of contamination would be eligible for exemption from the stringent Land Disposal Restrictions (LDRs), Minimum Technology Requirements (MTRs), and other Subtitle C standards. High risk contaminated soil would be subject to less stringent Subtitle C LDRs and streamlined permitting procedures. To best take advantage of this reform initiative, DOE should take a number of actions now. This paper describes the HWIR-Media proposal, discusses its potential impacts, and recommends potential steps for DOE.

64 V18/025507

Researchers Vie for Role in Nuclear-Waste Cleanup

Lawler, A.

Science 275(5307):1730 (March 21, 1997)

In 1995 a Department of Energy grants program that was supposed to entice researchers who designed the nuclear arsenal to help in the cleanup was proposed. A report from the National Research Council criticized the program, and another 10 year plan will be unveiled by DOE which some researchers say leaves little room for science. This article gives an overview of the financial, political, and scientific problems surrounding clean up of DOE nuclear facilities.

65 V18/023752

Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress: Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp. (November 1995)

The objectives of the Pollution Prevention Conference are to provide a forum for the exchange of information and technology, to discuss technical and institutional problems, regulatory issues, program development, and to recognize those individuals, sites, and projects that implement pollution prevention measures. The eleventh conference focused on the theme of "Shaping the Future through Pollution Prevention: Involvement, Commitment,

Progress." Keynote presentations featured Management and Operations Contractor's and DOE's perspectives. Workshops were offered on the following topics: Return on Investment, Performance Measures, Design for Environment, and Pollution Prevention Tools for Environmental Restoration. The second annual DOE Pollution Prevention Awards were presented noting achievements in eleven different categories. An exhibit area with more than 40 displays and exhibits showcased many accomplishments from across the DOE complex and provided the stage for a networking reception. These proceedings contain the conference program and a compendium of abstracts as well as the papers presented at the conference. Individual papers within the scope of the RAPIC database are indexed separately.

66 V18/022148

Simplified Risk Model for Waste Management and Environmental Restoration Activities

Eide, S.A.; Smith, T.H.; Peatross, R.G.; Stepan, I.E.

Lockheed Idaho Technologies Company, Idaho Falls, ID

INEL-96/00139; CONF-9607148; Proceedings of the Energy Facility Contractor Organization Group/Safety Analysis Workshop Group (EFCOG/SAWG) Annual Safety Analysis Workshop, Knoxville, TN, July 5-7, 1996; (6 pp.) (1996)

A Simplified Risk Model (SRM) is being developed to support environmental restoration and waste management (ERWM) planning activities. The SRM is designed to be able to quantitatively estimate risk for various ERWM alternatives within hours or days, given limited information about the processes covered within the alternative. The risk model covers radiological, chemical, and industrial risk from both accidents and normal, incident free operations. A simple risk equation is used to model accident risk. Normal, incident free operation risk is modeled using a multiplier on accident risk. Ongoing applications of the SRM are expected to lead to significant improvements to the model in the near future.

67 V18/022996

Site Specific Advisory Board Initiative: Evaluation Survey Results Supplementary Appendix - Summary of Individual Site Results

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0312; 291 pp. (August 1996)

This Appendix presents results of the Site-Specific Advisory Board (SSAB) Initiative for each of the 11 sites that participated in the survey. These individual results are a supplement to the June 1996 Summary Report which presented overall survey results. Results are presented in 11 sections, arranged alphabetically by site. Each section includes a series of figures and tables that parallel those presented in the Summary Report. To facilitate comparison, figures are presented both for the individual site and for the overall survey. The sequence of sections is: Fernald, Hanford, Idaho, Los Alamos, Monticello, Nevada, Pantex, Rocky Flats, St. Louis, Sandia, and Savannah River.

68 V18/022995

State of Federal Facilities: A Comprehensive Overview

of the Environmental Compliance Status of Federal Facilities Through the End of FY 1992

U.S. Environmental Protection Agency, Office of Federal Facilities Enforcement, Washington, DC

EPA/300/R-94/001; 177 pp. (February 1994)

The purpose of this document is to provide a comprehensive overview of the state of affairs at Federal facilities through the end of FY 1992. This document reflects the major program activities tracked by the mainframe data systems managed by EPA Headquarters.

69

V18/022789

Subsurface Contaminant Focus Area: An Overview

Chamberlain, G.S.; Ceci, V.M.; Wright, J.

U.S. Department of Energy, Germantown, MD; BDM Federal, Inc., Gaithersburg, MD; U.S. Department of Energy, Savannah River Operations Office, Aiken, SC

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1406-1413) (1996)

For over fifty years, the Department of Energy (DOE) or its predecessor agencies have designed, manufactured and tested nuclear weapons for national defense. Production, testing and decommissioning of these weapons has resulted in the contamination of vast tracts of property. Today, DOE is responsible for waste management and remediation of more than 100 contaminated installations in 36 states and territories. This paper presents an overview of a portion of the technology research and development activities that DOE is currently engaged in for the remediation of contaminated soil and groundwater.

70

V18/022941

Summaries of FY 1996 Geosciences Research

U.S. Department of Energy, Germantown, MD

DOE/NBM-1097; 205 pp. (December 1996)

The Department of Energy (DOE) supports research in the geosciences in order to provide a sound foundation of fundamental knowledge in those areas of the geosciences that are germane to the department's missions. Participants in this program include DOE laboratories, academic institutions, and other government agencies. The summaries in this document, prepared by the investigators, describe the scope of individual programs. Research areas include geophysics, geochemistry, resource evaluation, hydrogeology, and solar and terrestrial interactions.

71

V18/022989

Supplier Quality Information Group (SQIG): A DOE Complex-Wide Approach to Savings Through Sharing

Chestnut, M.J.; Rinderman, R.R.

Rocky Flats Environmental Technology Site, Golden, CO; Integrated Resources Group, Inc., Las Vegas, NV; American Society of Civil Engineers, New York, NY; American Nuclear Society, La Grange Park, IL

CONF-960421; High Level Radioactive Waste Management, Proceedings of the Seventh Annual International Conference, Las Vegas, NV, April 29-May 3, 1996, 519 pp.; (pp. 310-311) (1996)

The Department of Energy (DOE) Contractor's Supplier Quality Information Group (SQIG) is a voluntary program that was formed in 1990 with the specific objective to minimize duplication of supplier audits, reduce costs, develop a common supplier audit database, relieve suppliers of redundant audits, and promote supplier partnerships. Participation responsibilities for each member organization are expressed in the SQIG Charter and acknowledged by the signing of a Memorandum of Understanding. In addition, the SQIG Charter outlines specific supplier evaluation criteria that will establish a standardized approach for evaluating a supplier's quality and technical capabilities that will facilitate information sharing between contractors. This paper will describe the benefits and accomplishments of the SQIG and further explain how each element of the DOE complex can take advantage of the "Savings through Sharing" SQIG process.

72

V18/021670

Surface Characterization of Simulated Low-Level Radioactive Waste Glasses Corroded in a Water and LiOH Buffer Solution

Li, H.; Schweiger, M.J.; Hrma, P.R.; Feng, X.

Pacific Northwest National Laboratory, Richland, WA

CONF-951155; Scientific Basis for Nuclear Waste Management, W.M. Murphy and D.A. Knecht (eds.), Proceedings of a Materials Research Society Fall Meeting and Symposium, Boston, MA, November 27-December 1, 1995. Materials Research Society, Pittsburgh, PA, Vol. 412, 957 pp.; (pp. 213-220) (1996)

Chemical durability of simulated radioactive low-level waste (LLW) baseline glass, 6-5412, was found to decrease with the addition of either phosphate or sulfate, or chromium oxide. A scanning electron microscopic study of corroded samples suggests that the effect of these components on glass chemical durability may be attributed to cluster formation of: Na-O-P-O or Na-O-S-O, or O(3+)-Cr(3+)-O(3-) groups. Preferential corrosion attack was severe on certain corroded sample surface areas that are possibly enriched in these clusters. Durability tests in a solution with LiOH as a buffer suggest that chlorine in the glass slightly improved glass corrosion resistance, while fluorine significantly deteriorated glass corrosion resistance.

73

V18/021744

U.S. Department of Energy Office of Environmental Restoration Relative Ranking Evaluation Framework

Report; 135 pp. (December 20, 1995)

This Primer provides information on the relative ranking evaluation framework being implemented by the U.S. Department of Energy (DOE) Environmental Restoration Program (EM-40) to help rank release sites, facilities, and buildings requiring restoration or decommissioning. This Primer provides guidance for completing the initial relative ranking evaluation. Once complete, the information will be used to provide input into the public and worker sections of the Environmental Management Risk Data Sheet (RDS) process. As lessons learned during this initial implementation phase,

EM-40 will make appropriate adjustments and improvements to the framework through the established EM-40 Risk Working Group. The materials presented here are a modification of the Department of Defense Relative Risk Site Evaluation Primer, issued in November 1995. These materials reflect a modification to the relative ranking evaluation framework for adaptation to EM-40 remediation and decommissioning activities. This information will be used by both Headquarters and Field project managers and other environmental personnel responsible for planning, executing, and evaluating environmental restoration activities at DOE installations. External stakeholders such as representatives of federal and state regulatory agencies, local governments, and communities in the vicinity of current and formerly used DOE installations may use this data to review proposed and planned activities. The Environmental Restoration Program's goal is to conduct relative ranking evaluations by release sites, facilities, and buildings at the field level with input from stakeholders. The technical evaluation of release sites, facilities, and buildings using the evaluation framework will provide a justifiable and trackable input for the public and worker sections of the RDSs and can serve as a basis for discussion and negotiation among stakeholders. Where they exist, Site-Specific or Citizen Advisory Boards are an excellent forum for obtaining stakeholder input.

74 V18/023753

U.S. Department of Energy's Environmental Restoration Recycling Program

Warren, S.W.; Dorries, J.

U.S. Department of Energy, Office of Environmental Restoration, Germantown, MD; Booz-Allen & Hamilton, Inc., Germantown, MD

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 47-51) (November 1995)

Millions of tons of potentially recoverable materials have accumulated over the years at U.S. Department of Energy (DOE) sites and facilities now undergoing environmental restoration and decommissioning. These materials include scrap metals, timber, concrete, and other structural materials that can be either reused in their present form or recycled into new products. Beneficial reuse and recycle of materials that DOE no longer needs conserves natural resources and avoids costly disposal. Several recycling projects are already underway at environmental restoration sites. For example, the Savannah River Site is conducting a beneficial reuse demonstration to melt radioactive scrap metal and fabricate it into storage containers. In another instance, the Hanford site plans to crush the concrete from buildings dismantled on site and use of rubble for constructing roads on which to haul out surplus reactors following their decommissioning. Many of the recoverable materials at environmental restoration sites possess significant market value, particularly certain metals. However, some materials (though not all) are contaminated either on the surface or in mass, which limits their reuse or recycle in the open market. Private industry is pursuing decontamination techniques that raise the prospect of use of decontaminated, as well as uncontaminated, materials inside and outside the DOE complex. DOE is considering setting a policy for recycling surplus metals. The policy proposal now being

contemplated is to fabricate DOE-generated, radioactively contaminated scrap metals into waste storage or disposal containers for use within the complex. The environmental restoration program has initiated a series of analyses in connection with this policy proposal. These include an assessment of available data on DOE's materials inventory and an evaluation of available data on costs associated with recycle or disposal of surplus materials. These analyses also include examinations of technical issues associated with fabrication of contaminated scrap metals into other forms (such as containers) and the physical properties of the finished and assessments of regulatory and liability constraints that may apply to recycle of contaminated materials. This paper presents the results of these analyses, describes reuse and recycle accomplishments to date, and illustrates reuse and recycle prospects and progress at representative environmental restoration sites and facilities.

75 V18/024385

U.S. Department of Energy: Society for Effective Lessons Learned Sharing

U.S. Department of Energy, Washington, DC

Brochure; 2 pp. (November 1996)

The DOE Society for Effective Lessons Learned Sharing (SELLS) has established a newsgroup to provide opportunities for discussing and exchanging ideas regarding "lessons learned". The newsgroup is available to those in the DOE community who have access to either the DOE frame relay connectivity or dialup modem connection to the EH Technical Information Services (TIS). Access through TIS requires a user ID and password. To obtain a user ID and password, call 1-800-473-4375, or send an e-mail message to: support@tis.eh.doe.gov.

76 V18/024053

U.S. Nuclear Cleanup Shows Signs of Progress

Renner, R.

Environmental Science & Technology 31(3):134A-137A (March 1997)

The U.S. Department of Energy's program for dealing with the radioactive and hazardous wastes at its former nuclear weapons production sites and at the national laboratories has been criticized for its expense and slow pace of cleanup. The largest environmental restoration and waste management program in the world faces formidable technical and scientific problems and these, according to numerous investigate committees and commissions, have been compounded by poor management, misuse of technology, and failure to appreciate the need for new basic scientific knowledge to solve many of the cleanup problems. In the past three years DOE has begun to reduce costs and accomplish more, but concerns remain about reducing risks.

77 V18/022408

Update on EH-41 Activities in FY 1995

U.S. Department of Energy, Office of Environmental Policy and Assistance, Washington, DC

Report; 22 pp. (1995)

This report briefly describes the activities undertaken by the U.S. Department of Energy's (DOE's) Office of Environmental Policy

and Assistance (OEPA, EH-41) of the Office of the Deputy Assistant Secretary for Environment (EH-4) in fiscal year (FY) 1995 in three major areas: (1) regulatory interface, (2) environmental policy and guidance, and (3) line management support. A list of selected environmental guidance memoranda and documents distributed by OEPA in FY 1995 is also included at the end of this report.

78

V18/021429

Using Lessons Learned from the Federal Facilities Compliance Act to Modify Records of Decision at Mixed-Waste CERCLA Sites

Saunders, M.F.; Braun, R.; Booras, J.S.

Fluor Daniel Environmental Services Operating Company,
Irvine, CA

CONF-950877; Mixed Waste, A.A. Moghissi, B.R. Love and R.K. Blauvelt (eds.), Proceedings of the Third Biennial Symposium, Baltimore, MD, August 7-10, 1995, 545 pp.; (pp. 10.5.1-10.5.4) (1995)

Based on the vast number of federal mixed-waste sites, the need to define attainable cleanup standards for federal facilities is obvious. The "ripple effect" from these federal facility negotiations will have a major impact on past agreements and cleanup standards for industrial sites. Many Records of Decision (RODs) and legal resolutions of mixed-waste sites were completed in the early to mid 1980s under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). At that time, the human health risk assessment was biased by ultra-conservative mathematical models. Recently, the U.S. Environmental Protection Agency (EPA) has modified its guidance, allowing the use of more reasonable exposure parameters and scenarios. A recent comprehensive search of CERCLA legal records identified 180 citations in the past 2 years in which the potentially responsible parties have worked with EPA, states, and local stakeholders, or courts to modify or amend RODs based on risk assessment issues. Additionally, the true impact of federal facility compliance with CERCLA has been driven home with the U.S. Department of Energy's (DOE's) former weapons feed material production center in Fernald, Ohio, as the first federal facility to work under the Environmental Restoration Management Contract principle. Using the cleanup criteria and methods negotiated by the DOE, other CERCLA mixed-waste sites can be revisited to adjust cleanup standards to the current state of the art.

**U.S. DEPARTMENT OF ENERGY (DOE)
DECONTAMINATION AND DECOMMISSIONING
PROGRAM**

79

V18/021119

Decontamination and Decommissioning of Rooms 62-248 and 62-250 at Ernest Orlando Lawrence Berkeley National Laboratory

Garabedian, G.

Lawrence Berkeley National Laboratory, Berkeley, CA

PUB-3132; 57 pp. (May 1996)

This document details the decontamination and decommissioning (D&D) process of Rooms 248 and 250 of Building 62 at the Ernest Orlando Lawrence Berkeley National Laboratory (LBNL). The document describes the D&D efforts for the rooms, their contents, and adjacent areas containing ancillary equipment. The rooms and equipment, before being released, were required to meet the unrestricted release criteria and requirements set forth in DOE Orders 5400.5 and 5480.11, LBNL's internal release-criteria procedure (EH&S Procedure 708), and the LBNL Radiological Control Manual. The radioactive material and items not meeting the release criteria were either sent to the Hazardous Waste Handling Facility (HWHF) for disposal or transferred to other locations approved for radioactive material. The D&D was undertaken by the Radiation Protection Group of LBNL's Environment, Health and Safety (EH&S) Division at the request of the Materials Sciences Division. Current and past use of radioactive material in both Rooms 248 and 250 necessitated the D&D in order to release both rooms for nonradioactive work. Room 248 was designated a "controlled area." There was contained radioactive material in some of the equipment. The previous occupants of Room 248 had worked with radioactive materials. Room 250 was designated a "Radioactive Materials Management Area" (RMMA) because the current occupants used potentially dispersible radioisotopes.

80

V18/020955

Rapid Detailed Characterization of Concrete Shielding Blocks Utilizing Internal Natural Radionuclides for Calibration

McDonald, R.J.; Smith, A.R.; Norman, E.B.; Cowles, D.

Lawrence Livermore National Laboratory, Livermore, CA
CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (15 pp.) (1996)

This paper presents a method for the rapid characterization of gamma-ray-emitting radioisotopes in large samples of earth-like materials: concrete shielding blocks in this case. Active regions are identified with a sensitive radiation-survey instrument and then examined in detail with a high-efficiency lead-shielded Ge spectrometer. Naturally-occurring gamma-ray emissions from the decays of uranium, thorium, and potassium are used to calibrate the spectrometer. A simple relationship exists between the observed counting rate in a characteristic gamma ray and the activity in the block. This method, taking only tens of minutes per sample at the nano-Curie/gram sensitivity level, replaces much of the expensive coring and laboratory analysis methods needed otherwise.

81

V18/023840

Building 028 and STIR Facility Decontamination and Decommissioning: Final Report

Pascolla, A.L.

Rockwell International Corporation, Rocketdyne Division,
Canoga Park, CA

028-AR-0001; 20 pp. (March 18, 1996)

Building 028 previously housed an irradiation reactor and was known as the Shield Test and Irradiation (STIR) facility. It was decommissioned and decontaminated, and released for unrestricted use in 1976. A uranium oxide melting experiment was later conducted in the facility which contaminated the experimental equipment and other portions of the facility. In order to reduce the potential environmental risks and avoid the costs of maintenance and surveillance, the contaminated systems and equipment were removed, the above ground structure demolished, and the site prepared for release for unrestricted use in April 1989.

82

V18/023839

Building T028 Decontamination and Demolition: Final Report

Klein, A.

N001TI000322; 36 pp. (April 1997)

Building 028 previously housed an irradiation reactor and was known as the Shield Test and Irradiation (STIR) facility. It was decommissioned and decontaminated, and released for unrestricted use in 1976. A uranium oxide melting experiment was later conducted in the facility which contaminated the experimental equipment and other portions of the facility. In order to reduce the potential environmental risks and avoid the costs of maintenance and surveillance, the contaminated systems and equipment were removed, the above ground structure demolished, and the site prepared for release for unrestricted use in April 1989.

83

V18/023301

Certification Docket for the Release of Building 023 at the Energy Technology Engineering Center

U.S. Department of Energy, Office of Environmental
Restoration, Northwestern Area Programs, Germantown,
MD

DOE/CD-ETEC-023; 175 pp. (February 1997)

The purpose of this docket is to document the successful decontamination and decommissioning of Building 023 at the Energy Technology Engineering Center (ETEC) at the Santa Susana Field Laboratory, Area IV for unrestricted use. Material in this docket consists of documents supporting the DOE certification that conditions at ETEC Building 023 are in compliance with applicable DOE and proposed Environmental Protection Agency and Nuclear Regulatory Commission standards and criteria established to protect human health, safety, and the environment. A notice of certification of the radiological condition of the property was published in the Federal Register on March 12, 1997. A copy of the notice, official correspondence, release criteria, project report, radiological surveys, an independent verification report are compiled in this docket.

84

V18/023837

Certification Docket for the Release of Building 028 at the Energy Technology Engineering Center

U.S. Department of Energy, Office of Environmental Restoration, Germantown, MD

DOE/CD-ETEC-028; 165 pp. (April 1997)

The purpose of this docket is to document the successful decontamination and decommissioning of Building 028 at the Energy Technology Engineering Center (ETEC) at the Santa Susana Field Laboratory, Area IV for unrestricted use. Material in this docket consists of documents supporting the DOE certification that conditions at ETEC Building 028 are in compliance with applicable DOE and proposed EPA and NRC standards and criteria established to protect human health, safety, and the environment. A notice of certification of the radiological condition of the property was published in the Federal Register on April 4, 1997. A copy of the notice, official correspondence, release criteria, project report, radiological surveys, and an independent verification report are compiled in this docket. Individual parts of this document within the scope of this data base have been indexed separately.

85

V18/023939

Certification Docket for the Release of Building 029 at the Energy Technology Engineering Center

U.S. Department of Energy, Headquarters, Northwestern Area Programs, Germantown, MD

DOE/CD-ETEC-029; 78 pp. (April 1997)

The purpose of this docket is to document the successful decontamination and decommissioning of Building 029 at the Energy Technology Engineering Center (ETEC) at the Santa Susana Field Laboratory, Area IV for unrestricted use. Material in this docket consists of documents supporting the DOE certification that conditions at ETEC Building 029 are in compliance with applicable DOE and proposed Environmental Protection Agency and Nuclear Regulatory Commission standards and criteria established to protect human health, safety, and the environment. A notice of certification of the radiological condition of the property was published in the Federal Register on April 8, 1997. A copy of the notice, official correspondence, release criteria, project report, radiological surveys, and an independent verification report are compiled in this docket.

86

V18/023841

Certification of the Radiological Condition of Building 028 at the Energy Technology Engineering Center near Chatsworth, California

Williams, D.

U.S. Department of Energy, Office of Environmental Restoration, Washington, DC

ETEC-028; 6 pp. (April 1997)

The Department of Energy (DOE) has completed radiological surveys and taken remedial action to decontaminate Building 028 located at the Energy Technology Engineering Center (ETEC) near Chatsworth, California. This property previously was found to

contain radioactive materials from activities carried out for the Atomic Energy Commission and the Energy Research and Development Administration (AEC/ERDA), predecessor agencies to DOE. Although DOE owns the majority of the buildings and equipment, a subsidiary of Rockwell International, Rocketdyne, owned the land. Rocketdyne has recently been sold to Boeing North American Incorporated.

87

V18/023838

Final Decontamination and Radiological Survey of Building T028

Oliver, B.M.

Rockwell International Corporation, Rocketdyne Division, Canoga Park, CA

N704SRR990033; 57 pp. (February 22, 1991)

Santa Susana Field Laboratory (SSFL) Building T028 originally housed the Shield Test and Irradiation (STIR) test reactor. The reactor was removed, and the facility was decontaminated and decommissioned for release for unrestricted use in 1976. Subsequent uranium-oxide melting experiments conducted in the facility resulted in some decontamination of equipment and localized areas. Following completion of the uranium experiments, the facility underwent additional decontamination and decommissioning operations in 1988, and the above-grade structures were demolished and removed in 1989. As part of this effort, a final radiological survey was conducted (prior to demolition), which included both indication-only surveys, and detailed grid surveys of total and removable alpha/beta activity, and ambient gamma exposure rate. The results and statistical analysis of the final radiological survey data are presented in this report. The data show very small levels of residual radioactive contamination (just above background) in isolated areas of the facility, but at levels that are far below any regulatory limits. Ambient gamma exposure rates were observed to be slightly higher in the basement area, but still at levels below allowable limits. Some evidence of residual activation in the concrete wall adjacent to the removed STIR reactor was noted, but also at levels below the allowable limits. Based on the present results, it is concluded that residual radioactivity in all areas of Building T028 is below applicable limits. Therefore, these areas meet the requirements of DOE Order 5400.5, "Radiation Protection of the Public and Environment", and are suitable for release without radiological restrictions.

88

V18/023842

Proposed Sitewide Release Criteria for Remediation of Facilities at the SSFL

Oliver, B.M.; Tuttle, R.J.

Rockwell International Corporation, Rocketdyne Division, Canoga Park, CA

N001SRR140127; 25 pp. (August 22, 1996)

At several locations at the Santa Susana Field Laboratory (SSFL), low levels of radioactive contamination in buildings and in soil have occurred and have been or will be cleaned up for eventual release for use without radiological restrictions. For this purpose, a complete set of proposed guideline values for approval by DOE for DOE facilities at the SSFL has been developed and are presented in this

report. The various categories of release guidelines include: (1) annual expected dose; (2) soil and water concentration guidelines; (3) surface contamination guidelines; and (4) ambient gamma exposure rate. The proposed guidelines were obtained from regulatory values where available. Where not available, for example for soil, guidelines were calculated by use of the DOE computer code, RESRAD. For these calculations, the proposed annual dose is 15 mrem/year, which is consistent with proposed EPA and NRC guidelines and ALARA principles. The radionuclide guidelines presented in this report are applicable to DOE-optioned facilities and land and other radiological areas.

89 V18/023843

Verification Survey of the Old Conservation Yard, Building T064 Side Yard, and Building 028, Santa Susana Field Laboratory, Rockwell International, Ventura County, California: Final Report

Vitkus, T.J.

Oak Ridge Institute for Science and Education, Oak Ridge, TN

ORISE-93/J-107; 5 pp. (October 1993)

At the request of the U.S. Department of Energy, the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education performed a verification survey of the Old Conservation yard, Building T064 Side Yard, and Building T028 located at the Santa Susana Field Laboratory (SSFL) near Chatsworth, California. Activities included document reviews, surface scans, surface activity measurements, soil sampling, and sample analyses. The documentation prepared by Rockwell/Rocketdyne provides descriptions of characterization, remediation, and post-remedial action survey procedures as well as the current radiological status of each area. ESSAP provided specific comments which suggest modifications to the current procedures and investigative approaches used at SSFL. If the suggested modifications are adapted by Rockwell/Rocketdyne on future projects, a more accurate and complete appraisal of the pre- and post-remedial action site conditions would be possible.

90 V18/024163

Sandia, California Tritium Research Laboratory Transition and Reutilization Project

Garcia, T.B.

Sandia National Laboratories, Albuquerque, NM

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (17 pp.) (February 1997)

This paper describes a project within Sandia National Laboratory to convert the shut down Tritium Research Laboratory into a facility which could be reused within the laboratory complex. In the process of decommissioning and decontaminating the facility, the laboratory was able to save substantial financial resources by transferring much existing equipment to other DOE facilities, and then expeditiously implementing a decontamination program which has resulted in the building being converted into laboratory space for new lab programs. This project of facility reuse has been a

significant financial benefit to the laboratory.

91 V18/021118

Radiological Characterization and Final Facility Status Report Tritium Research Laboratory

Garcia, T.B.; Gorman, T.P.

Sandia National Laboratories, Health Protection Department, Livermore, CA

SAND96-8004; 386 pp. (August 1996)

This document contains the specific radiological characterization information on Building 968, the Tritium Research Laboratory (TRL) Complex and Facility. We performed the characterization as outlined in its Radiological Characterization Plan (SAND95-8216). The Radiological Characterization and Final Facility Status Report (RC&FFSR) provides historic background information on each laboratory within the TRL complex as related to its original and present radiological condition. Along with the work outlined in the Radiological Characterization Plan (RCP), we performed a Radiological Soils Characterization, Radiological and Chemical Characterization of the Waste Water Hold-up System including all drains, and a Radiological Characterization of the Building 968 roof ventilation system. These characterizations will provide the basis for the Sandia National Laboratory, California (SNL/CA) Site Termination Survey Plan, when appropriate.

92 V18/025466

Reclassification of the Tritium Research Laboratory
Johnson, A.J.

Sandia National Laboratories, Livermore, CA

SAND97-8003; 222 pp. (January 1997)

This document is a collection of the required actions that were taken to reclassify Building 968, the Tritium Research Laboratory, at Sandia National Laboratories/California.

93 V18/023764

Taking the "T" Out of the TRL

Painter, P.; Johnson, A.J.

Sandia National Laboratories, Albuquerque, NM

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 239-243) (November 1995)

Sandia's (SNL) Tritium Management Department has taken the "T" out of the TRL (Tritium Research Laboratory); this is a result of successfully reducing the facility's tritium inventory to zero. The Tritium Research Facility's Cleanup and Operations Team managed the risky job of disassembling the protective systems in the facility without any increase in exposure to personnel and with decreases in the emissions to both air and water. Also, as part of this project, the team shipped excess equipment valued at over 10 million for reuse to other DOE facilities, including Lawrence Livermore Laboratory, Savannah River and Los Alamos National Laboratory. In addition to the cost savings, these facilities realize (from reuse of this equipment), over \$110,000 in disposal fees and 200,000 pounds of waste was avoided. An equally significant accomplishment was that

these efforts were completed well ahead of the project's schedule and under budget. (Through FY 94 the team returned nearly \$1 million of the budget and closed the year within 1 percent of the budget target.) In 1977, the \$12 million facility was the most advanced and safest in the country. Throughout-out the life of the TRL, the facility has always remained in compliance with the strictest regulatory requirements. During its peak operation in the mid 1980s, the facility handled 120 grams of tritium (a hydrogen isotope used to increase yields in fusion reactions). The decision to end seventeen years of operations as a special nuclear materials site was made in 1991 for two reasons: (1) it will save operating costs, and (2) research on containing tritium could be conducted elsewhere. To accomplish the shut-down of the TRL, Sandia National Laboratories management selected an in-house cleanup and facility transition option-rather than bulldoze the facility and haul the rubbish away. This decision, in lieu of a D&D/ER option, has realized an accelerated schedule for the facility's reuse (conservatively 18 months) and approximately \$20 million savings. The facility was the first in the Department of Energy (DOE) Complex to use highly efficient containment methods - glove boxes and systems to remove tritium from the glove box environment (tritium gas emits low-energy beta particles and can be inhaled or absorbed through the skin). It is also the first in the DOE Complex to be cleaned up and prepared for new users by the staff who operated the facility. Their clean-up and transition efforts have received two Sandia President's Quality Awards, one in 1993 and one in 1994. This award is based on the Malcolm Baldrige Award Criteria which recognizes effectiveness in both identifying and meeting customer requirements. The cross-functional team uses TQM management tools such as cross-training of staff, trend analysis of maintenance, operational performance metrics, schedule and budget controls. This project provides a model of Best Management Practices for maximizing pollution prevention progress at other DOE sites which are scheduled for shut-down. This presentation will provide the TRL's waste minimization accomplishments, lessons learned, and future challenges.

94

V18/024847

Tritium Research Laboratory Cleanup and Transition Project: Final Report

Johnson, A.J.

Sandia National Laboratories, Livermore, CA
SAND97-8009; 90 pp. (February 1997)

The Tritium Research Laboratory located at Sandia National Laboratories' California site has been converted to support other Sandia programs. After a joint decision by Sandia and DOE to stop operations, Sandia in cooperation with DOE selected an in-house cleanup, equipment removal, and facility transition option rather than a more traditional decontamination, demolition, and disposal approach. This Tritium Research Laboratory Cleanup and Transition Project Final Report provides a high-level summary of this project's multidimensional accomplishments. Throughout this report references are provided for in-depth information concerning the various topical areas. Project related records also offer solutions to many of the technical and or administrative challenges that such a cleanup effort requires. These documents and the experience obtained during this effort are valuable resources to the DOE, which has more than 1200 other process contaminated facilities awaiting

cleanup and reapplication or demolition.

95

V18/021286

10 CFR 830.120 Criterion 10, Independent Assessment: We're Here to Help You!

Farrell, R.E.

EG&G Rocky Flats, Inc., Golden, CO

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:38-39 (1995)

Each organization performing activities in the U.S. Department of Energy (DOE) weapons complex is required to have an independent assessment function. This is consistent from DOE Order 5700.6C to 10 CFR 830.120, sometimes referred to as the Price-Anderson rule. At Rocky Flats Environmental Technology Site, budget decline coupled with our prime driver's taking on the impetus of federal regulation required a new approach to radiation oversight functions. Performance assurance at Rocky Flats utilizes a formal method of risk-based resource allocation coupled with a new oversight technique to efficiently utilize limited resources.

96

V18/021815

Criticality Safety Violation During Glovebox Cleanup OE Weekly Summary 96(28):2-13 (1996)

On July 3, 1996, at the Rocky Flats Environmental Technical Site, a process specialist discovered a potential Criticality Safety Operating Limit (CSOL) violation involving plastic bags greater than 4 liters in volume that were not slit. The bags were inside a plastic housing around a glovebox being cleaned for disposal. Facility managers critiqued the event and directed further investigation for other criticality safety concerns. They also directed criticality engineers to provide guidance on recovery and cleanup of the glovebox. Managers discovered that contractors assigned to the cleanup received no training on criticality safety limits. The managers reviewed the control process for criticality safety limits during decontamination and decommissioning and identified several issues of concern.

97

V18/021357

D&D at Rocky Flats Environmental Technology Site [Package 9]

Huffman, G.N.

U.S. Department of Energy, Rocky Flats Field Office,
Golden, CO

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (4 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. This presentation describes the D&D activities at the Rocky Flats Environmental Technology Site. An outline of the various steps for D&D of Building 889, petroleum tanks and glovebox removal is provided.

98

V18/021150

Future Is New Focus at Energy Department's Rocky Flats Facility

Lobsenz, G.

Energy Daily, Washington, DC

Energy Daily 21(217):2-3 (November 12, 1993)

After several years of intensive effort to address radioactive pollution threatening nearby communities, officials at the Energy Department's Rocky Flats plant now are turning their attention to the site's plutonium buildings and finding a cleanup challenge of equally daunting proportions. Containing and mopping up off-site soil and water contamination remains the first priority at the Colorado facility, but site environmental managers say the huge volumes of plutonium and associated radioactive waste stored in Rocky Flats' aging building pose increasingly urgent safety concerns.

99

V18/025361

Impacts of Decontamination and Decommissioning Activities on Waste Management Practices at the Rocky Flats Environmental Technology Site

Aycock, M.T.; Dorr, K.A.

Scientific Ecology Group - Colorado, Inc., Golden, CO;
Kaiser-Hill Company, Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

This presentation describes the lessons-learned, planning practices, and impacts on current waste management practices resulting from decontamination and decommissioning (D&D) activities at the Rocky Flats Environmental Technology Site (RFETS). The successful D&D of the RFETS site is dependent upon having waste management programs in place which address the eventual treatment, storage and disposal of D&D wastes generated as a result of the D&D process. This presentation discusses the impacts of the D&D process on waste management activities and the lessons learned in dealing with special waste considerations, including waste minimization for selected D&D projects at RFETS. The RFETS site has completed a series of D&D projects within the last year which have generated what are considered to be non-routine wastes which are not normally generated in day-to-day operations. The management of these wastes required technical as well as administrative modifications to the routine waste management practices at the site. The impacts discussed in this presentation include methods of performing waste characterization prior to and during D&D, waste packaging for unusual materials being generated (i.e., glove boxes, large tanks, etc.), waste storage considerations, waste recycling, and waste minimization techniques for decontamination of lead and other materials. The guidance for waste management planning is based on technical information presented in DOE/EM-0142P Decommissioning Handbook. The information presented implements the DOE program and would be of interest to others within the DOE complex who are performing D&D. RFETS has implemented a coordinated planning process between the D&D and Waste Management Divisions which incorporates the technical guidance provided in the DOE

Decommissioning Handbook and the Rocky Flats Clean-Up Agreement (RFCA).

100

V18/022927

National Conversion Pilot Project

Roberts, A.V.

BNFL, Inc., Golden, CO

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:57-58 (1995)

The National Conversion Pilot Project (NCP) is a recycling project under way at the U.S. Department of Energy (DOE) Rocky Flats Environmental Technology Site (RFETS) in Colorado. The recycling aim of the project is threefold: to reuse existing nuclear weapon component production facilities for the production of commercially marketable products, to reuse existing material (uranium, beryllium, and radioactively contaminated scrap metals) for the production of these products, and to reemploy former Rocky Flats workers in this process. The project has three stages. Stage I was the planning phase of the project. Stage II is the cleanup phase during which unnecessary equipment will be removed from the facility, equipment to be retained will be maintained and restored to operational use, and the building will be decontaminated to a level suitable for recycling operations. Stage III is the recycling phase of the project when the reuse of facilities and materials takes place. Stages I and II have been awarded to Manufacturing Sciences Corporation (MSC).

101

V18/020935

National Conversion Pilot Project Regulatory Process

Wambach, J.G.

BNFL, Inc., Englewood, CO

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (6 pp.) (1996)

Based on changes in the mission of the Rocky Flats Environmental Technology Site, and on a desire to accomplish tangible cleanup goals, the National Conversion Pilot Project (NCP) worked in coordination with the regulators and the public to develop a more streamlined approach to decontaminating buildings at Rocky Flats. The result of this work is an approach remarkably like that described in the joint DOE/EPA Policy on Decommissioning Department of Energy Facilities under CERCLA, which was published almost 18 months after the NCP began. By emphasizing coordination and a common-sense approach to regulatory compliance, two unrelated efforts arrived at essentially the same conclusions.

102

V18/025334

Obtaining Department of Energy Approval for a Radiation Protection Program for Decontamination and Decommissioning Activities

Samiljan, A.G.

Manufacturing Sciences Corporation, Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (4 pp.) (1997)

The present paper outlines the development, review, approval process, implementation, and administration of an independent Radiation Protection Program (RPP) for a decontamination and decommissioning project at Department of Energy (DOE) facilities. The radionuclides of concern for this project are uranium U-235/U-238 and Pu-239/Am-241. The RPP meets all the requirements of 10 CFR 835 and demonstrates that a private contractor can achieve tangible radioactive cleanup results outside the authority of, but in concert with, the site's integrating management contractor.

103 V18/022816

Recycling Entire DOE Facilities: The National Conversion Pilot Project

Floyd, D.R.

Manufacturing Sciences Corporation, Denver, CO

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1821-1826) (1996)

The Mission of the National Conversion Pilot Project is to demonstrate, at the Rocky Flats Site, the feasibility of economic conversion of DOE Sites. Contaminated facilities worth \$92 million are being cleaned and readied for reuse by commercial industry to manufacture products needed in the DOE cleanup and elsewhere. Former Rocky Flats workers have been hired and retrained to conduct the cleanup, and are expected to perform the future manufacturing by recycling DOE radioactive scrap metal (RSM) and other metals requiring special environmental controls. Stakeholder sway over project activities is welcome and strong.

104 V18/025827

Recycling Entire DOE Facilities: The National Conversion Pilot Project

Floyd, D.R.; Nix, D.E.

Manufacturing Sciences Corporation, Denver, CO; U.S. Department of Energy, Rocky Flats Field Office, Golden, CO

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 53-59) (1996)

The Mission of the National Conversion Pilot Project - to demonstrate, at the Rocky Flats Site, the feasibility of economic conversion of DOE Sites - is succeeding. Contaminated facilities worth \$92 million are being cleaned and readied for reuse by commercial industry to manufacture products needed in the DOE

cleanup and elsewhere. Former Rocky Flats workers have been hired, retrained, are conducting the cleanup, and are expected to perform the future manufacturing by recycling DOE radioactive scrap metal (RSM) and other metals requiring special environmental controls. Stakeholder sway over project activities is welcome and strong.

105 V18/020936

Reuse of Facilities, Materials and Labor: The NCPP at Rocky Flats

Roberts, A.V.

BNFL, Inc., Golden, CO

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (8 pp.) (1996)

The National Conversion Pilot Project, currently underway at Rocky Flats Environmental Technology Site, Denver, Colorado, aims to show how ex-weapon production facilities within the Department of Energy (DOE) can become successful commercial operations. This project, unique within the DOE, is converting three major buildings on the plantsite in preparation for commercial metal forming/processing activities. Preparation for commercial operations involves the radiological and toxicological decontamination of the buildings, the removal of redundant facilities and the refurbishment of tooling and equipment required for operations. Project planning began in April 1994 with cleanup activities commencing in Building 883 in April 1995. Completion of cleanup work is expected during FY 1997. Overall project management is the responsibility of Manufacturing Sciences Corporation (MSC) through a cooperative agreement with the DOE. BNFL Inc. is the principal subcontractor to MSC. The NCPP can be viewed as a three way recycling project: (1) The recycling of buildings and equipment from weapons production to commercial operation; (2) The recycling of scrap steel, as well as uranium and beryllium, away from weapon component production to commercial usage (e.g. the fabrication of waste storage boxes), and (3) The recycling of former Rocky Flats workers, made redundant following the plantsite mission change, from weapon component production workers to manufacturers of commercially viable products. By recycling facilities, materials and labor, the project aims to show that the conversion of contaminated ex-weapons facilities into commercial uses can reduce the burden of underutilized facilities upon the DOE as well as being an economically viable commercial operation. This paper describes the progress made to date in the decontamination and refurbishment of these facilities as part of the NCPP.

106 V18/024162

Rocky Flats 10 Year Plan: Over 500 Structures to be Demolished

Evans, B.; Bengel, P.

Kaiser-Hill Company, Golden, CO; Rocky Mountain Remediation Services, LLC, Golden, CO; EG&G Rocky Flats, Inc., Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW,

LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Rocky Flats Environmental Technology Site has prepared a Ten Year Plan (Plan) that demonstrates how the Site would achieve accelerated cleanup and rapidly reduce the risks the Site currently poses to its workers, the public, and the environment. A major element of the Plan is the decontamination and demolition of over 500 Site facilities, including all of the former nuclear production facilities, by the end of 2006. Facilities used for the storage of plutonium, treatment of low-level mixed waste, and several office buildings would remain until the plutonium is removed or there is no longer a need for the facility, in which case it would be demolished. While the Plan considers all aspects of the cleanup and closure, this paper focuses on the challenges posed by the removal of highly contaminated equipment and the demolition of structures. This paper describes near-term decommissioning projects as well as the long range plans and budgets. Cash flow ultimately controls schedule, and sharing of budget priorities among processing of special nuclear material, disposing of waste, and cleaning up the environment has to be juggled carefully to attain the goals of the Plan. The total cost of the Plan exceeds \$5 billion, and over \$1 billion will be spent on decommissioning activities. Following removal of the plutonium and the demolition of the plutonium storage and remaining Site facilities by the end of 2015, the cost to perform the long-term environmental monitoring at the Site is estimated to be \$10 million per year.

107 V18/024024

Worker Contaminated While Cutting a Glovebox

U.S. Department of Energy, Germantown, MD

Operating Experience Weekly Summary 97(6):5-6 (January 31, 1997)

On January 29, 1997, at the Rocky Flats Environmental Technology Site, a deactivation and decommissioning worker received skin contamination while cutting a glovebox with a power-driven cutter in a soft-sided containment house. The work crew consisted of three workers and a radiological control technician. All were properly dressed in personal protective equipment. While exiting the containment house because of a high Derived Air Concentration (DAC) reading, the radiological control technician found alpha contamination on the worker who was cutting the glovebox. The worker had 2,000 dpm/100 cm² on his neck, 7,000 dpm on his chest area, and 7,000 dpm on the inside of his upper left arm. The radiological control technician also detected 7,000 dpm on the worker's respirator facepiece. The worker was successfully decontaminated. This event is significant because particles from the cutting operation passed through the protective clothing, contaminating the worker's skin.

108 V18/025359

Workforce Mobilization for D&D at the Rocky Flats Environmental Technology Site (RFETS)

Coles, G.W.; Easdon, R.C.; Bourgeois, T.G.

Kaiser-Hill Company, Golden, CO; Rocky Mountain Remediation Services, LLC, Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW,

LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (5 pp.) (1997)

A dramatic evolution of labor policies, management and labor relations organizations, and the work force has taken place to prepare for and initiate the D&D of RFETS (the Site). Facilitating the transition of the Site management structure and workforce to be compatible with the new Site mission, D&D, required nearly fifty years of labor practices and precedence to be evaluated, dissolved, and reformed. Labor and management participated in carving new work assignment guidance and agreements that are unprecedented in the unique environment of the Department of Energy (DOE) weapons complex. The innovative approaches that led to the new and revised guidance and agreements at the Site address Federal Laws; Federal Acquisition Regulations; DOE, Department of Defense (DOD) and Department of Labor (DOL) requirements; and related interagency correspondence. The resulting labor practices generally apply to most government work.

109 V18/025362

D&D and Refurbishment Experience/Accomplishments: The NCPP at Rocky Flats

Carmichael, R.C.

BNFL, Inc., Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

The National Conversion Pilot Project, (NCPP) is DOE's first facilities reuse initiative. The NCPP was launched by Secretary O'Leary in 1993 at the Rocky Flats Environmental Technology Site, Golden, CO. Planning began in April 1993 with hands-on D&D and refurbishment work starting in April 1994. The NCPP is currently on schedule and budget in its mission to decontaminate, decommission and refurbish two of four former weapons production facilities. These two facilities, buildings 883 and 865 representing 90,330 square feet and 70 pieces of equipment will be available for commercial, non-weapons production activities in early 1997. An RFP requesting expressions of interest from private industry for use of these buildings was published in the Commerce Business Daily the fourth quarter of 1996. Responses were received early in January 1997. A contract for Stage III operations was awarded to Manufacturing Sciences Corporation at the end of January 97. Operational capabilities of the above facilities include metal rolling (up to 42 inches wide), forging, extruding, pressing, heat treating, welding, machining, and carbon dioxide cleaning. The NCPP has accomplished its mission with only one lost work day accident since the start of work. An aggressive monitoring program consisting of equipment, area, and personal sampling was instituted.

110 V18/025360

Decontamination and Decommissioning of Building 889 at Rocky Flats Environmental Technology Site

Dorr, K.A.; Sexton, R.J.; Hickman, M.E.; Henderson, B.J.

Kaiser-Hill Company, Golden, CO; Scientific Ecology Group - Colorado, Inc., Golden, CO; Rocky Mountain Remediation Services, LLC, Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

With the end of the Cold War the decontamination and decommissioning of surplus facilities at the Rocky Flats Environmental Site (RFETS) has begun. There are approximately 450 individual buildings to be dispositioned as part of the proposed 10-year plan. Only 35 of these facilities have significant levels of radiological and chemical contamination. The decommissioning of Building 889 was part of a major accomplishment for the Rocky Flats Environmental Technology Site and provided valuable lessons learned which are being incorporated in preparing for future decommissioning projects. This paper discusses the Building 889 Decommissioning Project which was the first large scale decommissioning project of a radiologically contaminated facility at Rocky Flats. The scope of the project consisted of the removal of all equipment and utility systems from the interior of the building, decontamination of interior building surfaces, and the demolition of the facility to ground level. The project was performed using proven decontamination and demolition techniques, incorporating lessons from previous DOE and commercial decommissioning projects. Details of the Project Management Plan, which include: schedule, engineering, cost, characterization methodologies, decontamination techniques, radiological control requirements, and demolition methods are provided.

111 V18/021115

Final Report of the Decontamination and Decommissioning of Building 1 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO
DOE/ID/12584-276; GJPO-GJ-36; 20 pp. (August 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. Building 1 was found to be radiologically contaminated and was demolished in 1996. The soil beneath and adjacent to the building was remediated in accordance with identified standards and can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

112 V18/022348

Final Report on the Decontamination and Decommissioning of Building 18 at the Grand Junction Projects Office Facility

Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-278; GJPO-GJ-39; 20 pp. (August 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, also is the remedial action contractor. The soil beneath Building 18 was found to be radiologically contaminated; the building was not contaminated. The soil was remediated in accordance with identified standards. Building 18 and the underlying soil can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

113 V18/022898

Building 2 Public Dose Evaluation: Final Report

Morris, R.L.

Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-265; GJPO-GJ-33; 170 pp. (May 1996)

Building 2 on the U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) site, is part of the GJPO Remedial Action Program (GJPORAP). This report describes measurements and modeling efforts to evaluate the radiation dose to members of the public who might someday occupy or tear down Building 2. Releasing the building for unrestricted use instead of demolishing it now could save a large amount of money because the site telecommunications system would not be disabled and replaced. Many originally exposed surfaces are no longer accessible for contamination surveys because expensive telecommunications equipment has been mounted on panels covering the walls and floors. Data were collected to characterize exposure rate, contamination levels, radon concentration, and contaminants in subsurface drain lines. When direct measurements of the dose component were not possible, RESRAD-BUILD, a predictive model sponsored by DOE, was used to assess the dose potential. Summing all sources, the predicted Total Effective Dose Equivalent (TEDE) from normal occupancy of Building 2 is 2 mrem/year, and radon is insignificant. For demolition the predicted dose is 0.1 mrem and radon is insignificant. Building 2 is suitable for unrestricted use by the public. Measurement and model predictions show the dose to the public from future use of Building 2 is much less than the legal limit of 100 mrem/year and well below the release criteria proposed in the DQO process. An ALARA analysis should be performed using the predicted dose and potential cost savings. A decision of disposition of the building would follow.

114 V18/021110

Final Report of the Decontamination and Decommissioning of Building 31 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-257; GJPO-GJ-28; 20 pp. (July 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. Radiological contamination was identified in Building 31, and the building was demolished in 1992. The soil area within the footprint of the building has been remediated in accordance with the identified standards and the area can be released for unlimited exposure and unrestricted use. This area was addressed in the summary final report of the remediation of the exterior area of the GJPO facility. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

115

V18/021113

Final Report of the Decontamination and Decommissioning of Building 34 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-274; GJPO-GJ-34; 20 pp. (August 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. Building 34 was radiologically contaminated and the building was demolished in 1996. The soil area within the footprint of the building was analyzed and found to be not contaminated. The area can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

116

V18/021114

Final Report of the Decontamination and Decommissioning of Building 36 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-275; GJPO-GJ-35; 20 pp. (August 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. Building 36 was found to be radiologically contaminated and was demolished in 1996. The soil beneath the building was remediated in accordance with identified standards and can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

117

V18/021111

Final Report of the Decontamination and Decommissioning of Building 39 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-258; GJPO-GJ-29; 20 pp. (July 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. The soil beneath Building 39 was radiologically contaminated and the building was demolished in 1992. The soil area within the footprint of the building has been remediated in accordance with the identified standards and the area can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

118

V18/021112

Final Report of the Decontamination and Decommissioning of Building 44 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-260; GJPO-GJ-30; 20 pp. (July 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement

program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. Building 44 was radiologically contaminated and the building was demolished in 1992. The soil area within the footprint was not contaminated; it complies with the standards and the area can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

119 V18/022306

Final Report of the Decontamination and Decommissioning of Building 52 at the Grand Junction Projects Office Facility

Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-261; GJPO-GJ-31; 20 pp. (August 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the U.S. Atomic Energy Commission's domestic uranium procurement program. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, also was the remedial action contractor. Building 52 was found to be radiologically contaminated and was demolished in 1994. The soil area within the footprint of the building has been remediated in accordance with the identified standards and the area can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

120 V18/021109

Final Report of the Decontamination and Decommissioning of Building 6 at the Grand Junction Projects Office Facility

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO; Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-254; GJPO-GJ-25; 20 pp. (July 1996)

The U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO) occupies a 61.7-acre facility along the Gunnison River near Grand Junction, Colorado. This site was contaminated with uranium ore and mill tailings during uranium refining activities of the Manhattan Engineer District and during pilot milling experiments conducted for the domestic uranium procurement program funded by the U.S. Atomic Energy Commission. The DOE Defense Decontamination and Decommissioning Program established the GJPO Remedial Action Project to clean up and restore the facility lands, improvements, and the underlying aquifer. The site contractor for the facility, Rust Geotech, is also the remedial action contractor. Radiological contamination was

identified in Building 6, and the building was demolished in 1992. The soil area within the footprint of the building has been remediated in accordance with the identified standards and the area can be released for unlimited exposure and unrestricted use. This document was prepared in response to a DOE request for an individual final report for each contaminated GJPO building.

121 V18/024061

Decontamination of an Analytical Laboratory Hot Cell Facility

Michelbacher, J.A.; Henslee, S.P.; Rosenberg, K.E.; R.M.

Argonne National Laboratory-West, Idaho Falls, ID

CONF-960306 (Vol. 4); ICONE-4 (Vol. 4), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Plant Operations and Maintenance, Nuclear Fuel Cycle, Institutional and Energy Policy, Non-Proliferation and Safeguards, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 4, 745 pp.; (pp. 677-682) (1996)

An Analytical Laboratory Hot Cell Facility at Argonne National Laboratory (ANL-W) had been in service for nearly thirty years. In order to comply with current DOE regulations governing such facilities and meet programmatic requirements, a major refurbishment effort was mandated. Due to the high levels of radiation and contamination within the cells, a decontamination effort was necessary to provide an environment that permitted workers to enter the cells to perform refurbishment activities without receiving high doses of radiation and to minimize the potential for the spread of contamination. State-of-the-art decontamination methods, as well as time-proven methods were utilized to minimize personnel exposure as well as maximize results.

122 V18/022726

Cask Dismantlement at the INEL for Lead Recovery and Recycle

Feldman, E.M.; Thurmond, S.M.

Lockheed Idaho Technologies Company, Idaho Falls, ID

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 535-539) (1996)

The Idaho National Engineering Laboratory (INEL) is successfully recycling radiologically clean metallic scrap lead and steel separated from obsolete lead shielded casks and devices. These casks and devices have low level radiological surface contamination and, because of the characteristic toxicity of the lead shielding, were previously declared a mixed hazardous waste and placed in Resource Conservation Recovery Act (RCRA) storage. This paper highlights the unique capabilities available at the INEL to perform dismantlement and recycling of casks and devices weighing from a few pounds to over 40 tons. Issues and results associated with the INEL's recycling of lead as free-released scrap metal are presented and discussed. Dismantlement process methods and equipment are described.

123

V18/021348

INEL D&D History [Package 2]

Perry, G.

Lockheed Idaho Technologies Company, Idaho Falls, ID
CONF-960437; Proceedings of a National Technical Information
Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (7
pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the
Deactivation and Decommissioning Focus Area Concurrent Session
at the National Technology Information Exchange (TIE)
Workshop in Santa Fe, New Mexico. The presentation addressed
D&D activities at the Idaho National Engineering Laboratory and
covered the following areas: D&D history; Characterization;
Decontamination; Dismantling, segmentation and demolition; and,
Waste disposition strategies and technologies

124

V18/023350

**Transforming Criticality Control Methods for EBR-II
Fuel Handling During Reactor Decommissioning**

Eberle, C.S.; Dean, E.M.; Angelo, P.L.

Argonne National Laboratory-West, Idaho Falls, ID
ANL/ED/CP-85397; CONF-9509100; Proceedings of the Fifth
International Conference on Nuclear Criticality Safety,
Albuquerque, NM, September 17-22, 1995; (10 pp.) (1995)

A review of the Department of Energy (DOE) request to
decommission the Experimental Breeder Reactor-II (EBR-II) was
conducted in order to develop a scope of work and analysis method
for performing the safety review of the facility. Evaluation of the
current national standards, DOE orders, EBR-II nuclear safeguards
and criticality control practices showed that a decommissioning
policy for maintaining criticality safety during a long term fuel
transfer process did not exist. The purpose of this research was to
provide a technical basis for transforming the reactor from an
instrumentation and measurement controlled system to a system
that provides both physical constraint and administrative controls
to prevent criticality accidents. Essentially, this was done by
modifying the reactor core configuration, reactor operations
procedures and system instrumentation to meet the safety practices
of ANS-8.1-1983. Subcritical limits were determined by applying
established liquid metal reactor methods for both the experimental
and computational validations.

125

V18/021383

**Development of Waste Minimization and
Decontamination Technologies at the Idaho Chemical
Processing Plant**

Ferguson, R.L.; Archibald, K.E.; Demmer, R.L.; Tripp, J.L.

Lockheed Idaho Technologies Company, Idaho Falls, ID
INEL-95/00108; CONF-9505111; Shaping the Future Through
Pollution Prevention: Involvement - Commitment - Progress,
Proceedings of the Eleventh DOE Pollution Prevention
Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (8 pp.)
(1995)

Emphasis on the minimization of decontamination secondary waste

has increased because of restrictions on the use of hazardous
chemicals and Idaho Chemical Processing Plant (ICPP) waste
handling issues. The Lockheed Idaho Technologies Company
(LITCO) Decontamination Development Subunit has worked to
evaluate and introduce new decontamination methods to minimize
secondary waste generation. The Decontamination Development
Subunit has performed testing, evaluations, development and on-site
demonstrations for a number of novel decontamination techniques
that have not previously been used at the ICPP. This report
includes information on decontamination techniques that have
recently been evaluated by the Decontamination Development
Subunit.

126

V18/023424

**Nuclear Criticality Safety Analysis of the PACT-8
Melter for the Idaho National Engineering Laboratory
(INEL) Pit-9 Comprehensive Demonstration Project**

Bennion, J.S.; Boston, R.D.; Johnson, A.S.; Pruvost, N.L.

Idaho State University, College of Engineering, Pocatello, ID;
Lockheed Martin Energy Systems, Inc., Oak Ridge, TN;
Galaxy Computer Services, Inc., Santa Fe, NM

CONF-961103; Decommissioning, Decontamination, and
Reutilization Worldwide Experience: DD&R, What Does It Mean,
M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of
an Embedded Topical Symposium of an American Nuclear Society
Winter Meeting, Washington, DC, November 10-14, 1996.
American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp.
199-204) (1996)

Between 1967 and 1969, approximately 3100 cu m of transuranic
(TRU) waste from the Rocky Flats Plant was buried with other
hazardous and low-level radioactive wastes in a 40 m x 116 m
disposal pit located at the Idaho National Engineering Laboratory's
Radioactive Waste Management Complex. This pit, designated as
pit 9, is estimated to contain approximately 40 Ci of Pu-238, 1.7
kCi of Pu-239, 0.4 kCi of Pu-240, 3.0 kCi of Pu-241, and 3.1 kCi
of Am-241. During the nearly 30 yr that have elapsed since burial,
normal surface-water movement coupled with the disintegration of
the original containers have contributed to limited migration of
radionuclides past the boundaries of the original disposal containers.
Sensitivity to issues germane to buried TRU waste has led to the
decision to retrieve this material. Because the remediation
operations involve fissile materials, a credible nuclear criticality
safety (NCS) analysis must be performed as part of the safety
evaluation process to demonstrate the improbability of any
contingencies contributing to an inadvertent criticality. Results
from preliminary NCS analyses demonstrate that processing
TRU-contaminated waste in a PACT-8 plasma-torch melter under
the extreme conditions modeled will not result in criticality.
Conservative geometrical and material models of the melter and its
contents were developed for the postulated maximum credible
loading conditions. Standard criticality safety computer codes
(KENO and MCNP) were used to calculate the effective neutron
multiplication factor for the models. Environmental NCS analyses
are problematic because no experimental benchmarks with
comparable ranges of scale and fissile material concentration exist
that can be applied to environmental situations.

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V18/021277

Conversion of Elemental Sodium to Sodium Carbonate at Argonne National Laboratory

Herrmann, S.D.; Buschman, H.W.; Washburn, R.A.

Argonne National Laboratory-West, Idaho Falls, ID

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:27-29 (1995)

An integral function of the liquid-metal reactor program is to provide safe and effective disposition for elemental sodium, previously used as a heat-transfer medium in nuclear reactor plants. Argonne National Laboratory (ANL) has constructed a sodium process facility (SPF) at the Idaho National Engineering Laboratory to convert elemental sodium into 50 wt percent sodium hydroxide solution. The SPF will treat 175,000 gal of sodium, which ANL currently possesses, i.e., 70,000 gal from the Detroit Edison Fermi reactor and 105,000 gal from ANL's Experimental Breeder Reactor II (EBR-II). The production of sodium carbonate from elemental sodium will occur in two independent processes - a caustic process and a carbonate process. Process flowsheets are provided.

128 V18/021152

Draft Environmental Assessment - Closure of the Waste Calcining Facility (CPP-633), Idaho National Engineering Laboratory

Braun, J.B.; Irving, J.S.; Staley, C.S.; Stanley, N.

Lockheed Idaho Technologies Company, Idaho Falls, ID

DOE/EA-1149; 74 pp. (April 1996)

The DOE-Idaho Operations Office has prepared an environmental assessment (EA) to analyze the environmental impacts of closing the Waste Calcining Facility (WCF) at the Idaho National Engineering Laboratory (INEL). The purpose of the action is to reduce the risk of radioactive exposure and release of radioactive and hazardous constituents and eliminate the need for extensive long-term surveillance and maintenance. DOE has determined that the closure is needed to reduce these risks to human health and the environment and to comply with Resource Conservation and Recovery Act requirements. The WCF closure project is described in the DOE Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (Programmatic EIS). DOE determined in the Programmatic EIS Record of Decision (ROD) that certain actions would be implemented and other actions deferred. The EA examined the potential environmental impacts of the proposed action and evaluated reasonable alternatives, including the no action alternative in accordance with the Council on Environmental Quality Regulations. Based on the analysis in the EA, the action will not have a significant effect on the human environment.

129 V18/020865

ANL-E Health Physics Experience with D&D

Baker, S.I.; Mosho, G.D.; Munyon, W.J.; Murdoch, B.T.; Sholeen, C.M.; Shuman, J.P.

Argonne National Laboratory, Health Physics Section, Argonne, IL

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 61-69) (1996)

The Argonne National Laboratory - East (ANL-E) Health Physics Section provides direct and/or oversight support to various D&D projects at ANL-E. The health physics problems encountered have been challenging, primarily because they involved the potential for high internal exposures as well as actual high external exposures. The lessons learned are applicable to other radiological facilities. A number of D&D projects being conducted concurrently at ANL-E are described. The problems encountered are then categorized, and lessons learned and recommendations are provided. The main focus will be limited to the support and technical assistance provided by personnel from the ANL Health Physics Section during the course of the work activities.

130 V18/022857

Decontamination and Decommissioning Activities Photobriefing Book: Fiscal Year 1995

Argonne National Laboratory, Argonne, IL

Decontamination and Decommissioning Activities Photobriefing Book, Argonne National Laboratory, Argonne, IL; 65 pp. (1996)

The Technology Development (TD)/D&D Projects Department proactively supports the U.S. Department of Energy (DOE) and ANL-E mission by conducting D&D activities that promote compliance with applicable DOE, ANL, Federal, state, and local regulations and procedures and which will lead to reuse of facilities when practicable. This includes planning, scheduling, and directing all D&D activities at ANL-E; interfacing with DOE on the status of these activities; planning and scheduling future D&D at ANL-E; and investigating new and innovative approaches to accomplishing D&D project work in a timely and cost-effective manner. Concern for worker safety and health, public safety and health, and the environment are the first priorities of the D&D program at the ANL-E site.

131 V18/021461

Waste Minimization and Pollution Prevention in D&D Operations at the Argonne National Laboratory - East Site

Boing, L.E.; Coffey, M.J.; Ditch, R.W.; Fellhauer, C.R.; Rose, R.W.

Argonne National Laboratory, Argonne, IL

ANL/TD/CP-89380; CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (5 pp.) (1996)

Argonne National Laboratory (ANL) is implementing waste minimization and pollution prevention activities into its conduct of decontamination and decommissioning (D&D) projects. Many of these activities are rather straight forward and simple approaches, yet they are often overlooked and not implemented as often as they should or could be. Specific activities involving recycling and reuse of materials and structures, which have proven useful in lowering decommissioning and disposal costs on D&D projects at

ANL are presented.

132 V18/023349

Welcome to the Home Page of the Decontamination and Decommissioning Program at Argonne National Laboratory

Argonne National Laboratory, Argonne, IL

ANL/TD/WWW-91207; 35 pp. (September 10, 1996)

This report presents the details of the Argonne National Laboratory Home Page. Topics discussed include decontamination and decommissioning of the following: hot cells; Experimental Boiling Water Reactor; glove boxes; the Chicago Pile No. 5 Research Reactor Facility; the Janus Reactor; Building 310 Retention Tanks; Zero Power Reactors 6 and 9; Argonne Thermal Source Reactor; cyclotron facility; and Juggernaut reactor; as well as remedial actions.

133 V18/024159

Work of Deactivation and Decommissioning of Nuclear Facilities in Argonne National Laboratory

Bkhattachariya, S.

Argonne National Laboratory, Argonne, IL

INIS-KZ-001; CONF-9606310; Nuclear Power Engineering in the Republic of Kazakhstan - Perspectives of Development, G.I. Koltysheva and I.G. Perepelkin (eds.), Proceedings of an International Scientific Practical Conference, Aktau, Kazakhstan, June 24-27, 1996. Sigma, Kurchatov, Kazakhstan, 150 pp.; 19 pp. (June 1996)

Short communication. No abstract available. (This document is in Russian).

134 V18/022327

Decontamination of Hot Cells K-1, K-3, M-1, M-3, and A-1, M-Wing, Building 200: Project Final Report - Argonne National Laboratory - East

Cheever, C.L.; Rose, R.W.

Argonne National Laboratory, Decontamination and Decommissioning Program, Argonne, IL

ANL/D&D/TM-96/2; 65 pp. (September 1996)

This is the final report for the Argonne National Laboratory-East (ANL-E) Building 200 M-Wing Hot Cells Decontamination Project. The purpose of the project was to practically eliminate the radioactive emissions of Rn-220 to the environment and to restore the hot cells to an empty restricted use-condition. About 96.2 TBq (2,600 curies) per year of Rn-220 was being emitted at the start of the project from the radioactive contaminants left in the hot cells at the end of the ANL-E Proof-of-Breeding program work in 1985.

135 V18/022328

Decontamination and Decommissioning of 61 Plutonium Gloveboxes in D-Wing, Building 212, Argonne National Laboratory - East: Final Project Report

Cheever, C.L.; Rose, R.W.

Argonne National Laboratory, Decontamination and Decommissioning Program, Argonne, IL

ANL/D&D/TM-96/3; 70 pp. (September 1996)

Since programmatic research funding had been phased out, the decontamination and decommissioning of 61 plutonium gloveboxes in nine laboratories in Building 212, Argonne National Laboratory-East (ANL-E), was proposed by ANL-E and funded by the Department of Energy (DOE). The gloveboxes had been used from early 1960s to 1989 for research on nuclear reactor fuel development and for determination of properties of actinide metals. The decommissioning was to eliminate the risk of release of plutonium from the contaminated glovebox systems and to make the building space available for beneficial use. The project objectives were to remove the plutonium glovebox systems, decontaminate the laboratories to meet unrestricted use criteria, and dispose of the resulting radioactive waste. Both ANL-E employees and contractor services were used to perform the project.

136 V18/022464

Low Impact Plutonium Glovebox D&D: A Case Study in Decontamination and Decommissioning in the Immediate Vicinity of Non-Radiological Areas

Rose, R.W.

Argonne National Laboratory, Argonne, IL

ANL/TD/CP-86095-A; CONF-950868; ER '95: Committed to Results, Proceedings of a U.S. Department of Energy Environmental Remediation Conference, Denver, CO, August 13-18, 1995; (14 pp.) (1995)

A dilemma often encountered in decontamination and decommissioning operations is the lack of choice as to the location where the work is to be performed. Facility siting, laboratory location, and adjacent support areas were often determined based on criteria, which while appropriate at the time, are not always the most conducive to a D&D project. One must learn to adapt and cope with as found conditions. High priority research activities, which cannot be interrupted, may be occurring in adjacent non-radiological facilities in the immediate vicinity where highly contaminated materials must be handled in the course of a D&D operation. The execution of a project within such an environment involves a high level of coordination, cooperation, professionalism and flexibility among the project, the work force and the surrounding occupants. Simply moving occupants from the potentially affected area is not always an option and much consideration must be given in the selection of the D&D methodology to be employed and the processes to be implemented. Determining project boundaries and the ensuring that adjacent occupants are included in the planning/scheduling of specific operations which impact their work area are important in the development of the safety envelope. Such was the case in the recent D&D of 61 gloveboxes contaminated with plutonium and other transuranic nuclides at the Argonne National Laboratory-East site. The gloveboxes, which were used in Department of Energy research and development program activities over the past 30 years, were decontaminated to below transuranic waste criteria, size reduced, packaged and removed from Building 212 by Argonne National Laboratory personnel in conjunction with Nuclear Fuel Services, Inc. with essentially no impact to adjacent occupants.

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V18/024022

Low-Impact Plutonium Glove Box D&D: A Case Study in D&D in the Immediate Vicinity of Nonradiological Areas

Rose, R.W.

Argonne National Laboratory, Argonne, IL

Radwaste Magazine 4(1):47-51 (January 1997)

A dilemma often encountered in decontamination and decommissioning (D&D) operations is the lack of choice as to the location where the work is to be performed. Facility siting, laboratory location, and adjacent support areas have often been determined based on criteria that, while appropriate at the time, have not always been the most conducive to a D&D project. One must learn to adapt and cope with as-found conditions.

High-priority research activities, which cannot be interrupted, may be occurring in adjacent nonradiological facilities in the immediate vicinity where highly contaminated materials must be handled in the course of a D&D operation. Determining project boundaries and assuring that adjacent occupants are minimally impacted are important. Sixty one glove boxes contaminated with plutonium and other transuranic nuclides at the Argonne National Laboratory-East Site were decontaminated, reduced in size, packaged, and removed with essentially no impact on adjacent occupants.

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V18/024850

Building 579 Waste Ion Exchange Facility Characterization Report [Draft Report]

Sholeen, C.M.; Geraghty, D.C.

Argonne National Laboratory, Environment Safety and Health Division, Argonne, IL

ANL/ESH-HP-97/01; 118 pp. (March 1997)

External direct surveys were performed for elevated gamma levels with a PG2 portable detector connected to a PRM 5-3 meter and for elevated alpha and beta levels with an NE portable detector. No gamma activity above background was detected. Several locations, the floor and west wall of building 579 and the manhole, had low levels of beta activity, up to 87 plus/minus 49 dis/min. These values are below the allowable residual surface contamination limits for removable beta activity. There is water in the Mixed Bed Exchange Vessel, the Cation Exchange Vessel, the Closed Drain Tank, the manhole, and some of the pipes. The accessible internal surfaces of the pipes, tanks, and columns had higher levels of beta activity up to 172 plus/minus 52 dis/min and some alpha activity up to 106 plus/minus 29 dis/min. After the water is removed from the vessels, tanks, and lines, they should be surveyed to determine whether the areas accessible for smear surveys are representative of the general inside contamination levels. There are elevated levels of radionuclides in the resin from the Cation Exchange Vessel and in the water from the manhole. Since the radionuclide concentrations in the manhole water are less than ten times the site release criteria, it does not need any processing before it is released to the onsite drains. Although there are RCRA metals on the resin in the Cation Exchange Vessel, the amount that is removed during a leaching analysis is below the toxicity Characteristic level. Therefore, the resin is a radioactive waste not a mixed waste.

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V18/021458

ANL CP-5 Decontamination and Decommissioning Project Necessary and Sufficient Pilot: Report of the Standards Identification Team on the Selection of the Necessary and Sufficient Standards Set

Argonne National Laboratory, Argonne, IL

ANL/DIS/RP-90166; 363 pp. (May 1996)

The CP-5 reactor was a heavy-water moderated and cooled, highly-enriched uranium-fueled thermal reactor designed for supplying neutrons for research. The reactor was operated almost continuously for 25 years until its final shutdown in 1979. It is situated on approximately three acres in the southwestern section of Argonne National Laboratory. In 1980 all nuclear fuel and the heavy water that could be drained from the process systems were shipped off-site, and the CP-5 facility was placed into lay-up pending funding for decommissioning. It was maintained in the lay-up condition with a minimum of maintenance until 1990, when the decontamination and decommissioning (D&D) project began. This D&D project provides for the disassembly and removal of all radioactive components, equipment, and structures that are associated with the CP-5 facility. The experimental area around the CP-5 reactor has been prepared for D&D, and the area outside the facility has been remediated. The reactor primary coolant and support systems have been removed and packaged as waste. The significant remaining tasks are: (1) removal of the reactor internals and the biological shield structure; (2) decontamination of the rod storage area; (3) decontamination of the various radioactive material storage and handling facilities, including the fuel pool; and (4) decontamination and dismantlement of the building. This report describes the scope of the project, identification of standards for various aspects of the project, the lessons learned, and consideration for implementation.

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V18/023443

Remote Dismantlement Activities for the Argonne CP-5 Research Reactor

Noakes, M.W.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-961241; ETAR 96: 1996 Emerging Technologies in Advanced Robotics, Proceedings of a Conference, London, United Kingdom, December 2-3, 1996; (7 pp.) (1996)

The Department of Energy's (DOE's) Robotics Technology Development Program (RTDP) is participating in the dismantlement of a mothballed research reactor, Chicago Pile Number 5 (CP-5), at Argonne National Laboratory (ANL) to demonstrate technology developed by the program while assisting Argonne with their remote system needs. Equipment deployed for CP-5 activities includes the dual-arm work platform (DAWP), which will handle disassembly of reactor internals, and the RedZone Robotics-developed 'Rosie' remote work vehicle, which will perform size reduction of shield plugs, demolition of the biological shield, and waste packaging. Remote dismantlement tasks are scheduled to begin in February of 1997 and to continue through 1997 and beyond.

141

V18/022924

Conversion of the EBWR into a Radioactive Waste Storage Facility

Patel, P.B.

Argonne National Laboratory, Argonne, IL

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:53-54 (1995)

This paper describes the environmental and engineering issues of interest during the conversion of the experimental boiling water reactor (EBWR) into the radioactive waste storage facility (RWSF) at Argonne National Laboratory-East (ANL-E), Argonne, Illinois. The existing EBWR at ANL-E was constructed in the late 1950s. The decontamination and decommissioning of the EBWR is in progress and nearing completion. This facility will be used to provide sufficient radioactive waste storage to meet ANL-E's needs until the Waste Isolation Plant near Carlsbad, New Mexico, will accept the waste. During the conceptual design phase of the project, the cost for the construction of a new RWSF was estimated at approximately \$6.25 million as compared to a \$2.7 million estimate for the conversion of the EBWR into the RWSF. These estimates include costs for engineering, permits, and construction. In anticipation of budget recision, ANL took a proactive role to further reduce the project cost by approximately \$0.5 million using a value engineering process and redefining the storage requirements.

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V18/021350

D&D of the Experimental Boiling Water Reactor (EBWR) [Package 4]

Fellhauer, C.R.; Boing, L.E.; Yule, T.J.; Bhattacharyya, S.K.

Argonne National Laboratory, Argonne, IL

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (5 pp.) (April 16, 1996)

Argonne National Laboratory has completed the D&D of the Experimental Boiling Water Reactor (EBWR). The Project consisted of decontaminating and/or packaging as radioactive waste the reactor vessel and internals, contaminated piping systems, miscellaneous tanks, pumps, and associated equipment. The D&D work involved dismantling process equipment and associated plumbing, ductwork, drain lines, etc., performing size reduction of reactor vessel internals in the fuel pool, packaging and manifesting all radioactive and mixed waste, and performing a thorough survey of the facility after the removal of activated and contaminated material. Non-radioactive waste was disposed of in the ANL-E landfill or recycled. The EBWR D&D project was divided into four phases. Phase I and II were performed by ANL-E personnel, while Phases III and IV were performed by a contractor under ANL-E management. The final survey was performed by the contractor, while the verification survey was performed by ANL-E. The project lasted 188 months. Phase I was initiated in April 1986 and the final report was issued in February 1996. The total exposure to project personnel was 208.7 person-mSv (20.87 person-rem), with no individual exceeding the EBWR D&D Project limit of 15 mSv (1.5 rem). A total of 360,205 kg (792,452 lbs) of radioactive waste were packaged for off-site disposal at a low level radioactive waste repository, with a total activity of 24,798 Gbq (670.23 Ci).

Additionally, 26,829 kg (59,023 lbs) of mixed waste, with a total activity of 3,171 Mbq (85.7 mCi) were packaged for disposal. The total cost of the EBWR D&D project, including labor, management and waste disposal, was \$19,586,000. The EBWR containment building will be used by ANL-E for interim storage of transuranic waste. Some very small amounts of inaccessible residual contamination was left in place for economic or structural reasons. In January 1996 the EBWR facility was formally decommissioned and transferred from EM-40 to EM-30. This paper discusses the details of this ten year effort.

143

V18/025408

Decontamination and Decommissioning of the Experimental Boiling Water Reactor (EBWR): Project Final Report - Argonne National Laboratory

Fellhauer, C.R.; Boing, L.E.; Aldana, J.

Argonne National Laboratory, Decontamination and Decommissioning Program, Argonne, IL; NES, Inc., Danbury, CT

ANL/D&D/TM-96/4; 111 pp. (March 1997)

The Final Report for the Decontamination and Decommissioning (D&D) of the Argonne National Laboratory - East (ANL-E) Experimental Boiling Water Reactor (EBWR) facility contains the descriptions and evaluations of the activities and the results of the EBWR D&D project. It provides the following information: (1) an overall description of the ANL-E site and EBWR facility; (2) the history of the EBWR facility; (3) a description of the D&D activities conducted during the EBWR project; (4) a summary of the final status of the facility, including the final and confirmation surveys; and (5) a summary of the final cost, schedule, and personnel exposure associated with the project, including a summary of the total waste generated. This project report covers the entire EBWR D&D project, from the initiation of Phase I activities to final project closeout. After the confirmation survey, the EBWR facility was released as a "Radiologically Controlled Area," noting residual elevated activity remains in inaccessible areas. However, exposure levels in accessible areas are at background levels. Personnel working in accessible areas do not need Radiation Work Permits, radiation monitors, or other radiological controls. Planned use for the containment structure is an interim transuranic waste storage facility (after conversion).

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V18/023535

EBWR Decommissioning Project: Progress Report

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (11 pp.) (1996)

On February 29, 1996, Argonne National Laboratory successfully completed the D&D of the Experimental Boiling Water Reactor (EBWR). The project consisted of decontaminating and/or packaging as radioactive waste the reactor vessel and internals; contaminated piping systems; and miscellaneous tanks, pumps, and associated equipment. The major technical interest was the WACHS reactor vessel cutting machine used to segment both the reactor vessel and cavity liner. The EBWR was decommissioned so that the reactor containment could be reused for other Laboratory programmatic purposes without any significant operational

radiological restrictions. The work involved four phases. Phase I included preparatory activities, Phase II encompassed tasks associated with disassembling reactor system piping and associated equipment, Phase III involved reactor disassembly, and Phase IV involved the removal of the bio-shield concrete. Phase IV was completed in November 1995. The period from December 1995 - February 1996 was used for project close-out activities. Components of the biological shield, including concrete and lead bricks, were removed and decontaminated for salvage or disposed of accordingly. Remaining trace quantities of radioactivity that could not be removed was left in place in such a way that all accessible areas in the EBWR shell were at or near background levels of radioactivity. Phase IV also included the performance of any final decontamination activities. To close out the project, final surveys were performed and project reports and miscellaneous documentation were issued. The D&D contractor performed a final release survey to confirm that residual activity in the EBWR facility was below unrestricted release limits. ANL-E Health Physics performed a verification survey to confirm the contractor's results. The D&D contractor demobilized and removed all temporary housing, equipment, etc. off-site. All waste was removed from the facility and disposed of appropriately.

145 V18/020921

Experimental Boiling Water Reactor D&D ES&H Lessons Learned

Hannum, W.H.; Knox, A.E.

Argonne National Laboratory, Argonne, IL

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (10 pp.) (1996)

The decontamination and decommissioning of the Experimental Boiling Water Reactor (EBWR) was well planned and professionally accomplished by an experienced contractor. In the process, two particular radiological incidents occurred that were outside of the planning envelope. The first involved trace Pu-241 that had decayed to Am-241 and that was vaporized during size reduction. The second involved microspheres of activated steel that were produced in condensation of plasma-arc cutting vapors. While neither resulted in significant exposure, the americium uptake was clearly an "unreviewed safety question," and both deserve attention as lessons learned.

146 V18/021149

Status Report on the Experimental Boiling Water Reactor (EBWR) Decontamination and Decommissioning (D&D) Project

Sears, L.; Garlock, G.; Mencarelli, R.

ALARON Corporation, Cayce, SC; Electric Power Research Institute, Palo Alto, CA; Paul Williams and Associates, Medina, OH

EPRI-TR-105569; CONF-950718; Proceedings of the 1995 Electric Power Research Institute (EPRI) International Low-Level Waste Conference, Orlando, FL, July 10-12, 1995, 600 pp.; (pp. 39.1-39.10) (November 1995)

ALARON Corporation is under contract, to Argonne National Laboratory - East (ANL-E), to complete the decontamination and decommissioning of the Experimental Boiling Water Reactor (EBWR). The project, begun in 1986 by ANL-E personnel, is projected to be completed by the end of 1994. The final phase of work was awarded to ALARON in December 1993 with the scope of work including the disassembly and removal of all remaining reactor internals, the reactor vessel, the lead bio-shield, the core liner, and the activated portion of the concrete bio-shield. This paper discusses the work undertaken beginning in January 1994 and continuing through July 1994. During this period the required pre-mobilization documentation was prepared and approved, mobilization was completed, and the reactor internals, reactor vessel, lead bio-shield and core liner were removed. The paper will compare the planned schedule to the actual schedule, discuss problems encountered, review volume reduction techniques and health and safety issues including radiological aspects of the project.

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V18/021240

Decontamination and Dismantlement of the Argonne National Laboratory - East Map Tube Facility

Moos, L.P.; Wescott, J.B.; Fleming, D.L.; Subbaraman, G.; Horton, P.H.

Argonne National Laboratory, Argonne, IL; Jacobs Engineering Group Inc., St. Charles, MO; Rockwell International Corporation, Rocketdyne Division, Canoga Park, CA

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 164-167) (1994)

The Map Tube Facility at Argonne National Laboratory - East (ANL-E) was used to temporarily store small, highly radioactive objects and waste materials. The facility contained 129 cast-iron pipes set vertically in a 21 foot deep concrete monolithic structure. Deterioration of the unit allowed precipitation to enter, corroding radioactive material in the pipes. Leakage of this contaminated water is thought to be responsible for radioactive contamination of surrounding soil and groundwater. Radioactive sediment and numerous small metallic objects were found in the pipes. Decontamination was undertaken to remove the radioactive water and sediment. The highly radioactive metallic objects were removed and characterized. Residual radioactivity was removed from the structure by removing each pipe from the concrete matrix through a deep concrete coring operation. Each 21 foot long pipe was removed from the concrete matrix as a single unit; lead in two joints in each pipe was removed and the cores were shipped to the DOE Hanford site for disposal. The coring operation successfully removed all residual radioactive material from the structure.

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V18/022406

C-340 Facility Characterization Plan for Decontamination and Decommissioning Paducah Gaseous Diffusion Plant, Paducah, Kentucky

CDM Federal Programs Corporation, Paducah, KY

7914-209-FR-BBVP; 625 pp. (June 22, 1994)

The Paducah Gaseous Diffusion Plant (PGDP) is a DOE facility located in western Kentucky. The C-340 Uranium Reduction is located on the east side of the plant. Because the C-340 building is a contaminated facility under DOE jurisdiction, the potential for reuse and recovery of materials and equipment must be documented and a schedule for decommissioning the building must be developed. The scope of this project is to conduct a facility characterization of the C-340 complex that presents a thorough physical, chemical, and radiological characterization to fulfill applicable requirements. This facility characterization plan (FCP) defines how this project will be conducted. The FCP details all sampling, quality assurance/quality control, health and safety, and other steps that should be taken during the implementation of the project to ensure that worker health and safety is maintained, and that accurate data, in quantities sufficient to adequately characterize the facility, are collected. This FCP has been produced in both a print version and on 2 diskettes.

149

V18/022509

Uranium Enrichment Decontamination and Decommissioning Fund: 1995 Report

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0305; 29 pp. (1996)

This report describes the strategy of recycle, reuse, and waste minimization for the gaseous diffusion plants. Progress in decontamination and decommissioning, remedial action, and waste management is discussed. Financial statements for the uranium enrichment decontamination and decommissioning fund are presented.

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V18/021248

Decommissioning and Demolition at Weldon Spring

Davis, M.L.; Toms, B.Y.

B&W/OHM Weldon Spring, Inc., St. Charles, MO; B&W Nuclear Environmental Services, Inc., Lynchburg, VA

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 205-208) (1994)

B&W Nuclear Environmental, Inc. (B&W NESI) and OHM Corporation formed a joint venture company, B&W/OHM Weldon Spring, Inc. (B&W/OHM WSI) to perform work at the Department of Energy's Weldon Spring Site Remedial Action Project in St. Charles, Missouri (Weldon Spring). This joint venture company combines the radiological decontamination and decommissioning experience of B&W NESI with the hazardous and toxic waste remediation experience of OHM. Together, the two companies have over 60 years of relevant experience and a strong record of performance in resolving problems associated with nuclear and hazardous materials contamination. B&W/OHM WSI is under

contract to MK, DOE's Project Management Contractor (PMC), to provide supervision, tools, labor and equipment to decontaminate and dismantle 10 buildings and one area at the chemical plant site. The United States Atomic Energy Commission used the site from 1957 through 1966 as a feed material for the weapons complex production site to process uranium and thorium ore concentrates. Since the cessation of production activity, the buildings and structures contained in the chemical plant have badly deteriorated, posing immediate potential threat to workers, the general public, and the environment, prompting the DOE to initiate an Expedited Response Action to decontaminate, empty, and dismantle all the buildings and structures. B&W/OHM WSI's scope of work included the equipment installation in preparation for removal and building demolition. Residual levels of fixed contamination materials were sorted by category; staged; locked in place utilizing surface coatings to prevent the release of airborne activity; and transported to a temporary disposal facility. Loose surface contamination was removed from building structures. All friable and non-friable asbestos were removed prior to building demolition and packaged for subsequent burial in accordance with OSHA requirements. The buildings were demolished to their foundation levels.

151

V18/021153

Evaluating and Planning the Radioactive Waste Options for Dismantling the Tokamak Fusion Test Reactor [December 1995]

Rule, K.; Scott, J.M., III; Larson, S.B.; Parsells, R.; Cislo, R.J.; Chiruvolu, M.; Gallagher, D.

Princeton Plasma Physics Laboratory, Princeton, NJ

CONF-951209; Proceedings of the 17th Annual U.S. Department of Energy Low-Level Radioactive Waste Management Conference, D. Lake (ed.), Phoenix, AZ, December 12-14, 1995, 480 pp.; (9 pp.) (1995)

The Tokamak Fusion Test Reactor (TFTR) is a one-of-a kind tritium fusion research reactor, and is planned to be decommissioned within the next several years. This is the largest fusion reactor in the world and as a result of deuterium-tritium reactions is tritium contaminated and activated from 14 MeV neutrons. This presents many unusual challenges when dismantling, packaging and disposing its components and ancillary systems. Special containers are being designed to accommodate the vacuum vessel, neutral beams, and tritium delivery and processing systems. A team of experienced professionals performed a detailed field study to evaluate the requirements and appropriate methods for packaging the radioactive materials. This team focused on several current and innovative methods for waste minimization that provides the most opportune, cost effective manner to package and dispose of the waste. This study also produces a functional time-phased schedule which conjoins the waste volume, weight, costs and container requirements with the detailed project activity schedule for the entire project scope. This study and project will be the first demonstration of the decommissioning of a tritium fusion test reactor. The radioactive waste disposal aspects of this project are instrumental in demonstrating the viability of a fusion power reactor with regard to its environmental impact and ultimate success.

152

V18/023726

Evaluating and Planning the Radioactive Waste Options

for Dismantling the Tokamak Fusion Test Reactor [July 1996]

Rule, K.; Scott, J.M., III; Larson, S.B.; Cislo, R.J.; Parsells, R.; Chiruvolu, M.

Princeton Plasma Physics Laboratory, Princeton, NJ

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (9 pp.) (1996)

The Tokamak Fusion Test Reactor is a one-of-a-kind tritium fusion research reactor that was scheduled to begin decommissioning in September 1995. It is the largest fusion reactor in the world and is contaminated with tritium and activated from 14-MeV neutrons. The activation and contamination present unusual challenges in dismantling, packaging, and disposing of the components and ancillary systems. Because the location and some of the supporting equipment are to be reused by a second-generation fusion reactor, and the schedule is tight, the sequencing of tasks is critical. To meet these challenges, a detailed field study was performed to evaluate appropriate methods and requirements for packaging the radioactive materials. The study focused on current and innovative methods for waste minimization. Special containers were designed to accommodate the vacuum vessel, neutral beams, and tritium delivery and processing systems. The study also produced a functional time-phased schedule that combines the waste volume, weight, costs, and container requirements with the detailed project activity schedule. This schedule allowed different scenarios and strategies to be tested for their effect on waste generation, schedule impact, and cost, before implementation. This project will be the first decommissioning of a tritium fusion test reactor. The radioactive waste disposal aspects of this project are instrumental in demonstrating the viability of a fusion power reactor with regard to its environmental impact.

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V18/022035

Segmentation Strategies for the Irradiated and Tritium Contaminated PPPL TFTR

Walton, G.R.; Litka, T.J.; Spampinato, P.T.

Princeton Plasma Physics Laboratory, Princeton, NJ; Advanced Consulting Group, Inc., Chicago, IL; RHD Consultants, Inc., Princeton, NJ

CONF-950414 (Vol. 57-II); Life Assessment Technology for Fossil Power Plants, R. Viswanathan and R.W. Porter (eds.), Proceedings of the 57th Annual American Power Conference, Chicago, IL, April 18-20, 1995. Illinois Institute of Technology, Chicago, IL, Vol. 57-II, 914 pp.; (pp. 1305-1310) (1995)

The Tokamak Fusion Test Reactor (TFTR) at Princeton Plasma Physics Laboratory is scheduled to complete its final experiments in the Fall of 1995. As a result, the TFTR will be activated and tritium contaminated. After the experiments are complete, the TFTR will undergo Shutdown and Removal (S&R). The space vacated by the TFTR will be used for a new test reactor, the Tokamak Physics Experiment (TPX). Remote methods may be required to remove components and to segment the Vacuum Vessel. The TFTR has been studied to determine alternatives for the segmentation of the Vacuum Vessel from the inside (In-Vessel). The methodology to determine suitable strategies to segment the Vacuum Vessel from In-Vessel included several areas of concentration. These areas were

segmentation locations, cutting/removal technologies, pros and cons, and cutting/removal technology delivery systems. The segmentation locations for easiest implementation and minimal steps in cutting and removal have been identified. Each of these will also achieve the baseline for packaging and shipment. The methods for cutting and removal of components were determined. In addition, the delivery systems were conceptualized.

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V18/022902

Chemical Surety Materiel Decontamination and Decommissioning of Los Alamos National Laboratory Chemical Surety Materiel Laboratory Area TA-3, Building SM-29, Room 4009

Moore, T.E.; Smith, J.M.

Battelle Memorial Institute, Chemical/Biological Defense Department, Columbus, OH

LA-SUB-95-146; 98 pp. (April 1994)

The objective of this work was threefold: (1) To provide near-real-time (NRT) monitoring operations to detect distilled mustard (HD) agent in support of the disassembly crews to alert them to any potential exposure to HD, (2) sample all laboratory residues for the presence of agent off-gassing above the XXX level prior to release for final disposal and, (3) develop a Chemical surety materiel (CSM) safety training course. The air sampling support provided by Battelle Memorial Institute (BMI) clearly indicated a lack of HD or G-series nerve agent contamination above 1 TWA, respectively, in the former CSM laboratory and associated ductwork located in room 4009 of building SM-29. The BMI staff also demonstrated that Tenax-TA tubes are a viable and cost-effective alternative to MINICAMS sampling. However, it was discovered that standard GC analysis can be disrupted by an interferant which, heretofore, had not been encountered (i.e., sulfur cured latex gloves). As a result of this discovery the HMRF analytical staff have adopted the use of non-powdered (non-sulfur) latex gloves for use within the HMRF and at other off-site air monitoring operations.

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V18/021239

Decommissioning of an Enriched Uranium Processing Facility

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Los Alamos National Laboratory, Los Alamos, NM

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 160-163) (1994)

Decommissioning Buildings 3 and 4 South at Technical Area 21, Los Alamos National Laboratory, involves the decontamination, dismantlement, and demolition of two enriched uranium processing buildings containing process equipment and ductwork holdup. The Laboratory has adopted the "observational approach." Rather than extensively characterize the entire project, enough data is collected to begin activities. Procedures are developed as the work progresses.

A system has been implemented whereby technical procedures and work permits are augmented with task hazard analyses to fully define specific tasks and inform workers of hazards. All daily work activities are tied to the specific governing work procedure/hazard analysis. The project has used nondestructive assay methods and will be applying an innovative duct lining technique and a long-range alpha detector. The Laboratory has accelerated the work schedule by one year and reduced fixed costs by \$1.4 million. Using strategies developed at Oak Ridge National Laboratory, sampling and dismantlement techniques for perchlorate-contaminated items were accomplished without delaying the schedule.

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V18/024075

Decontamination and Size Reduction of Plutonium-Contaminated Process Exhaust Ductwork and Glove Boxes

LaFrate, P.J., Jr.; Elliott, J.W.; Siddoway, D.; Velasquez, M.
Los Alamos National Laboratory, Los Alamos, NM

LA-UR-97-254; CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (12 pp.) (1997)

The Los Alamos National Laboratory (LANL) Decommissioning Project has decontaminated and demolished two filter plenum buildings at Technical Area 21 (TA-21). During the project, a former hot cell was retrofitted for decontamination and size reduction of 1100 linear ft. of process exhaust and glove boxes highly contaminated with plutonium. Plutonium-238 and Pu-239 concentrations were as high as 1 Ci per linear foot and averaged approximately 1 mCi per linear foot. The project's objective was to reduce plutonium contamination on surfaces to below transuranic levels. If possible, metal surfaces were further decontaminated to meet Science and Ecology Group (SEG) waste classification guidelines so that the metal could be recycled at the SEG facility in Oak Ridge, Tennessee. Ninety percent of all radioactive waste for the project was eventually characterized as low-level radioactive waste (LLRW). Twenty percent of this material was shipped to SEG. This paper focuses on process exhaust and glove box decontamination methodology, size reduction techniques, waste characterization, engineering controls, worker protection, lessons learned, and waste minimization. Decontamination objectives are discussed in detail. The paper also presents the project's surface contamination acceptance criteria for LLRW, low-level radioactive waste, transuranic waste, and SEG waste.

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V18/025841

Nuclear Criticality Safety in D&D Operations: A Los Alamos Experience

Schlesser, J.A.

Los Alamos National Laboratory, Los Alamos, NM
CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 182-185) (1996)

Decommissioning operations at the Los Alamos National Laboratory require the interaction of several disciplines so that the effort to D&D radiological facilities can proceed unencumbered, on schedule, and within budget. Although playing a minor role, the Laboratory's Nuclear Criticality Safety Group has provided criticality safety guidance to one such D&D team efficiently and cost-effectively. During the first major D&D effort at Los Alamos, a total of about 6 kilograms of uranium (U-93) was recovered from a facility thought to contain only tens of grams.

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V18/021146

Shoreham Decommissioning: Project Summary and Lessons Learned

Petschauer, F.

Electric Power Research Institute, Palo Alto, CA; Long Island Power Authority, Mount Sinai, NY

EPRI-TR-106148; 104 pp. (February 1996)

As the first large commercial nuclear power facility to be decommissioned in the U.S., Shoreham has served as a "test case" for emerging NRC policy and regulations on decommissioning. Consequently, the level of regulatory oversight has been greater at Shoreham than for previous decommissioning efforts. The project was also strongly affected by changes in the availability of radioactive waste burial space. Decommissioning large commercial nuclear power plants is an important economic issue and safety concern for electric utilities. The report includes information regarding activities performed by the LIPA, LILCO, NYPA, and many vendor organizations who supplied equipment, supplies, and services to the project. Since the information has not been readily available elsewhere, it should have special interest to power plant operators.

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V18/025416

BNL Building 650 Lead Decontamination and Treatment Feasibility Study: Final Report

Kalb, P.D.; Cowgill, M.G.; Milian, L.W.; Selcow, E.C.

Brookhaven National Laboratory, Upton, NY

BNL-64383; 36 pp. (October 1995)

Lead has been used extensively at Brookhaven National Laboratory (BNL) for radiation shielding in numerous research programs. A large inventory of excess lead (estimated at 410,000 kg) in many shapes and sizes is currently being stored. Through use at BNL, some of the lead has become radioactive, either by contamination of the surface or through activation by neutrons or deuterons. The presence of radioactivity converts the lead from a hazardous waste to a mixed waste, which is considerably more complicated and expensive to dispose of. This study was conducted at BNL's Environmental and Waste Technology Center for the BNL Safety and Environmental Protection Division to evaluate the feasibility of various treatment options for excess lead currently being stored. A review and evaluation of the literature indicated that a number of physical and chemical methods are available for decontamination of lead. Many of these techniques have been applied for this purpose with varying degrees of success. Preliminary findings indicate that activated materials have a distinct gamma signature, and a gamma scanning survey would be useful for screening and identifying

materials that are in one of three categories: clean, contaminated, or activated. Bench-scale experiments resulted in the identification of several wet chemical methods that are very effective in removing layers of lead oxide from the surface. Silica sand blasting was effective in removing lead oxide from the surface of bricks. Polyethylene macroencapsulation was successfully demonstrated for the treatment of contaminated lead as an alternative to decontamination or for cases where decontamination is either not technically or economically feasible.

160 V18/021284

Front-End Planning and Evaluation for West Valley Demonstration Project Completion

Gramling, J.; Sharma, V.; Marschke, S.E.

West Valley Nuclear Services Company, Inc., West Valley, NY; Raytheon Nuclear, Inc., Lexington, MA

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:37-38 (1995)

In December 1988, the U.S. Department of Energy and the New York State Energy Research and Development Authority announced their intent to prepare a joint environmental impact statement (EIS) to evaluate alternatives for West Valley Demonstration Project (WVDP) completion and closure and/or long-term maintenance of the Western New York Nuclear Service Center (WNYNSC) in West Valley, New York. Planning was initiated for the eventual closure of the site, even though vitrification of the high-level waste (HLW) stored at the site was, at that time, a number of years in the future. West Valley Nuclear Services Company (WVNSC), the WVDP management and operations contractor, and their architect/engineer, Raytheon Nuclear Incorporated, were authorized to develop characterization studies and engineering evaluations of closure alternatives for the various facilities of the WNYNSC. This paper presents a summary of the status of that effort, including the resolution of unique problems.

161 V18/021387

D&D Experience at Fernald

Warner, R.D.

U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH

Fostering the Needed Partnerships: Doing the Necessary Science to Support Technology Development, Commercialization, Deployment, E.L. Helminski (ed.), Proceedings of the Seventh Annual Western Governors' Association/Weapons Complex Monitor Applied Research and Cleanup Technology Colloquium, Phoenix, AZ, April 29-May 2, 1996. Exchange/Monitor Publications and Forums, Lake Bluff, IL, 500 pp.; (20 pp.) (April 1996)

This presentation examined a variety of issues concerning decontamination and decommissioning activities at Fernald. The outline and viewgraphs cover the following topics: Waste characterization; Decontamination; Dismantling, segmentation and demolition; D&D waste disposition; and the Large-scale technology

demonstration.

162 V18/021354

Deactivation and Decommissioning Experience at Fernald [Package 8]

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Fernald Environmental Restoration Management Corporation, Cincinnati, OH

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (17 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. The presentation was organized into the following areas: Characterization, Decontamination, Dismantling, segmentation and demolition, Waste disposition, and, Large-scale technology demonstration.

163 V18/022080

Dose and Risk Assessment Approach for the Fernald CERCLA D&D Project

Throckmorton, J.D.; Clark, T.R.; Waligora, S.J., Jr.; Haaker, R.F.

Fernald Environmental Restoration Management Corporation, Cincinnati, OH; Environmental Dimensions, Inc., Albuquerque, NM

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 515-519) (1994)

At the Fernald Environmental Management Project (FEMP) the uranium processing facilities used from 1952 through 1989 are near or beyond their intended design life. These current conditions present an increasing probability for future releases of hazardous substances to the environment. To support a decision by the U.S. Department of Energy (DOE) and the Environmental Protection Agency (EPA) to remediate the buildings, a dose and risk assessment was performed to determine the extent of exposure that would be associated with the controlled decontamination and dismantlement (D&D) of the Fernald facilities. A conceptual risk assessment model was developed, with exposure mechanisms and associated pathways for each potential receptor. The three receptor groups were defined as: the remediation workers, other on-site workers (those not performing D&D), and off-site residents. For use in the conceptual model, an airborne source term was developed through process knowledge, other historical information and data, and air sample data from within the facilities. Individual and collective doses and risks were developed for each receptor and for each population group. The risk assessment demonstrated that all exposures resulting from the action would be within the acceptable DOE administrative control level of 2.0 rem per year for occupational workers and the acceptable EPA risk range from 10(E-6) to 10(E-4) for the general

public.

164 V18/022960

Large-Scale Decontamination and Decommissioning Technology Demonstration Project at a Former Uranium Metal Production Facility

Martineit, R.A.; Borgman, T.D.; Bossart, S.J.; Brown, D.M.; Krause, D.R.; Peters, M.S.; Pettit, P.J.; Ruesink, G.P.; Stebbins, L.L.; Warner, R.D.

Fluor Daniel Fernald, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH; B&W Nuclear Environmental Services, Inc., Lynchburg, VA; Halliburton NUS Corporation, Gaithersburg, MD

FEMP-2525; CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (14 pp.) (1997)

In early 1995, the Department of Energy's (DOE's) Federal Energy Technology Center (FETC) was selected as the lead organization for the Decontamination and Decommissioning (D&D) Focus Area. The DOE's D&D Focus Area is charged with developing technologies or finding existing technologies, being used in other fields, that are more cost effective and/or safer than existing baseline D&D technologies. The merit of these new technologies is to be demonstrated through a commercial-scale application as part of Large-Scale Technology Demonstrations (LSTD). The Fernald Environmental Management Project's (FEMP) proposal to use its Plant 1 D&D Project as a vehicle for LSTD was accepted in October, 1995 by the D&D Focus Area. The Plant 1 D&D Project consisted of Building 1A and six smaller associated buildings. As a result of the underlying Plant 1 D&D Project being an independent project for which a contract had already been awarded, this LSTD Project required the integration of the technology demonstrations into the baseline D&D project. This paper describes management structures for integration as well as implementation of demonstration technologies.

165 V18/020979

Radiological Contamination Penetration Depth in Fernald Transite Panels

Russ, W.R.; Valentine, J.D.; Chung, W.

University of Cincinnati, Department of Mechanical, Industrial, and Nuclear Engineering, Cincinnati, OH

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (14 pp.) (1996)

To characterize the penetration depth of radiological contamination through the thickness of transite (an asbestos-cement building material) from the Department of Energy Fernald site, both destructive and non-destructive analysis techniques were used. The destructive techniques were based on progressively removing layers of material and subsequent direct analysis of the exposed surfaces. These layer removal analyses included quantitative measurements using a Geiger-Mueller (G-M)

detector and qualitative measurements based on autoradiography and ultraviolet photography. G-M detector measurements during layer removal provided quantitative distributions consistent with diffusion theory, serving to validate a novel non-destructive technique. The ultraviolet analysis provided qualitative information with the advantage of instantaneous results that may be useful for screening samples. The autoradiographic analysis also provided qualitative results for comparison and image analysis. The novel non-destructive technique involves acquiring gamma-ray spectra with high-purity germanium detectors placed on both sides of a panel and relies on relating the difference in gamma-ray attenuation for different energies to the spatial distribution of contamination through the thickness of the panel. Both quantitative and qualitative results from this study indicate that the contamination did penetrate into the volume of the transite. However, this penetration depth was observed to be strongly dependent on the manner in which the transite was exposed to the contamination. Consequently, it is likely that significantly different penetration depths will be observed for different processes, buildings, and sites.

166 V18/023351

Status of Decommissioning Activities at the Fernald Environmental Management Project (FEMP) Site

Argonne National Laboratory, Argonne, IL

ANL/TD/VU-91602; CONF-961122 (Summary, Viewgraphs); Proceedings of the Fernald Environmental Management Project (FEMP) Advisory Group Meeting, Madrid, Spain, November 4-8, 1996; (56 pp.) (1996)

The Fernald Environmental Management Project (FEMP) was formally closed and the mission of the facility was officially redirected toward environmental restoration in August 1991. Many of the production facilities and equipment still contained quantities of raw, intermediate, and finished production-related materials. The safe shutdown program was initiated to remove and properly disposition all nuclear product and in process residue materials, supplies, chemicals, and associated process equipment that was abandoned in place when FEMP stopped production in 1989. As part of the remedial design of the interim remedial action, a schedule for building dismantlement was submitted in June 1995. A 31-year schedule was developed, based on anticipation of reduced funding levels. However, recent cleanup successes at Fernald led to DOE endorsement of greater funding for the final cleanup, accelerating the schedule for Operable Unit 3 dismantlement, reducing the schedule to ten years. Under the accelerated schedule, several plants will be dismantled, starting in 1996.

167 V18/023536

Fernald Decommissioning Project

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (6 pp.) (1996)

As part of the D&D Program at Fernald, an Invitation Bid for a firm fixed price contract for the demolition of Plant 4 was prepared and issued in August 1994. Subsequently, a bid was accepted and a contract awarded to B&W Nuclear Environmental Services, Inc. (B&W-NESI) in November 1994. Building 4A (Green Salt Plant) is a seven-level, five-story, rectangular structure measuring 146 ft x

194 ft and 41 ft high. It is constructed of a structural steel frame enclosed by transite siding and roofing panels and is supported on a reinforced poured concrete base. The floors of the first level (ground floor) of Building 4A are concrete. The floors of the other six levels are either steel diamond plating or steel catwalks.

168 V18/021244

Decontamination and Dismantlement of Plant 7 at Fernald

Albertin, M.F.; Borgman, T.D.; Zebick, W.A.

Fernald Environmental Restoration Management Corporation, Cincinnati, OH

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 187-191) (1994)

Decontamination and dismantlement (D&D) tasks have been successfully completed on Plant 7 at the Fernald Environmental Management Project. The seven story facility was radiologically, chemically, and biologically contaminated. The work involved the D&D work beginning with safe shutdown and gross decontamination, and ended with removal of the structural steel. A series of lessons learned were gained which include use of explosives, bidding tactics, safe shutdown, building decontamination and lockdown, use of scan climbers, etc. Twenty-one lessons learned are listed.

169 V18/021353

Deactivation and Decommissioning Focus Area Meeting [Package 7]

Rohrig, S.D.

EG&G Mound Applied Technologies, Inc., Miamisburg, OH

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (17 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. This presentation provided an overview of D&D activities at the Mound Facility. Topics discussed include characterization techniques, decontamination experience, dismantling and segmentation, demolition, and waste disposition.

170 V18/021463

Safe Shutdown of Defense Program Facilities at the Mound Plant, Miamisburg, Ohio

Anderson, H.F.; Bantz, P.D.; Luthy, D.F.

EG&G Mound Applied Technologies, Transition and Facility Management, Miamisburg, OH

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference -

Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 119-126) (1996)

The Mound Plant was one of several production sites in the US Department of Energy's Defense Programs (DP) Weapons Complex. As a result of the downsizing of the weapons program, certain operations at Mound are being transferred to other DOE sites and the DP buildings at Mound are being shut down. The objectives of the program are to reduce the hazardous and financial liabilities to DOE and to foster the reuse of facilities for economic development. The overall program is described. The process began with the categorization of excess DP buildings into three groups depending on their anticipated future use. The draft DOE/EM-60 Acceptance Criteria were used to develop a detailed shutdown checklist as the foundation of the process. The overall program budget, schedule, and options for disposition of materials and components are presented. Accomplishments in FY94 and FY95 are described. By the end of FY95, all excess energetic materials and components, all excess chemicals (from non-radiation areas) and significant amounts of radioactive materials will have been removed from the site. By the end of FY95, 47 of the 72 buildings in the program will have been taken through all ten of the draft EM-60 acceptance criteria. Lessons learned, based on experience at Mound to date, are summarized.

171 V18/025367

Economic Feasibility of Unconditional Release of a Building with Radiological Process History

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EG&G Mound Applied Technologies, Inc., Miamisburg, OH; U.S. Department of Energy, Miamisburg Environmental Management Project Office, Miamisburg, OH; Project Performance Corporation, Sterling, VA

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

EG&G Mound Applied Technologies (MAT) and the Department of Energy (DOE)-Miamisburg Environmental Management Project Office (MEMPO) conducted an evaluation to determine the viability of unconditional release of demolition debris from Building 21 at Mound. The primary advantage of pursuing unconditional release of debris is the economic benefit derived from disposal of debris as other than low-level waste. However, if extensive decontamination is required prior to release, the decontamination and verification costs can exceed the benefit of unconditional release. This paper describes the evaluation to determine the feasibility of decontamination of Building 21 in order to unconditionally release demolition debris. The feasibility analysis for the unconditional release of Building 21 demolition debris was comprised of three sections: (1) an evaluation of criteria to unconditionally release the debris, (2) an evaluation of existing information to determine the extent of decontamination that would be required, and (3) an order of magnitude comparative cost evaluation to approximate the probable magnitude of economic benefit possible. Based on existing

information, the contaminants of concern in Building 21 are Th-232 and its decay products, and U-238 and its decay products. To date, a dose limit or generic criteria for unconditional release of D&D debris to a construction and debris (C&D) landfill have not been established. In order to proceed, a range of dose limit criteria (i.e., 15, 18, 25, 30, and 100 mrem) were used to develop recommended average volume concentrations (i.e., a range of criteria) for the unconditional release of Building 21 debris. EG&G MAT and DOE-MEMP developed specific guideline criteria, derived from basic dose limits, for the average volume residual radioactivity acceptable for release. The analysis outlines the considerations for developing an unconditional release process related to the disposal of D&D debris, details an order of magnitude cost comparison, and provides a recommendation for the preferred disposition alternative, including next steps, for Building 21's demolition debris.

172

V18/022819

History of Special Metallurgical (SM) Building Remediation

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EG&G Mound Applied Technologies, Inc., Miamisburg, OH
CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1839-1840) (1996)

Throughout most of the 1960s, the SM-Building at the Mound Facility was a very busy and undoubtedly exciting place to work. The SNAP Program was in full swing then, producing heat sources, first for demonstration purposes, then for communications and weather satellites. As the program evolved, Mound was engaged in producing plutonium-powered heat sources for medical applications, including the famous cardiac pacemaker, which supplied rhythmic electrical pulses to the human heart in order to regulate the heart beat. But with the end of that era, operations in the SM-Building began a gradual termination process in August 1968 and continued to wind down through August 1972. During that time, 600 linear feet of gloveboxes, fumehoods, and enclosures were removed from the building and approximately 6 kilograms of plutonium-238 was recovered. For the next ten years the building sat idle, while routine surveillance and maintenance were regularly performed.

173

V18/025823

Conceptual Engineering and Cost Estimate for the D&D of the Mound Plant Technical, Semi-Works, and Research Buildings

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 8-15) (1996)

Parsons was given the task of preparing the preconceptual cost estimate and engineering design of the Tritium Facilities and the adjacent Research Building at the United States Department of Energy's (DOE's) Mound Plant. These buildings, known as the Technical (T), Semi-Works (SW), and Research (R) buildings are all large, significant buildings and are described in detail in this paper. The T-Building, for example, is built into the side of a hill and is 345 feet long, 150 feet wide, and 34 feet high. The reinforced concrete exterior shell has a 15-foot thick roof, walls that are approximately 16 feet thick, and an 8-foot thick floor slab. This paper describes several Decontamination and Decommissioning (D&D) options that were studied to achieve free release of the facilities or their resultant real property. A decay-in-place option for the T-Building was thoroughly investigated. The estimating approach was to develop labor standards and work practices to allow the D&D to occur while maintaining tritium emissions below 1,000 curies (Ci) per year (yr). Normally, the Mound Plant tritium emissions are 600 to 800 Ci/yr with few major tritium activities occurring. Also, the window for tritium emissions from D&D activities is only 200 to 400 Ci/yr.

174

V18/022071

Steam Generator Waste Disposal Options

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CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 408-415) (1994)

This paper examines the steam generator waste stream and investigates disposal options associated with the decommissioning of the reference Pressurized Water Reactor (PWR) Power Station as described in NUREG/CR-0130. Specifically, the removal and disposal of the steam generators and those activities and associated occupational doses inherent in the activities are the focus of this paper. The results of this effort are compared to more recent data for the reference PWR contained in NUREG/CR-5884 and a determination of the appropriate volumes and activities is made. These data are used to complete projections of steam generator waste volumes and activities generated from Light Water Reactor (LWR) decommissioning using the DECON decommissioning alternative. Several disposal options for the steam generators are considered and the segmentation, one piece waste package and smelting options are detailed.

175

V18/023347

Shippingport Reactor Pressure Vessel Safety Analysis Report for Packaging

Ferrell, P.C.

Rust Federal Services of Hanford, Inc., Richland, WA
CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society

Winter Meeting, Washington, DC, November 10-14, 1996.
American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 238-241) (1996)

This paper presents selected portions of the activities that were performed while developing the documentation needed to transport the Shippingport Reactor Pressure Vessel (RPV) to the Hanford Site. During the decommissioning process, the spent reactor fuel was removed from the Shippingport RPV, and the RPV and surrounding Neutron Shield Tank (NST) were filled with a lightweight concrete material. The filled RPV/NST was removed as a unit and transported by barge to Richland, Washington, for internment at the Hanford Site. The main document that was developed for packaging and transportation of the Shippingport RPV/NST was the safety analysis report for packaging (SARP), which is required to demonstrate the adequacy of a radioactive material package to meet Title 10 of the Code of Federal Regulations, Part 71 (10 CFR 71). The Shippingport RPV/NST, as readied for transportation, was shown in the SARP to meet the Type B requirements of the 10 CFR 71. As part of the certification process, benchmark testing and comparative analyses were performed.

176 **V18/020891**
Innovative Approach to Decommissioning Requirements
Lee, J.W.; Fricke, V.R.

Westinghouse Savannah River Company, Aiken, SC
CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 46-52) (1996)

The Savannah River Site (SRS) Decommissioning Requirements Manual is the result of a thorough review of all decommissioning-related documents. The screening process, its results, and the advantages of a clearly-worded list of decommissioning requirements is discussed in this paper.

177 **V18/021245**
Savannah River Site D&D Program Status
Johnson, S.V.; Kasper, K.

U.S. Department of Energy, Savannah River Operations Office, Environmental Restoration Division, Aiken, SC; PRC Environmental Management, Inc., Aiken, SC
CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 192-196) (1994)

The decontamination and decommissioning (D&D) program at the Savannah River Site (SRS) has been successful in showing tangible, visible results on most D&D projects during the 1994 fiscal year (FY). The FY 1995 D&D budget, however, is only about 30 percent of its FY 1994 budget. As a result, many of the projects will discontinue and the program will contract.

178 **V18/020885**
Savannah River Site Decommissioning Project Experience

Austin, W.E.

Westinghouse Savannah River Company, Aiken, SC
CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 244-245) (1996)

The decontamination and decommissioning program at the Savannah River Site is a young one that started in 1991. The program has been minimally funded due to low priorities and no regulatory drivers. Because of this, the program has not yet hit its stride. Nevertheless, there have been some notable achievements during the past five years, and more are expected. This paper briefly describes the status of D&D activities at the Department of Energy's Savannah River Site (SRS).

179 **V18/025853**
Stainless Steel Recycling - Radioactive Scrap Metal
Boettinger, W.L.

Westinghouse Savannah River Company, Beneficial Reuse Programs, Aiken, SC
CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 273-277) (1996)

The U.S. Department of Energy's (DOE) Savannah River Site (SRS) has thousands of tons of stainless steel radioactive scrap metal (RSM). Much of the metal is volumetrically contaminated. There is no "de minimis" free release level for volumetric material, and therefore no way to recycle the metal into the normal commercial market. If declared waste, the metal would qualify as low level radioactive waste (LLW) and ultimately be dispositioned through shallow land buried at a cost of millions of dollars. The metal however could be recycled in a "controlled release" manner, in the form of containers to hold other types of radioactive waste. This form of recycle is generally referred to as "Beneficial Reuse". Beneficial reuse reduces the amount of disposal space needed and reduces the need for virgin containers which would themselves become contaminated.

180 **V18/023760**
Waste Minimization During Transition at the Savannah River Site Reactor Facilities

Griffith, J.M.; Miller, J.A.

Westinghouse Savannah River Company, Aiken, SC
CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN,

May 16-18, 1995, 495 pp.; (pp. 134-139) (November 1995)

The Reactor Division at the Savannah River Site is actively pursuing deactivation from an operating mode to a cold shutdown condition with minimum surveillance and maintenance. In addition, the Reactor Division is conducting several transition activities to prepare its five separate reactor facilities for their eventual decontamination and decommissioning. During the planning of this transition, increases in waste generation, both in the types and quantities, were forecasted. The Reactor Division, therefore, initiated several activities to minimize the waste generated during the transition. This paper addresses the many activities pursued and their effectiveness.

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V18/022491

D&D Characterization of the 232-F "Old Tritium Facility" at the Savannah River Site

Scallon, K.L.; England, J.L.

Westinghouse Savannah River Company, Aiken, SC

CONF-950877; Mixed Waste, A.A. Moghissi, B.R. Love and R.K. Blauvelt (eds.), Proceedings of the Third Biennial Symposium, Baltimore, MD, August 7-10, 1995, 545 pp.; (pp. 2.9.1-2.9.15) (1995)

This paper presents the Decontamination and Decommissioning (D&D) characterization efforts for the 232-F Facility, including: (1) Development of a Characterization Information Package, a document describing the facility history, process knowledge, contaminant survey history, and the most recent radiological/hazardous contaminant status. Also included in the Characterization Information Package is a preliminary D&D waste volume estimate. The Characterization Information Package is important as it represents the "pre-characterization" baseline, and it provides the prerequisite data for subsequent characterization planning; and (2) Development of a Characterization Plan, a document outlining the plan for sampling and analysis of facility structures, systems, and components in order to determine the pre-D&D locations and levels of radiological and hazardous constituents associated with the facility.

182

V18/021287

Bagless Transfer at the Savannah River Site

Rogers, L.; Jones, R.H.

Westinghouse Savannah River Company, Aiken, SC

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:40-42 (1995)

Traditional methods of removing plutonium from process glove boxes in preparation for packaging involve the use of bagout procedures utilizing plastic bags, an organic material not allowed in storage containers per the new long-term storage criteria. Engineers at the Savannah River Site (SRS) have developed a system for moving plutonium from a glove box directly into an all-metal, welded, leaktight container free of external contamination. The process, known as bagless transfer, utilizes a tungsten-inert-gas (TIG) welding process to fuse and separate a transfer canister from the glove-box environment while maintaining glove-box and

canister integrity. A semiautomated prototype system has been demonstrated at the SRS, and engineers are making preparations to demonstrate the system in radioactive operation in the site's FB-Line Plutonium Facility.

183

V18/022973

Analysis of Removal Alternatives for the Heavy Water Components Test Reactor at the Savannah River Site

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Westinghouse Savannah River Company, Aiken, SC; U.S. Energy Corporation, Aiken, SC

WSRC-TR-96-0268; 124 pp. (August 1996)

This engineering study was developed to evaluate different options for decommissioning of the Heavy Water Components Test Reactor (HWCTR) at the Savannah River Site (SRS). This document will be placed in the DOE-SRS Area reading rooms for a period of 30 days in order to obtain public input to plans for the demolition of HWCTR.

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V18/022733

Application of Industrial Experience to DOE Decommissioning Planning

Person, G.A.; Foster, B.B.; Grubb, R.G.; Keener, D.E.; Yannitell, D.M.

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; Parsons Infrastructure & Technology Group, Inc., Oak Ridge, TN

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 742-746) (1996)

The use of industrial experience and expertise to plan and execute DOE environmental remediation projects can potentially save many millions of tax dollars. Commercial strategies and lessons learned can provide useful insight for DOE projects despite the presence of unique DOE concerns not directly comparable to industry. This paper describes the application of commercial demolition, salvage, and scrap metal recycle experience to decommissioning planning and estimating at the K-25 Site in Oak Ridge, Tennessee. Valuable planning level cost estimates and pre-conceptual engineering data was prepared for 32 auxiliary facilities at K-25 in an efficient, cost-effective manner by utilizing the available industrial expertise and strategies. The resulting information can now be used as a basis for decommissioning baselines and associated funding requests. This paper describes the process used and the lessons learned from the project. Recommendations related to the application of industrial experience and expertise to other decommissioning and remediation projects are provided.

185

V18/025838

Characterization Activities at the K-25 Gaseous Diffusion Plant

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Foster Wheeler Environmental Corporation, Livingston, NJ;

Foster Wheeler Environmental Corporation, Oak Ridge, TN CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 159-165) (1996)

Characterization for decommissioning is distinctly different from characterization for contaminant identification or its extent. This paper describes some characterization technologies that would be useful for decommissioning characterization at the K-25 Gaseous Diffusion Plant (GDP). We include descriptions of appropriate characterization needs, purposes, assurances, and technologies, as well as summaries of some experiences at the K-25 Site. We report our recommendations for "faster, better, safer, and cheaper" characterization and conclusions based on these descriptions and summaries.

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V18/021434

Initial Operations Analyses and Plans for the Oak Ridge K-25 Site Large Scale Metals Recycle Project

Rod Rodriguez, Inc., Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN

K/ER-300; 150 pp. (February 23, 1996)

The Oak Ridge Gaseous Diffusion Plant (ORGDP) was originally constructed and operated under the auspices of the Manhattan Project between 1942 and 1944. When the plant was shutdown completely in 1987, the need for eventual decontamination and decommissioning (D&D) of the K-25 equipment and facilities became a focus for the Department of Energy (DOE). Numerous studies have been completed to address and understand D&D for these facilities. Various technologies have been demonstrated and proven. The costs associated with these technologies have often been shown to be relatively expensive. This report addresses, in a preliminary way, all the key areas for consideration of effective and technically feasible alternatives to performing conventional decontamination and decommissioning of the K-25 Site equipment and related surplus materials. The report focuses on scrap metals recycling and identifies a comprehensive way to understand the major phases of the K-25 Site Large Scale Metals Recycle Project (LSMRP). The concept consists of three core processes: metal sorting, identification and preparation; rolling, melting and casting metal; and fabrication of products into reusable containers. This document was assembled to provide comprehensive information about the LSMRP, here-to-fore unavailable in one package, to decision makers, stakeholders, regulators, and prospective participants necessary to begin to understand costs, benefits, alternatives, feasibilities, and uncertainties related to an enterprise organized and built to accomplish a D&D alternative.

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V18/021358

K-25 Site Decontamination and Decommissioning Surveillance and Maintenance: Annual Report - Fiscal Year 1995

Battelle Memorial Institute, Oak Ridge Operations, Oak

Ridge, TN; Oak Ridge K-25 Site, Oak Ridge, TN K/OPS-058; 30 pp. (December 1995)

Surveillance and Maintenance (S&M) is a vital and important part of the K-25 Site Decontamination and Decommissioning (D&D) Program. The objective of the S&M Program is to eliminate or control hazards, contaminated material, and situations that could adversely impact the environment, jeopardize the public or the worker's health and safety, or adversely affect national security from the loss of classified technology or special nuclear materials. The S&M Program encompasses an area of approximately 13 million square feet in 127 facilities at the K-25 Site. Program responsibilities include identification and implementation of the appropriate corrective actions for polychlorinated biphenyl (PCB) leaks, oil leaks, roof leaks, steam leaks, air leaks, safety concerns, and asbestos deterioration throughout the various facilities. Additionally, fissile storage areas, shutdown equipment, hazardous materials, and hazardous wastes must be properly controlled and maintained in a safe condition. There is an ongoing effort designed to remove these hazardous materials and hazardous wastes and thereby reduce risks within the facilities. A summary of S&M Program accomplishments for FY95 is presented.

188

V18/023538

National Research Council Review of DOE Gaseous Diffusion Plant Decommissioning Cost Estimates

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (13 pp.) (1996)

The viewgraphs from this update on DOE decommissioning include conclusions, recommendations, and cost implications and estimates as well as a summary of current activities at the K-25 plant. These conclusions were drawn: Decommissioning can be done; Cost estimates are high; Technology is available; Risks are currently low; Progressive D&D involves prioritized cost and risk; Integrate with soil and water remediation; and, Convert depleted uranium to oxide. The following recommendations were made: Use the Capenhurst experience; Implement three-level planning - integrate remedial action and depleted uranium - prioritized cost and risk regulation; Coordinate regulatory and stakeholder issues; Focused demonstrations; and, Engage in modest R&D - barrier decontamination. Those recommendation with direct cost implications included: Using an independent contractor - open competition; Integrated waste management - emphasise recycle and reuse; Reduce support facilities - use existing; Reduce impact of classified technology; and, Convert depleted uranium to oxide.

189

V18/023958

Nuclear Criticality Safety Calculations for a K-25 Site Vacuum Cleaner

Shor, J.T.; Haire, M.J.

Oak Ridge K-25 Site, Oak Ridge, TN

K/ER-314; 175 pp. (February 1997)

A modified Nilfisk Model GSI-115 dry vacuum cleaner is used throughout the K-25 Site for cleanup of dry forms of highly enriched uranium (HEU). This report describes the calculations done with the SCALE (KENO V.a) computer code to establish the

minimum nuclear critical mass for this vacuum cleaner. This report does not represent a complete nuclear criticality safety evaluation. Such an evaluation, of which this report may be a supporting document, is contained in K-25 Site Nuclear Criticality Safety Evaluations.

190

V18/025843

Nuclear Criticality Safety Modeling of an LEU Deposit

Haire, M.J.; Jordan, W.C.; Elam, K.R.; Dahl, T.L., Sr.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 192-198) (1996)

The construction of the Oak Ridge Gaseous Diffusion Plant (now known as the K-25 Site) began during World War II and eventually consisted of five major process buildings: K-25, K-27, K-29, K-31, and K-33. The plant took natural (0.711% ²³⁵U) uranium as feed and processed it into both low-enriched uranium (LEU) and high-enriched uranium with concentrations up to approximately 93% ²³⁵U. The K-25 and K-27 buildings were shut down in 1964, but the rest of the plant produced LEU until 1985. During operation, inleakage of humid air into process piping and equipment caused reactions with gaseous uranium hexafluoride (UF₆) that produced nonvolatile uranyl fluoride (UO₂F₂) deposits. As part of shutdown, most of the uranium was excavated as volatile UF₆. The UO₂F₂ deposits remained. The U.S. Department of Energy has initiated a program to improve nuclear criticality safety by removing the larger enriched uranium deposits. The largest ²³⁵U deposit in the K-29 Building is of sufficient size and enrichment and in a geometry such that it cannot easily be demonstrated to be subcritical. This paper examines those random factors of safety that are keeping the deposit subcritical. Sensitivity calculations using factors that influence nuclear criticality safety were made with SCALE's KENO V.a computer code. Factors varied in the sensitivity calculations were uranium enrichment (3 to 4%); neutron reflection (e.g., people and equipment coming into contact with the pipe); hydrogen content of the deposit (e.g., exposing the deposit to the moisture in air); and deposit configuration (annular, chord-shaped, or filling the pipe). These parameters, and measured deposit mass, are related to critical conditions (i.e., calculated $k_{\text{eff}} = 0.95$).

191

V18/025277

Polychlorinated Biphenyl Electrical Project Closeout Report for the Oak Ridge K-25 Site [Rev. 1]

Nolan, S.D.

Oak Ridge K-25 Site, Oak Ridge, TN

K/ER-280 (Rev. 1); 95 pp. (December 1995)

The Oak Ridge K-25 Site was constructed in the 1940s and 1950s when polychlorinated biphenyls (PCBs) were the preferred dielectric material used in electrical equipment. The K-25 Site used a large quantity of this PCB-containing electrical equipment. After the permanent shutdown of the K-25 Site in 1987, the site was left with

a large quantity of PCB-containing electrical equipment that was no longer needed. A project was started in the late 1980s to properly restore and/or dispose of this surplus electrical equipment. At the end of FY 1995, the first phase of the work was completed and all items were in compliance with the Toxic Substances Control Act Uranium Enrichment-Federal Facilities Compliance Agreement (TSCA UE-FFCA). By the end of FY 1995, the portions of work needed to meet the TSCA UE-FFCA requirements were completed, and the U.S. Department of Energy stopped funding for the project to allow other higher priority work to proceed. The remaining work for disposal of PCBs electrical equipment will be funded either as part of the overall decontamination and decommissioning of the buildings or in accordance with other TSCA UE-FFCA requirements. This report documents the work that has taken place to date and the additional work needed to bring the PCB electrical program into compliance with TSCA UE-FFCA. This completed work includes the disposal of more than 200,000 gallons of PCB fluids, more than 10,000 PCB capacitors and approximately 20 transformers, and the storage of more than 125 PCB transformers.

192

V18/024373

Recycle of Radioactive Scrap Metal from the Oak Ridge Gaseous Diffusion Plant (K-25 Site)

Meehan, R.W.

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (10 pp.) (1996)

These viewgraphs present information on efforts to recycle radioactive scrap metal from the K-25 site. In summary: Recycling provides a realistic, workable, cost-effective strategy to reduce the K-25 mortgage; Privatization is essential to achieve the economies of scale necessary for the recycling option; Once established, the K-25 Recycling Enterprise can play a major role in reducing waste dispositioning costs across the DOE complex; Processing capabilities can be transitioned to applicable commercial customer bases; Recycling and associated industries can play a major role in reindustrialization of K-25.

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V18/022267

Report on the Small Scale Metals Recycle Project at the Oak Ridge K-25 Site, Oak Ridge, Tennessee: Volume 1 - Management Summary

Oak Ridge K-25 Site, Oak Ridge, TN

K/ER-316/V1; 25 pp. (December 1996)

The Small Scale Metals Recycle Project (SSMRP) was undertaken to demonstrate the capability to recover contaminated metals and equipment from the shutdown gaseous diffusion facilities for recycle into useful products. The goals of the project were: (1) to evaluate recycle potential of the electric motors used in the gaseous diffusion process; (2) to recover surface-contaminated metal, process by smelting, and fabricate volumetrically contaminated metal waste storage containers; and (3) to demonstrate dismantlement and staging of gaseous diffusion equipment. The motor evaluation was completed in March 1996, metal recovery was completed in July

1996, and the dismantlement and staging demonstration was completed in August 1996. Fabrication of the waste storage containers will be completed in December 1996. This report summarizes the project efforts and discusses the lessons learned from the project. Brief discussions on the motor recycle evaluation, metal recovery effort, and the equipment dismantlement and staging demonstration are included. An evaluation of the generated waste is not addressed in this report because metal processing has not been completed, and an accurate assessment could not be made without the final results from that effort.

194 V18/022268

Report on the Small Scale Metals Recycle Project at the Oak Ridge K-25 Site, Oak Ridge, Tennessee: Volume 2 - Technical Summary

Oak Ridge K-25 Site, Oak Ridge, TN
K/ER-316/V2; 175 pp. (December 1996)

The Small Scale Metals Recycle Project (SSMRP) was undertaken to demonstrate the capability to recover contaminated metals and equipment from shutdown gaseous diffusion facilities for recycle into useful products. The goals of the project were: (1) to evaluate recycle potential of the electric motors used in the gaseous diffusion process; (2) to recover surface-contaminated metal, process by smelting, and fabricate volumetrically contaminated metal waste storage containers; and (3) to demonstrate dismantlement and staging of gaseous diffusion equipment. The motor evaluation was completed in March 1996, metal recovery was completed in July 1996, and the dismantlement and staging demonstration was completed in August 1996. Fabrication of the waste storage containers will be completed in December 1996. This report discusses the project efforts and the lessons learned from the project. An evaluation of the generated waste is not addressed in this report because metal processing has not been completed, and an accurate assessment could not be made without the final results from that effort.

195 V18/021359

Surveillance and Maintenance Plan for the K-25 Site Decontamination and Decommissioning Facilities

Oak Ridge K-25 Site, Oak Ridge, TN
K/PM-23; 150 pp. (February 1994)

This document establishes the plan for conducting surveillance and maintenance (S&M) of 82 surplus facilities at the K-25 Site. As mandated by Department of Energy (DOE) Order 5820.2A for all radioactively contaminated surplus facilities, this plan was written to assure adequate containment of contamination, provide physical safety and security, and reduce potential hazards to the public and the environment. This plan identifies all of the S&M activities managed by the S&M Operations Department of the K-25 Operations Division, and funded through, Activity Data Sheet (ADS) 4701. These activities fall into three general categories: (1) Baseline S&M; (2) Selected Phase I Decontamination and Decommissioning (D&D) projects; and (3) Plant and Allocated support. Baseline S&M includes facility inspections, routine maintenance and related activities. Selected Phase I D&D projects include activities closely associated with S&M and being conducted to reduce S&M costs and/or reduce environmental, safety and health

(ES&H) risks. Plant and Allocated support includes other plant and outside services purchased to support the S&M Program. The S&M Plan is organized to discuss each of these activities. The Introduction, Section 1.0, provides the scope of the S&M Program, including a list of all facilities in the Program, and the regulatory drivers under which the Program must operate. Section 2.0, Program Management, describes the management structure for the S&M Program, the work breakdown structure (WBS) and the milestones for FY 1994. Section 3.0, Program Description, describes the Baseline S&M activities. The selected Phase I D&D projects in support of S&M are discussed in Section 4.0, Surplus Materials Management, and Section 5.0, Special Corrective Action and Compliance Projects. Section 6.0, Plant and Allocated Support, describes all of the additional support services the S&M Program requires.

196 V18/022269

Surveillance and Maintenance Program Annual Report on the Oak Ridge K-25 Site, Oak Ridge, Tennessee: Fiscal Year 1996

Oak Ridge K-25 Site, Oak Ridge, TN
K/ER-318; 75 pp. (December 1996)

Surveillance and Maintenance (S&M) is divided into two distinct operations, Decontamination and Decommissioning (D&D) and Remedial Action (RA). The D&D Program encompasses an area of approximately 12M ft² in 127 facilities at the Oak Ridge K-25 Site, which includes 6 nuclear facilities. The RA Program at the K-25 Site consists of 123 facilities covering approximately 160 acres. These facilities include 57 Environmental Restoration Program inactive waste sites and 66 recirculating cooling water valve vaults. The challenges facing the S&M Program in FY 1997 include successfully executing the negotiated task order contract and continuing improvements in the operations and management of the program. However, improvements in efficiency and cost reduction will not be as apparent in FY 1997 (after the implementation of the improvements this past year) and will require even more stringent attention to detail.

197 V18/022281

Nuclear Criticality Safety Analyses of a Uranium Deposit in the K-29 Building at the Oak Ridge K-25 Site, Oak Ridge, Tennessee

Haire, M.J.; Elam, K.R.; Jordan, W.D.
Oak Ridge National Laboratory, Oak Ridge, TN
K/ER-310; 30 pp. (July 1996)

Nuclear criticality safety modeling was done of the largest uranium deposit in the K-29 Building, the deposit in Unit 2, Cell 7, in the 7BB2 valve and the 24-inch diameter pipe leading to the B bypass line. Sensitivity calculations using factors that influence criticality safety were made using SCALE's KENO V.a computer code. It is concluded that at a normally assumed neutron moderation level of H/U = 4, used in criticality safety calculations, credit must be taken for the distribution of uranium in order to demonstrate subcriticality. If the distributed deposit were to collapse and collect in the lower portion of the process piping, the system could be critical if the actual H/U of the deposit exceeds about 2. This report examines the random factors of safety that keep the deposit

subcritical.

198 V18/022279

Quality Assurance Plan for the Nuclear Criticality Stabilization Project at the Oak Ridge K-25 Site, Oak Ridge, Tennessee [Rev. 3]

Oak Ridge K-25 Site, Oak Ridge, TN

K/ER-288/R3; 30 pp. (December 1996)

This plan establishes the requirements for the control and assurance of activities associated with the Oak Ridge K-25 Site Nuclear Criticality Stabilization Project (NCSP) as identified in the Incentive Task Order (ITO) contract between Lockheed Martin Energy Systems, Inc. (Energy Systems), and the U.S. Department of Energy (DOE). The scope of the NCSP contract is to: (1) remove three low-enriched uranium deposits in the K-29 Building and place the removed uranium in a criticality safe configuration, (2) remove four highly enriched uranium deposits in the K-25 Building and place in a criticality safe configuration, (3) place removed uranium in safe interim storage, and (4) explore final disposition alternatives for the uranium. These activities are being conducted in support of the Environmental Restoration (ER) Program's Decontamination and Decommissioning activities. This QAP defines the NCSP quality program; identifies requirements and responsibilities for ensuring program objectives are achieved as planned; and describes or references the controls, procedures, and guidelines to be followed during performance of nuclear criticality stabilization activities.

199 V18/025331

Demolition of Cooling Towers at the Oak Ridge K-25 Site, Oak Ridge, Tennessee

Larson, E.P.; Lay, A.C.; Hatmaker, T.L.; DiDonato, R.; Yust, R.L.

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN; Foster Wheeler Environmental Corporation, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

The Cooling Towers Demolition Project consisted of the demolition and disposition of 6 out-of-service cooling towers, removal and disposal of radioactively contaminated sediment from the cooling tower basins, and demolition of 28 other auxiliary services facilities. This project was located at the Oak Ridge K-25 Site, a government-owned, contractor-operated facility managed by Lockheed Martin Energy Systems, Inc., for the U.S. Department of Energy (DOE) in Oak Ridge, Tennessee. These structures were associated with the deactivated gaseous diffusion process for uranium enrichment. The project was conducted using a partnering agreement between three prime contractors, where the partners shared liabilities for fines and penalties and shared in profits and losses. The scope was broken into the following three distinct phases: (1) cooling tower superstructure demolition, (2) removal of sediment from the cooling tower basins, and (3) demolition of above-grade basins and auxiliary facilities. The major waste streams identified were wood, asbestos, sediment, and concrete. Metal

generated by the demolition of these facilities was commercially recycled.

200 V18/023537

Presentation of K-25 Powerhouse Demolition

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (2 pp.) (1996)

In April 1993, the U.S. Department of Energy (DOE) Oak Ridge Program began planning efforts to decontaminate and demolish the powerhouse facilities at the K-25 Site, formerly known as the Oak Ridge Gaseous Diffusion Plant. The project would involve 15 facilities, including the boiler, turbine, and switch house facilities, with a total floor space of nearly 10,000 sq m. The overall objective of the project was to demolish the structures to grade so that the site could be reused for industrial purposes. The project was completed by January 1996 - nine months ahead of schedule.

201 V18/022399

Annual Report on Surveillance and Maintenance Activities at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Fiscal Year 1996

Oak Ridge National Laboratory, Oak Ridge, TN; CDM Federal Programs Corporation, Oak Ridge, TN; S.M. Stoller Corporation, Oak Ridge, TN

ORNL/ER-386; 45 pp. (November 1996)

In fiscal year (FY) 1995, the sites and facilities from both the Remedial Action (RA) and Decontamination and Decommissioning (D&D) programs were combined to form the Oak Ridge National Laboratory (ORNL) Environmental Restoration (ER) Surveillance and Maintenance (S&M) Program. This combined program includes all ER-owned facilities (i.e., inactive liquid low-level waste storage tanks, impoundments, burial grounds, test sites, leak sites, contaminated soil, inactive reactor buildings, cooling towers, pump houses, evaporators, hot cells, wells and boreholes, and various research and development facilities). The establishment of a unified S&M Program facilitates the management of the applicable areas or facilities following their operating life and until final disposition or site stabilization (whichever is deemed most appropriate based on environmental regulations and/or best management practices).

202 V18/025493

3001 Canal Radiological Characterization and Waste Removal Report, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Ritchie, M.G.

Science Applications International Corporation, Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN ORNL/ER-390; 23 pp. (December 1996)

An underground steel reinforced concrete transfer and storage canal was built in 1943 and operated as an integral part of the Oak Ridge Graphite Reactor Building (3001) until 1963 when the reactor was shutdown. During operation, the canal was used for under water transfer of irradiated materials and other metals from the reactor in Building 3001 to the Building 3019 hot cell for further processing. After shutdown of the reactor, the canal was used for storage of

irradiated materials and fission products until 1990 when the larger materials were removed and stored in the Department of Energy (DOE) approved solid waste management storage facilities. At that time it was discovered that a considerable amount of sludge had accumulated over the intervening years and subsequent analysis showed that the sludge contained Resource Conservation and Recovery Act (RCRA) materials that violated quantities allowed by the RCRA regulations. It was also recognized in 1990 that the canal was losing water to evaporation and the ground at the rate of approximately 400 gallons per day. To maintain water quality; i.e., radionuclide content at or near DOE derived concentration guidelines (DCG), the water in the canal is constantly demineralized using a demineralizer in the Building 3001 and demineralized make up water is supplied from the Building 3004 demineralizer. This report summarizes the 301 Canal Cleanup Task and the solid waste removed from the 3001 Canal in 1996.

203 V18/022396

Comprehensive Work Plan for Building 3001 Storage Canal Media Replacement at the Oak Ridge National Laboratory, Oak Ridge, TN

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/ER-392; 30 pp. (January 1997)

The Building 3001 Canal at the Oak Ridge National Laboratory is an approximately 150 feet long "L" shaped, below grade, concrete reinforced structure running from the west face of the reactor in the Oak Ridge Graphite Reactor (OGR) Building 3001 to a hot cell in the Building 3019. The concrete walls of the canal beneath the water are contaminated with radionuclides that have penetrated the surface of the walls. This creates a potential problem of exposure for workers in the area to airborne radionuclide contamination if the water is removed and the exposed walls are allowed to dry. The purpose of this project is to (1) minimize potential future risk to human health and the environment; (2) reduce surveillance and maintenance cost of the canal; (3) perform site preparation activities; (4) replace the water in the canal with a solid controlled low strength material (CLSM); (5) pump the water to the Process Waste Treatment System (PWTS) for further processing at the same rate that the CLSM is pumped under the water; (6) remove the water using a process that will protect the workers and the public in the visitors area from contamination while the CLSM is being pumped underneath the water; (7) painting a protective coating material over the CLSM after the CLSM has cured.

204 V18/023970

Removal Action Report on the Building 3001 Canal at Oak Ridge National Laboratory, Oak Ridge, Tennessee [D1]

U.S. Department of Energy, Washington, DC; Science Applications International Corporation, Oak Ridge, TN
DOE/OR/01-1599&D1; 22 pp. (May 1997)

The Oak Ridge Graphite Reactor and its storage and transfer canal are located in Building 3001 in the approximate center of Waste Area Grouping 1 in the ORNL main complex. The Building 3001 Storage Canal is an L-shaped, underground, reinforced-concrete structure running from the back and below the Graphite Reactor in Building 3001 to a location beneath a hot cell in the adjacent

Building 3019. The Graphite Reactor was built in 1943 to produce small quantities of plutonium and was subsequently used to produce other isotopes for medical research before it was finally shut down in 1963. The associated canal was used in transport, under water, spent fuel slugs and other isotopes from the back of the reactor to the adjacent Bldg. 3019 hot cell for further processing. During its operation and years subsequent to operation, the canal's concrete walls and floor became contaminated with radioisotopes from the water. The canal was found to be losing water contaminated with Cs-137, Co-60, and Sr-90 at the rate of approximately 1235 L/day (326 gal/day) to the ground underneath the canal and approximately 280 L/day (74 gal/day) to evaporation. Over the years, the contamination has been controlled at levels close to DOE's derived concentration guide levels by replacing lost water with demineralized water and continuously recirculating the water through a demineralizer. The destination of the water leaking from the canal was never conclusively determined, but surface water in the area primarily flows toward White Oak Creek. Remediation of contaminated water released from this canal was not in the scope of this effort and will be addressed as part of the Bethel Valley Watershed Record of Decision. This report documents the activities involved with replacing the canal water with a solid, controlled, low-strength material (CLSM) in response to a Comprehensive Environmental Response, Compensation, and Liability Act non-time-critical removal action. Planning for this activity started in July 1996. Backfilling of the canal started on March 11, 1997. Approximately 314,800 L (412 cu yd) of CLSM were required to fill the canal to the top. The CLSM material used had a compressive strength of approximately 28 kg/sq cm (100 lb/cu in.) after curing for 28 days, which should permit the use of conventional excavation tools to remove it at a later date for further remediation (if required). The low-permeability CLSM eliminated contaminated water out-leakage and groundwater in-leakage within the canal area.

205 V18/024063

Appendix A-I - Specific Application for Oak Ridge National Laboratory Dismantlement of Building 3004

Oak Ridge National Laboratory, Environmental Restoration Division, Oak Ridge, TN
ORNL/ER-225 (10-0297); 15 pp. (March 1997)

This quality assurance (QA) plan defines the QA requirements for the dismantlement and removal of Building 3004 at Oak Ridge National Laboratory (ORNL). The building is a four-story wooden trained structure with wooden siding, which resides approximately 150 feet west of the Bulk Shielding Reactor, and only several feet away from the visitors entrance to the Graphite Reactor museum. Complete descriptions and sketches are in the Performance Specification document for this project. This project is being conducted as a non-CERCLA maintenance action. This plan is an appendix to the QA plan for the ORNL Environmental Restoration (ER) Program. ORNL/ER-225, which is the source of the project QA requirements, tailors those QA requirements to the specific needs of this project as defined in ORNL/ER-225. Project-specific description and organization are also provided in this plan.

206 V18/022289

Removal Site Evaluation Report on Building 3019B at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Advanced Sciences, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR/01-1514&D1; 25 pp. (September 1996)

This removal site evaluation report on Building 3019B at Oak Ridge National Laboratory was prepared to provide the Environmental Restoration Program with information necessary to evaluate whether hazardous and/or radiological contaminants in and around the facility pose a substantial risk to human health or the environment (i.e., a high probability of adverse effects) and whether remedial site evaluations or removal actions are, therefore, required. The scope of the project included: (1) a search for, and review of, readily available historical records regarding operations and use of the facility (including hazardous substance usage and existing contamination); (2) interviews with facility personnel concerning current and past practices; and (3) a brief walk-through to visually inspect the facility and identify existing hazard areas requiring maintenance actions or remedial evaluation. The results of the removal site evaluation indicate that areas inside Building 3019B pose no imminent hazard because adequate engineering and administrative controls are in place and enforced within the facility to ensure worker and environmental protection. A maintenance action, however, is being undertaken or proposed.

207

V18/023992

Final Deactivation Project Report on the Alpha Powder Facility, Building 3028, at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-399; 120 pp. (April 1997)

This report documents the condition of the Alpha Powder Facility, Building 3028, after completion of deactivation activities by the Isotopes Facilities Deactivation Project. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the U.S. Department of Energy (DOE) Office of Environmental Restoration program. A history and profile of Building 3028 prior to commencing deactivation activities and a profile of the building after completion of deactivation activities is provided. Turnover items, including the post-deactivation surveillance and maintenance (S&M) plan, remaining hazardous materials, radiological controls, safeguards and security, quality assurance, facility operations, and supporting documentation provided in turnover packages are discussed.

208

V18/023993

Final Deactivation Project Report on the Source Development Laboratory, Building 3029, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-400; 95 pp. (May 1997)

This report documents the condition of Building 3029 after completion of deactivation activities as outlined by the U.S. Department of Energy (DOE) Nuclear Materials and Facility Stabilization guidance document. This report outlines the activities conducted to place the facility in a safe and environmentally sound condition for transfer to the DOE Office of Environmental

Restoration. A history and profile of Building 3029 prior to commencing deactivation activities and a profile of the building after completion of deactivation activities is provided. Turnover items, including the post-deactivation surveillance and maintenance (S&M) plan, remaining hazardous materials, radiological controls, safeguards and security, quality assurance, facility operations, and supporting documentation provided in turnover packages are discussed.

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V18/025278

Deactivation of Building 7602

Yook, H.R.; Barnett, J.R.; Collins, T.L.; Jackson, S.C.; Lewis, B.E.; Plummer, K.E.; Brantley, C.N.

Oak Ridge National Laboratory, Robotics and Process Systems Division, Oak Ridge, TN; Oak Ridge National Laboratory, Office of Radiation Protection, Oak Ridge, TN

ORNL/TM-13093; 85 pp. (October 1995)

The Department of Energy (DOE) has sponsored research and development programs in Building 7602 at Oak Ridge National Laboratory (ORNL) since 1984. This work focused on development of advanced technology for processing nuclear fuels. Building 7602 was used for engineering-scale tests using depleted and natural uranium to simulate the nuclear fuel. In April 1994, the DOE Office of Nuclear Energy (NE) sent supplemental FY 1994 guidance to ORNL stating that in FY 1995 and beyond Building 7602 is considered surplus to NE programs and missions and shall be shut down (deactivated) and maintained in a radiologically and industrially safe condition with minimal surveillance and maintenance (S&M). DOE-NE subsequently provided FY 1995 funding to support the deactivation activities. Deactivation of Building 7602 was initiated on October 1, 1994. The principal activity during the first quarter of FY 1995 was removal of process materials (chemicals and uranium) from the systems. The process systems were operated to achieve chemical solution concentrations needed for reuse or disposal of the solutions prior to removal of the materials from the systems. At the end of December 1994, the process systems and control systems were shut down and deactivated. Disposition of the process materials removed from the process systems in Building 7602 proved to be the most difficult part of the deactivation. Significant effort was devoted to finding ways to recycle and reuse these materials. Preparations for S&M of Building 7602 included corrective maintenance such as replacement and repair of roof sections, relocation of several critical gages to locations outside the radiological buffer area, and preparation of a procedure for S&M. S&M was formally initiated in April 1995 and continued through September 1995. Building 7602 was deactivated on schedule and within budget.

210

V18/022282

Removal Site Evaluation Report on Building 7602 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Advanced Sciences, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR/01-1515&D1; ORNL/M-5444; 20 pp. (September 1996)

This removal site evaluation report for Building 7602 at Oak Ridge National Laboratory was prepared to provide the Environmental Restoration Program with information necessary to evaluate

whether hazardous and/or radiological contaminants in and around the facility pose a substantial risk to human health or the environment (i.e., a high probability of adverse effects) and whether remedial site evaluations or removal actions are, therefore, required. The scope of the project included: (1) a search for, and review of, readily available historical records regarding operations and use of the facility (including hazardous substance usage and existing contamination); (2) interviews with facility personnel concerning current and past practices; and (3) a brief walk-through to visually inspect the facility and identify existing hazard areas requiring maintenance actions, removal actions, or remedial evaluation. The results of the removal site evaluation indicate that areas associated with Building 7602 pose no imminent hazards requiring maintenance actions. Adequate engineering and administrative controls are in place and enforced within the facility to ensure worker and environmental protection. Current actions that are being taken to prevent further release of contamination and ensure worker safety within Building 7602 are considered adequate until decontamination and decommissioning activities begin.

211 V18/022291

Removal Site Evaluation Report on the Bulk Shielding Facility at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Advanced Sciences, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR/01-1516&D1; ORNL/M-5446; 90 pp. (September 1996)

This removal site evaluation report on the Bulk Shielding Facility (BSF) at Oak Ridge National Laboratory was prepared to provide the Environmental Restoration Program with information necessary to evaluate whether hazardous and/or radiological contaminants in and around BSF buildings pose a substantial risk to human health or the environment (i.e., a high probability of adverse effects) and whether remedial site evaluations or removal actions are, therefore, required. A removal site evaluation was conducted at nine areas associated with the BSF. The scope of each evaluation included: (1) a search for, and review of, readily available historical records regarding operations and use of the facility (including hazardous substance usage and existing contamination); (2) interviews with facility personnel concerning current and past practices; and (3) a brief walk-through to visually inspect the facility and identify existing hazard areas requiring maintenance actions or remedial evaluation. The results of the removal site evaluation indicate that no substantial risks exist from contaminants present because adequate efforts are being made to contain and control existing contamination and hazardous substances and to protect human health and the environment.

212 V18/022512

Decontamination and Decommissioning of the Fission Product Pilot Plant at the Oak Ridge National Laboratory

Mandry, G.J.; Snedaker, W.

Oak Ridge National Laboratory, Oak Ridge, TN; Enserch Environmental Corporation, Oak Ridge, TN

CONF-9404313; Proceedings of an International Conference on Nuclear Energy, Kyoto, Japan, April 23-27, 1994; 7 pp. (November

1994)

The Fission Product Pilot Plant (FPPP) at the Oak Ridge National Laboratory (ORNL) was one of the first facilities used to extract radioactive isotopes from liquid radioactive wastes. During operations, the FPPP was extensively contaminated, resulting in high radiation levels even 30 years after the conclusion of operations. The facility has been abandoned for over 20 years and is now a candidate for decontamination and decommissioning (D&D). In fact, the ORNL management has begun activities toward the D&D of the FPPP. Two of these activities were completed in 1993 and 1994. The first 2030 activity was a facility characterization designed to assess the condition of the interior of the FPPP and to quantify, if possible, the amounts and identities of any radioactive contaminants and hazardous materials as defined by the U.S. Environmental Protection Agency. The facility characterization was intended to determine the condition of the interior, the complement of equipment left in the facility at the time of its closure, and the radiation environment that would be encountered during its D&D. The second activity was an alternatives assessment designed to determine the best approach to the D&D of the FPPP. The alternatives assessment examined five alternatives to decontaminate and decommission the FPPP and recommended the best alternative for its disposition. The first section of the paper describes the FPPP and its history. It includes the various conjectures on what exactly was done when the FPPP was entombed with the shield wall visible in today's pictures. The next section discusses the characterization that was performed concurrently with the alternatives evaluation. The next two sections detail the D&D plan for the complete dismantlement of the FPPP and its estimated cost and schedule.

213 V18/022274

Health and Safety Plan for the Isotopes Facilities Deactivation Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee [Rev. 1]

Oak Ridge National Laboratory, Environmental Restoration Division, Oak Ridge, TN

ORNL/ER-370/R1; 35 pp. (August 1996)

This plan describes the process for identifying the requirements, written safety documentation, and procedures that are necessary to protect the personnel involved in the Isotopes Facilities Deactivation Project (IFDP). The key objective of this project is to place 19 former isotope production facilities at the Department of Energy's (DOE's) Oak Ridge National Laboratory (ORNL) in a radiologically, industrially, and environmentally safe condition in anticipation of an extended period of minimum surveillance and maintenance (S&M). This project will be conducted in a manner that ensures the protection of the safety and health of workers, the public, and the environment. Upon completion of the project, the deactivated facilities will be turned over from the DOE Headquarters Office of Nuclear Materials and Facility Stabilization (EM-60) to the DOE Headquarters Office of Decontamination and Decommissioning Program (EM-40). Deactivation of the IFDP facilities was initiated in fiscal year (FY) 1994 and is scheduled for completion in FY 2000.

214 V18/022275

Project Management Plan for the Isotopes Facilities

Deactivation Project at Oak Ridge National Laboratory, Oak Ridge, TN

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/ER-376; 25 pp. (August 1996)

The purpose of the Isotopes Facilities Deactivation Project (IFDP) is to place former isotopes production facilities at Oak Ridge National Laboratory in a safe, stable, and environmentally sound condition suitable for an extended period of minimum surveillance and maintenance (S&M) as quickly and economically as possible. Implementation and completion of the deactivation project will further reduce the already small risks to the environment and public safety and health. Furthermore, the project will result in significant S&M cost savings in the future. The IFDP management plan has been prepared to document the project objectives, define organizational relationships and responsibilities, and outline the management control systems to be employed in the management of the project. The project has adopted a strategy to deactivate the simple facilities first to reduce the scope of the project and gain experience before addressing more difficult facilities. A deactivation end-point determination process has been developed and utilized to identify end points.

215 V18/022288

Removal Site Evaluation Report for the Isotope Facilities at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Advanced Sciences, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN
DOE/OR/01-1501&D1; 155 pp. (July 1996)

This removal site evaluation report for the Isotope Facilities at Oak Ridge National Laboratory was prepared to provide the Environmental Restoration Program with information necessary to evaluate whether hazardous and/or radiological contaminants in and around the Isotope Facilities pose a substantial risk to human health or the environment (i.e., a high probability of adverse effects) and if remedial site evaluations or removal actions are, therefore, required. The scope of the project included: (1) a review of historical evidence regarding operations and use of the facility; (2) interviews with facility personnel concerning current and past operating practices; (3) a site inspection; and (4) identification of hazard areas requiring maintenance, removal, or remedial actions. The results of the removal site evaluation indicate that no substantial risks exist from contaminants present in the Isotope Facilities because adequate controls and practices exist to protect human health and the environment.

216 V18/022299

Action Memorandum for Uranium Deposit Removal at the Molten Salt Reactor Experiment, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Jacobs Engineering Group Inc., Oak Ridge, TN
DOE/OR/02-1488&D1; 20 pp. (June 1996)

This action memorandum documents approval of the removal action proposed in Engineering Evaluation/Cost Analysis for Uranium Deposit Removal at the Molten Salt Reactor Experiment, Oak Ridge National Laboratory, Oak Ridge, Tennessee. The

uranium deposit removal action will reduce or eliminate the risks that could result from a nuclear criticality accident or chemical reaction in the auxiliary charcoal bed (ACB) in the charcoal bed cell (CBC).

217 V18/021147

Characterization of the Molten Salt Reactor Experiment Fuel and Flush Salts

Williams, D.F.; Peretz, F.J.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-9606116; Proceedings of an American Nuclear Society (ANS) Annual Meeting, Reno, NV, June 16-20, 1996. ANS, La Grange Park, IL; (9 pp.) (1996)

Wise decisions about the handling and disposition of spent fuel from the Molten Salt Reactor Experiment (MSRE) must be based upon an understanding of the physical, chemical, and radiological properties of the frozen fuel and flush salts. These "static" properties can be inferred from the extensive documentation of process history maintained during reactor operation and the knowledge gained in laboratory development studies. Just as important as the description of the salt itself is an understanding of the dynamic processes which continue to transform the salt composition and govern its present and potential physicochemical behavior. A complete characterization must include a phenomenological characterization in addition to the typical summary of properties. This paper reports on the current state of characterization of the fuel and flush salts needed to support waste management decisions.

218 V18/022972

Criticality Safety Study of the Molten Salt Reactor Experiment (MSRE) Auxiliary Charcoal Bed

Hollenbach, D.F.; Hopper, C.M.

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/M-5450; 23 pp. (September 1996)

The Molten Salt Reactor Experiment (MSRE) was operated from June 1965 to December 1969. The objective of the experiment was to investigate the practicality of developing a power reactor consisting of a graphite lattice with circulating molten uranium salt as fuel for application in central power stations. When the experiment was terminated in 1969, approximately 4710 kg of salt containing approximately 36.3 kg of uranium, 675 g of plutonium, and various fission products were transferred to two fuel drain tanks (FDTs). The almost 30.5 kg of Uranium 233 in the salt is the primary fissile constituent, but about 0.93 kg of Uranium 235 is also present. In April 1994, a gas sample from the MSRE off-gas system (OGS) indicated that uranium had migrated from the FDTs into the OGS. Further investigation revealed a likely accumulation of approximately 2.6 kg of uranium in the auxiliary charcoal bed (ACB), which is located in the concrete-lined charcoal bed cell (CBC) below ground level outside the MSRE building. The nuclear criticality safety (NCS) situation was further complicated by the CBC being filled with water up to the overflow pipe, which completely submerged the ACB. Thus there was not only an increased risk of criticality because of water reflection in the ACB, but also because of potential moderation in the ACB in case of water inleakage. Leakage into the ACB would result in a direct path

for water between the CBC and the OGS or FDTs, thus increasing the risk of criticality in these areas. When uranium was discovered in the ACB, a number of steps, detailed in this report, were immediately taken to try to understand and ameliorate the situation. After all the actions were completed, a validation of the results obtained for the ACB was performed.

219 V18/021148

Descriptive Model of the Molten Salt Reactor Experiment After Shutdown: Review of FY 1995 Progress

Williams, D.F.; Del Cul, G.D.; Toth, L.M.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/TM-13142; 66 pp. (January 1996)

During FY 1995 considerable progress was made toward gaining a better understanding of the chemistry and transport processes that continue to govern the behavior of the Molten Salt Reactor Experiment (MSRE). As measurements in the MSRE proceed, laboratory studies continue, and better analyses are available, our understanding of the state of the MSRE and the best path toward remediation improves. Because of the immediate concern about the deposit in the auxiliary charcoal bed (ACB), laboratory studies in the past year focused on carbon-fluorine chemistry. Secondary efforts were directed toward investigation of gas generation from MSRE salts by both radiolytic and nonradiolytic pathways. In addition to the laboratory studies, field measurements at the MSRE provided the basis for estimating the inventory of uranium and fluorine in the ACB. Analysis of both temperature and radiation measurements provided independent and consistent estimates of about 2.6 kg of uranium deposited in the top of the ACB. Further analysis efforts included a refinement in the estimates of the fuel-salt source term, the deposited decay energy, and the projected rate of radiolytic gas generation. This report also provides the background material necessary to explain new developments and to review areas of particular interest. The detailed history of the MSRE is extensively documented and is cited where appropriate. This work is also intended to update and complement the more recent MSRE assessment reports.

220 V18/022276

Identification and Evaluation of Alternatives for the Disposition of Fluoride Fuel and Flush Salts from the Molten Salt Reactor Experiment at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Peretz, F.J.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-380; 175 pp. (August 1996)

This document presents an initial identification and evaluation of the alternatives for disposition of the fluoride fuel and flush salts stored in the drain tanks at the Molten Salt Reactor Experiment (MSRE) at Oak Ridge National Laboratory (ORNL). It will serve as a resource for the U.S. Department of Energy contractor preparing the feasibility study for this activity under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This document will also facilitate further discussion on the range of credible alternatives, and the relative merits of

alternatives, throughout the time that a final alternative is selected under the CERCLA process.

221 V18/022272

Molten Salt Reactor Experiment UF6 Migration Remediation: Status Report

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/M-4023; 8 pp. (August 17, 1994)

The amount of uranium deposited in the ACB has been estimated using a portable gamma spectrometer and gamma dose rate measurements. Raw data have been acquired and computer curve-fitted to estimate the quantity and length of deposit. The data indicates the deposit is in the range of 2 to 2.2 Kg and deposited within the first 10 inches of charcoal. Neutron dosimetry and spectrometry are also underway to quantify the amount of neutron activity. Bubble dosimetry has indicated a neutron dose rate of 2 mrem/h. The first two attempts at neutron scanning of the ACB have encountered difficulties due to water leakage to the detector and effects from saturation of the neutron detector with high gamma activity. A third attempt was successful using a different sensor configuration and has indicated the neutron activity to be in the same region as the gamma activity. However, differentiation between spontaneous fission neutrons and alpha-n reaction neutrons has not been completed.

222 V18/022264

Program Management Plan for the Molten Salt Reactor Experiment Remediation Project at Oak Ridge National Laboratory, Oak Ridge, TN

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-341; 50 pp. (September 1996)

The primary mission of the Molten Salt Reactor Experiment (MSRE) Remediation Project is to effectively implement the risk-reduction strategies and technical plans to stabilize and prevent further migration of uranium within the MSRE facility, remove the uranium and fuel salts from the system, and dispose of the fuel and flush salts by storage in appropriate depositories to bring the facility to a surveillance and maintenance condition before decontamination and decommissioning. This Project Management Plan (PMP) for the MSRE Remediation Project details project purpose; technical objectives; milestones, and cost objectives; work plan; work breakdown structure (WBS); schedule; management organization and responsibilities; project management, performance measurement, planning, and control; conduct of operations; configuration management; environmental, safety, and health compliance; quality assurance; operational readiness reviews; and training.

223 V18/024088

Technical Bases for the Use of CIF3 and MSRE Reactive Gas Removal Project at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Trowbridge, L.D.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-402; 48 pp. (June 1997)

Nearly impermeable, non-volatile deposits in the Molten Salt Reactor Experiment (MSRE) off-gas piping are impeding the removal of reactive gases from that system. The deposits almost certainly consist of reduced uranium fluorides or of uranium oxyfluorides. Treatment with CIF₃ is a non-intrusive method capable of chemically converting these compounds back to UF₆, which can then be removed as a gas. This report discusses the technical bases for the use of CIF₃ treatments in this system. A variety of issues are examined, and where the necessary information exists or has been developed, the resolution discussed. The more important of these issues include the efficacy of CIF₃ at deposit removal under the conditions imposed by the MSRE system, materials compatibility of CIF₃ and its reaction products, and operational differences in the Reactive Gas Removal System imposed by the presence of CIF₃ and its products.

224 V18/021405

Thermal Analysis to Support Decommissioning of the Molten Salt Reactor Experiment

Sulfredge, C.D.; Morris, D.G.; Park, J.E.; Williams, P.T.
Oak Ridge National Laboratory, Engineering Technology Division, Oak Ridge, TN
ORNL/TM-13026; 65 pp. (June 1996)

As part of the decommissioning process for the Molten Salt Reactor Experiment (MSRE) at Oak Ridge National Laboratory, several thermal-sciences issues were addressed. Apparently, a mixture of UF₆ and F₂ had diffused into the upper portion of one charcoal column in the MSRE auxiliary charcoal bed (ACB), leading to radiative decay heating and possible chemical reaction sources. A proposed interim corrective action was planned to remove the water from the ACB cell to reduce criticality and reactivity concerns and then fill the ACB cell with an inert material. This report describes the design of a thermocouple probe to obtain temperature measurements for mapping the uranium deposit, as well as development of steady-state and transient numerical models for the heat transfer inside the charcoal column. Additional numerical modeling was done to support filling of the ACB cell. Results from this work were used to develop procedures for meeting the goals of the MSRE Remediation Project without exceeding appropriate thermal limits.

225 V18/021241

Decontamination and Decommissioning Preparation of Oak Ridge National Laboratory Research Reactors

Stover, R.L.; Anderson, G.E.; Finger, J.M.; Skipper, D.D.
Oak Ridge National Laboratory, Oak Ridge, TN
CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 171-175) (1994)

During the past seven years, four research reactors at Oak Ridge National Laboratory (ORNL) have been shut down by the U.S. Department of Energy (DOE) because of a lack of funding and

mission. Before the reactors are eligible to receive DOE funding for decontamination and decommissioning (D&D), certain preparations are required, including resolution of significant environmental concerns. This paper describes the results of the D&D preparations for one of these four reactors, the Oak Ridge Research Reactor (ORR), with the emphasis on the environmental aspects.

226 V18/022292

Removal Site Evaluation Report on the Tower Shielding Facility at Oak Ridge National Laboratory, Oak Ridge, TN

Advanced Sciences, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR/01-1517&D1; ORNL/M-5442; 135 pp. (September 1996)

This removal site evaluation report for the Tower Shielding Facility (TSF) at Oak Ridge National Laboratory was prepared to provide the Environmental Restoration Program with information necessary to evaluate whether hazardous and/or radiological contaminants in and around the Tower Shielding Facility pose a substantial risk to human health or the environment (i.e., a high probability of adverse effects) and if remedial site evaluations or removal actions are, therefore, required. The scope of the project included: (1) a review of historical evidence regarding operations and use of the facility; (2) interviews with facility personnel concerning current and past operating practices; (3) a site inspection; and (4) identification of hazard areas requiring maintenance, removal, or remedial actions. Based on the findings of this removal site evaluation, adequate efforts are currently being made at the TSF to contain and control existing contamination and hazardous substances on site in order to protect human health and the environment. No conditions requiring maintenance or removal actions to mitigate imminent or potential threats to human health and the environment were identified during this evaluation. Given the current conditions and status of the buildings associated with the TSF, this removal site evaluation is considered complete and terminated according to the requirements for removal site evaluation termination set forth in 40 CFR 300.410(e).

227 V18/025390

How a Simple Effectiveness-Cost Analysis Expedited a Combined Decontamination and Decommissioning Action and a Remedial Action at the Old Hydrofracture Facility at Oak Ridge National Laboratory

Redus, K.S.; Bednarz, C.

MACTEC, Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

An effectiveness-cost (EC) analysis was performed on several strategies that combined tank, surface impoundment, or waste pit Comprehensive Environmental Restoration and Compensation Liability Act (CERCLA) remedial actions with a structural decontamination and decommissioning action at the Old Hydrofracture Facility (OHF) in Waste Area Grouping 4 at the Oak Ridge National Laboratory (ORNL). Results were obtained and

subsequently approved by Department of Energy Oak Ridge Office program manager in less than three weeks. It is a fact that DOE is rapidly moving to a project-based approach of dealing with environmental challenges in the areas of waste management, environmental restoration, nuclear material and facility stabilization, science and technology development, landlord activities, and national program planning and management. This means that Maintenance and Integration (M&I) contractors at DOE sites will be required to support and justify strategy planning and decisions in these project areas. This paper demonstrates that EC analysis can be accomplished in a timely manner to support such decisions.

228 V18/020953

Measurement Technique and Results, Data Analysis Methods, and Modeling Used for D&D and Waste Characterization of ORNL, Old Hydrofracture Facility

Haghighi, M.H.; Nelson, T.R.; Kelsey, A.P.; Sloan, D.

Bechtel Environmental, Inc., Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; CH2M Hill Inc., Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (16 pp.) (1996)

A series of site characterization measurements were performed in 1994 in preparation for the decontamination and decommissioning (D&D) of the Old Hydrofracture Facility (OHF) at Oak Ridge National Laboratory. The OHF was one of four sites in Melton Valley used in the development and full-scale application of the hydrofracture process, a unique disposal method that involved injecting radioactive liquid low-level waste mixed with grout and additives into a deep, low-permeability shale formation. The OHF facility did not appear to have been decontaminated before it was abandoned; most of the equipment and piping used in the cells and control room are still present. The objective of the site characterization was to determine the nature and extent of radioactive and hazardous materials and other industrial hazards in and around the structures. This information will be used in subsequent planning to develop a detailed approach for dismantling and disposing of the structures: (1) to evaluate and design the most cost-effective D&D approach; (2) to determine the level and type of protection necessary for D&D workers; and (3) to estimate the types and volumes of wastes generated during D&D activities and support decisions on waste disposal. The D&D characterization scope included the entire OHF structure, including the foundation and equipment or materials within the structure. To estimate potential worker exposure from the soil during D&D, the characterization scope also included the soils underneath and surrounding the building to a distance of 5 ft from the structure. This paper will discuss measurement results, data analysis methods used to quantify various types of contaminants, and modeling used to estimate the relative isotopic distribution of the contaminants. Results from different types of measurements along with modeling results will be used to infer the spatial distribution and correlation of the contaminants and radiation fields they generate. The contribution of loose and fixed contaminants to the total general area radiation fields will also be estimated. The measurement

methods included gross alpha, beta, and gamma surveys; directional gamma surveys; gamma spectroscopy; concrete coring; photography; and collection of soil and miscellaneous samples.

229 V18/022343

Program Management Plan for Nuclear Material and Facility Stabilization in the U.S. Department of Energy Oak Ridge Operations

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; Advanced Sciences, Inc., Oak Ridge, TN

ES/ER/TM-204; 155 pp. (September 1996)

This Program Management Plan (PMP) is a comprehensive document which describes the Nuclear Material and Facility Stabilization (NMFS) Program objectives, responsibilities, organization relationships, and management control systems to be used in executing projects in the program. It provides guidance for the transfer of surplus contaminated facilities from CSOs and turnover of facilities from NMFS to the Environmental Restoration Program (EM-40) or other users; describes the end points determination process to be used in defining and performing deactivation activities; defines the necessary elements to be included in S&M Plan development and management; and defines the requirements for achieving environmental compliance. The Program Summary Work Breakdown Structure (PSWBS) included in this plan defines the organization of the workscope of the Oak Ridge Office of Nuclear Material and Facility Stabilization. It is the structure for defining and controlling program/project work and is the basis for work planning, authorization, reporting, and monitoring of performance.

230 V18/022377

Surveillance and Maintenance Report on Decontamination and Decommissioning and Remedial Activities at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Fiscal Year 1996

King, H.L.; Sollenberger, M.L.; Sparkman, D.E.; Reynolds, R.M.; Wayland, G.S.

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-276; 40 pp. (December 1996)

The Oak Ridge Y-12 Plant Decontamination and Decommissioning (D&D) and Remedial Action (RA) programs are part of the Environmental Restoration (ER) Division and are funded by the Office of Environmental Management (EM-40). Building 9201-4 (known as Alpha-4), three sites located within Building 9201-3 (the Oil Storage Tank, the Molten Salt Reactor Experiment Fuel Handling Facility, and the Coolant Salt Technology Facility), and Building 9419-1 (the Decontamination Facility) are currently the facilities at the Y-12 Plant included in the D&D program. The RA program provides surveillance and maintenance (S&M) and program management of ER sites at the Y-12 Plant, including selected sites listed in Appendix C of the Federal Facilities Agreement (FFA), sites listed in the Hazardous and Solid Waste Amendment (HSWA) permit Solid Waste Management Unit (SWMU) list, and sites currently closed or undergoing post-closure activities under the Resource Conservation and Recovery Act of 1976 (RCRA) or the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). This report communicates the

status of the program and specific S&M activities for the D&D and RA programs.

231 V18/022510

Dose Reduction Through Automation of Nuclear Weapons Dismantlement and Storage Procedures at the Department of Energy's Pantex Facility

Thompson, D.A.; Poston, J.W.

Texas A&M University, College Station, TX

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):37b (June 1996)

With the end of the Cold War and the subsequent break up of the Soviet Union, the number of weapons in the nuclear stockpile now greatly exceeds any foreseeable future need. To compensate for this excess an estimated 20,000 nuclear warheads have been earmarked for dismantlement and storage at the Department of Energy's Pantex Plant near Amarillo, Texas. It is anticipated that the majority of these warheads will arrive at the Pantex facility by the year 2000. At that time, it is estimated that current dismantlement and inventory procedures will not be adequate to control worker radiation exposure within administrative and federal dose limits. To control these exposures alternate approaches to dismantlement and inventory must be developed. One attractive approach is to automate as many activities as possible, thus reducing worker exposure. To facilitate automation of dismantlement and storage procedures, current procedures were investigated in terms of collective dose to workers, time to completion, ease of completion, and cost of automation for each task. A cost-benefit comparison was then performed in order to determine which procedures would be most cost-effective to automate.

232 V18/023734

Thermal Decontamination of Tritium-Contaminated Materials at the DOE Pantex Plant

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Pantex Plant, Amarillo, TX

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (5 pp.) (1996)

The low-level radioactive waste generated from nuclear weapons dismantlement is being reduced by utilizing a thermal treatment method for decontaminating tritium-contaminated components, allowing them to be reused. Previously, nuclear weapon components contaminated with tritium were shipped to the Nevada Test Site (NTS) for disposition. The pilot project was performed in 1995 on beryllium parts. A contract was established with Idaho National Engineering Laboratory to have beryllium fabricated into reflector blocks to be reused in their Advanced Test Reactor (ATR). Approximately 35,000 lb of beryllium components from weapons dismantlement will be diverted from NTS to the ATR. Total savings is estimated at \$1.1 million.

233 V18/021743

Deactivate Facilities/Nuclear Materials Management Data Management Plan

Report; 17 pp. (1996)

The primary Transition Projects (TrP) mission is to deactivate facilities on the Hanford Site in preparation for D&D. The secondary mission is to provide safe and secure storage of special nuclear materials, nuclear materials, and nuclear fuel. TrP will protect the health and safety of the public and Hanford employees, protect the environment, and provide beneficial use of the facilities and other Site resources. Work will be performed in accordance with the Tri-Party Agreement, other agreements, and in compliance with all applicable Federal, state, and local laws. The stakeholders will be active participants in the decision processes including establishing priorities and developing a consistent set of rules, regulations, and laws. The work will be leveraged with a new process of providing positive, lasting economic impact in the region. Effectiveness, efficiency, and discipline in all mission activities will enable the Hanford Site cleanup mission to proceed in a continuous and substantive manner.

234 V18/022823

Decommissioning at Hanford

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Bechtel Hanford, Inc., Richland, WA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1868-1872) (1996)

The decontamination and decommissioning (D&D) of surplus facilities at Hanford has been ongoing for approximately twenty-three years, beginning with a very modest effort in terms of funding, manpower and equipment. The program has evolved into a very structured, well equipped organization that has become a recognized leader in D&D within the United States Department of Energy (DOE) complex.

235 V18/021242

Long Term Decontamination at the Hanford Site: A Case Study

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CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 176-180) (1994)

This paper describes an engineering study that evaluates decontamination requirements at Hanford and the potential reutilization of the first plutonium processing production facility as a decontamination facility. The logic used to develop the study, the options available for a long-term decontamination mission, and the resultant strategy recommended in the study are presented. The paper provides a starting point for other similar study efforts. The process flowsheets, regulatory restrictions, and preconceptual

designs developed in this study are common throughout the nuclear waste industry.

236 V18/024158

Radiological Dose Assessment for the Decontaminated Concrete Removed from 183-H Solar Evaporation Basins at the Hanford Site, Richland, Washington

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Argonne National Laboratory, Environmental Assessment Division, Argonne, IL

ANL/EAD/TM-67; 26 pp. (January 1997)

Potential maximum radiation dose rates over a 1,000-year time horizon were calculated for exposure to the decontaminated concrete removed from the 183-H Solar Evaporation Basins at the Hanford Site, Richland, Washington. The RESRAD computer code, Version 5.62, which implements the methodology described in the US Department of Energy's manual for developing residual radioactive material guidelines, was used in this evaluation. Currently, the concrete is not being used. Four potential exposure scenarios were developed for the land area where the decontaminated concrete will be stored. In Scenario A industrial use of the land is assumed; in Scenario B recreational use of the land is assumed; in Scenario C residential use of the land is assumed; and in Scenario D (a plausible but unlikely land-use scenario), the presence of a subsistence farmer in the immediate vicinity of the land is assumed. For Scenarios A and B, water used for drinking is assumed to be surface water from the Columbia River; for Scenarios C and D, groundwater drawn from a well located at the downgradient edge of the storage area is the only source of water for drinking, irrigation, and raising livestock. Conservative parameter values were used to estimate the radiation doses. The results of the evaluation indicate that the US Department of Energy's dose limit of 100 mrem/yr would not be exceeded for any of the scenarios analyzed. The potential maximum dose rates for Scenarios A, B, C, and D are 0.75, 0.022, 29, 29 mrem/yr, respectively. An uncertainty analysis was performed to determine which parameters have the greatest impact on the estimated doses. The doses in Scenarios C and D were found to be very sensitive to the magnitude of the irrigation rate.

237 V18/023697

Transfer of an Inactive Facility to Long-Term Surveillance and Maintenance

Nemec, J.F.

Bechtel Hanford, Inc., Richland, WA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (20 pp.) (1996)

This series of viewgraphs provides an outline of a presentation on the deactivation of a nuclear facility. A cost benefit analysis and actual operating vs. surveillance and maintenance comparisons are presented. The deactivation process and the end point process are described. Acceptance criteria are discussed and lessons learned are included.

238 V18/023565

103-B, 1701-BA, and 1714-C Demolition Less Than 90

Day Storage Supplemental Information to the Hanford Facility Contingency Plan

Snider, P.M.

Bechtel Hanford, Inc., Richland, WA

BHI-00840; 11 pp. (October 1996)

The 103-B, 1701-BA, and 1714-C Less Than 90 Day Storage Area stores characteristic wastes generated in the demolition of the 103-B, 1701-BA, and 1714-C Complex. Wastes (lead-based painted components) are packaged and stored in vendor shipment containers. This document is to be used to demonstrate compliance with the contingency plan requirements in Washington Administrative Code 173-303 for certain Resource Conservation, and Recovery Act of 1976 waste management units.

239 V18/025303

Development of Design Criteria for the Interim Safe Storage of the 105-C Reactor Project at the U.S. Department of Energy Hanford Site

Rodovsky, T.J.

Bechtel Hanford, Inc., Richland, WA

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (10 pp.) (1997)

The 105-C production reactor at the Hanford Site in Washington State will be placed into interim safe storage for up to 75 years. The 105-C reactor will be one of the first plutonium producing reactors, used in the cold war, to be decommissioned in the entire (DOE) Department of Energy complex. Extraneous structures outside the reactor shield walls will be decontaminated; waste will be removed; and the external structures will be demolished, leaving the shield walls as final containment for the reactor block for the safe storage period. After all contamination is removed or stabilized in underlying areas, a new stainless steel roof will be built. The design criteria reflects the construction, demolition, and decontamination and decommissioning (D&D) effort overall. The 105-C Reactor project will also include a large scale decommissioning technology demonstration for the U.S. Department of Energy (EM-50) and will demonstrate a variety of new, innovative, and previously overlooked technologies. The incorporation of innovative technologies into safety assessments, scheduling and work procedures has also created new challenges from the standpoint of design criteria. The overall building requirements, for the most part, are more stringent now for the interim safe storage than during the time of actual operations, which poses several challenges in developing the design criteria for the interim safe storage. The paper provides insight into the process and the decisions needed to generate the new design criteria for the interim safe storage to comply with all requirements.

240 V18/022814

Interim Safe-Storage of the Hanford 105-C Reactor

Bruggeman, J.M.; Miller, R.L.; Thomas, J.P.

U.S. Department of Energy, Richland Operations Office, Richland, WA; Bechtel Hanford, Inc., Richland, WA; Delphinus Engineering, Inc., Philadelphia, PA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1809-1814) (1996)

Engineering and planning has been initiated to determine the feasibility of reducing the 105-C reactor building footprint to a size adequate to ensure containment of any radioactive and hazardous materials that may escape from the reactor but still have access to areas around the reactor for surveillance purposes. The general concept is to remove the building structure such that the massive shield walls surrounding the reactor become the outside walls of the remaining building. A new roof system would be placed over the reactor using the shield walls for support.

241 V18/025414

Final Decommissioning Report for the 183-C Filter Building/Pumproom Facility

Marske, S.G.

Bechtel Hanford, Inc., Richland, WA

BHI-01005; 80 pp. (April 1997)

This report documents the decommissioning and demolition (D&D) of the 183-C Filter Building/Pumproom facility. Characterization of the facilities was initiated in November 1994 with the remainder of the assessment activities complete by September 1995. The remediation started in October 1995, and the final site demolition and restoration was completed in September 1996. The 183-C Facility D&D involved the performance of characterization to support the development of a project plan and final hazard classification. Obtaining the necessary regulatory approvals and developing the initial work packages completed the assessment phase of the D&D work. The remediation phase of the project started with the removal of the asbestos lagged pipes and continued with the removal of the transite siding and roofing. During the same time frame other hazardous materials were removed, the liquids were pumped from the sodium dichromate tanks, and the associated hazardous piping was removed. With the transite removed from the exterior of the facility, the heavy equipment started demolishing the filter building working towards the pumproom. The structural steel was removed at the same time the concrete of the filter beds was demolished. Once the structural steel was removed from the pumproom, the remaining hazardous materials were removed and the site was backfilled. The area was then graded to match the surrounding terrain.

242 V18/024160

1995 Phase 1 Concrete Sampling at the Decontaminated 183-H Basins

Kramer, C.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00922; 764 pp. (October 3, 1996)

This report provides a consolidated reference for 1995 concrete sampling data associated with the Hanford Site's 183-H Solar Evaporation Basins (located at the Hanford Site in Richland, Washington). In 1995, the basins were decontaminated and dismantled. Sampling efforts began after completion of concrete

decontamination efforts. Soil and water samples were collected and are described in chronological order in this report.

243 V18/025410

Application for Approval of Derived Authorized Limits for the Release of the 190-C Trenches and 105-C Process Water Tunnels at the Hanford Site: Volume 1 - Dose Assessment and Results

Denham, D.H.; Winslow, S.L.; Kennedy, W.E., Jr.; Moeller, M.P.

Bechtel Hanford, Inc., Richland, WA

BHI-00844 (Vol. 1, Rev. 1); 35 pp. (March 1997)

As part of environmental restoration activities at the Hanford Site, Bechtel Hanford, Inc. (BHI) is conducting a series of evaluations to determine appropriate release conditions for specific facilities following the completion of decontamination and decommissioning (D&D) projects. The release conditions, with respect to the residual volumetric radioactive contamination, are termed authorized limits. The U.S. Department of Energy (DOE), Richland Operations Office (RL) has the authority (under current DOE Order 5400.5 and potentially under 10 CFR 834) to approve authorized limits specific to D&D projects at the Hanford Site. This report was prepared following decontamination of the subject trenches and process water tunnels. Radiological surveys were performed prior to and during the decontamination efforts and again during a detailed post-decontamination radiological characterization of the residual radioactive materials, both fixed and removable. These trenches and tunnels were subsequently surveyed by an Independent Verification Contractor (IVC). While the initial goal had been to remove all detectable surface radioactivity, to accomplish that task would have required significantly more labor and would have greatly increased the amounts of radioactive waste generated. Because the residual radionuclide levels were above the releasable surface contaminant levels of DOE 5400.5, pathway analyses were performed to bound the potential annual doses that could be received in the extreme case that individuals were to use the trenches or tunnels or to reside on soil contaminated to that degree. The fact that the trenches and tunnels will be effectively isolated from the public for the foreseeable future emphasizes the improbability of such doses actually being received.

244 V18/025411

Application for Approval of Derived Authorized Limits for the Release of the 190-C Trenches and 105-C Process Water Tunnels at the Hanford Site: Volume 2 - Source Term Development

Denham, D.H.; Winslow, S.L.; Kennedy, W.E., Jr.; Moeller, M.P.

Bechtel Hanford, Inc., Richland, WA

BHI-00844 (Vol. 2, Rev. 1); 58 pp. (March 1997)

As part of environmental restoration activities at the Hanford Site, Bechtel Hanford, Inc. (BHI) is conducting a series of evaluations to determine appropriate release conditions for specific facilities following the completion of decontamination and decommissioning (D&D) projects. The release conditions, with respect to the residual volumetric radioactive contamination, are termed authorized limits.

The U.S. Department of Energy (DOE), Richland Operations Office (RL) has the authority (under current DOE Order 5400.5 and potentially under 10 CFR 834) to approve authorized limits specific to D&D projects at the Hanford Site. This two volume report provides the necessary evaluations for the 190-C trenches and 105-C process water tunnels, serves as the technical basis for a request for approval of authorized limits of residual radioactive contamination levels associated with these facilities, and documents the response (Appendix A, Volume 1) to the comments received from RL following issuance of Rev. 0 on January 20, 1997. Volume 1 of this report contains the Dose Assessment and Results and this volume (Volume 2) contains the Source Term Development. This volume contains the radiological characterization data, spreadsheet analyses, and radiological source terms. The source terms characterize the radionuclides and activity concentration levels for the facilities and serve as input to the various radiation exposure pathways and scenarios used to estimate the individual annual radiation doses that could result from release of these facilities. Based on the results of these evaluations, it is determined that the application of the proposed authorized limits for the 190-C trenches and the 105-C process water tunnels represents a safe and cost-effective approach to their final disposition.

245 V18/023563

Final Report for the 190-D Complex Decontamination and Decommissioning

Thoren, S.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00903; 138 pp. (September 1996)

This report documents the decontamination and decommissioning (D&D) of the 190-D complex (located on the Hanford Site in Richland, Washington). D&D of the 190-D complex included decontaminating and removing hazardous and radiologically contaminated materials; dismantling equipment piping and utility infrastructure; demolishing the structure; and restoring the site. The 100-D Area contains two of the nine inactive plutonium production reactors. The reactor sites are located along the south shore of the Columbia River where the sites cover the northern part of the Hanford Site. The 190-D complex is located in the 100-D Area and is composed of the following seven buildings: 185-D De-aeration Building, 189-D Refrigeration Building, 190-D Tank Room Highbay, 190-D Process Pump Room, 190-DA Process Pump Room Annex, 195-D Vertical Safety Rod Test Tower, 1724-D Underwater Test Facility.

246 V18/022975

Safety Analysis for the 233-S Decontamination and Decommissioning Project

Thoren, S.D.

Bechtel Hanford, Inc., Richland, WA; Los Alamos Technical Associates, Inc., Los Alamos, NM

BHI-00892; 47 pp. (August 1996)

Decommissioning of the 233-S Plutonium Concentration Facility (REDOX) is a proposed expedited response action that is regulated by the Comprehensive Environmental Response Compensation and Liability Act of 1980 and the Hanford Federal Facility Agreement

and Consent Order. Due to progressive physical deterioration of this facility, a decontamination and decommissioning plan is being considered for the immediate future. This safety analysis describes the proposed actions involved in this D&D effort; identifies the radioactive material inventories involved; reviews site specific environmental characteristics and postulates an accident scenario that is evaluated to identify resultant effects.

247 V18/025409

Isolation Plan for the Southern End of the 313 Metal Fabrication Building

Smith, D.S.

Bechtel Hanford, Inc., Richland, WA

BHI-00767; 105 pp. (February 1997)

The 313 Metal Fabrication Building was originally constructed as part of the Manhattan Project and underwent major remodeling and expansion in 1954. The building is divided into two sections that were separated by a fire wall. The northern end of this building is currently leased by Richland Specialty Extrusions. The southern end of the building, referred to as 313(S), is the subject of the isolation plan. The 313(S) Building will be transitioned to the Environmental Restoration Contractor Decontamination and Decommissioning Project at a later date and will eventually be demolished when funding is available. The intent of the isolation plan is to identify all known issues and reasonable solutions to the issues. The basic isolation plan approach involves: (1) removal of remaining equipment that presents a risk if left in place, (2) sealing the roof, (3) removal of hazardous substances that cannot be buried in approved disposal sites during future demolition, (4) physically isolating the facility from personnel intrusion, (5) mechanically isolating all non-essential utilities, and (6) periodically monitoring facility conditions.

248 V18/022083

B-Plant Exhaust Filter Inventory Analysis

Lan, J.S.; Wootan, D.W.; Carter, L.L.; Bunch, W.L.; Covey, L.I.; Greenborg, J.

Westinghouse Hanford Company, Richland, WA

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 326-331) (1994)

This paper describes a method for determining radionuclide inventories in filters using measurements of radiation fields that determine photon dose rates and photon-plus-electron dose rates between filter banks. The mathematical approach quantifies the curie inventories of filter banks by using the measured dose rates and the calculated Green's functions involving detector responses per unit source.

249 V18/021288

CO2 Pellet Decontamination Technology at Westinghouse Hanford

Aldridge, T.L.; Martin, M.L.; Aldrich, L.K.

Westinghouse Hanford Company, Richland, WA

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:42-43 (1995)

Experimentation and testing with CO₂ pellet decontamination technology was conducted at Westinghouse Hanford Company (WHC), Richland, Washington. The testing was conducted under a demonstration of services contract from July 1993 through September 1994. The Non-Destructive Cleaning, Inc., (NDC)-patented process/facility uses small, solid carbon dioxide particles propelled by dry compressed air. The CO₂ particles shatter upon impact with the surface of the material to be cleaned and flash into dry CO₂ gas. The cleaning is accomplished by the rapidly expanding CO₂ gas's lifting and flushing the foreign materials out. This paper discusses the demonstration, lessons learned, successes and future plans.

250

V18/022804

Hot Cell Decontamination at the DOE Hanford Site Using the KSI Tentacle [TM] Manipulator

Immega, G.; Antonelli, K.; Ko, J.; Konynenbelt, J.

Kinetic Sciences, Inc., Vancouver, British Columbia, Canada; Pacific Northwest Laboratory, Richland, WA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1757-1759) (1996)

The KSI Tentacle [TM] is a low-cost robotic manipulator functionally and economically ideal for decontaminating and decommissioning operations. This paper reports how Battelle Pacific Northwest Laboratories (PNL) successfully employed a Tentacle [TM] manipulator to spray-wash the radioactive airlock to the B-Cell hot cell facility at the DOE Hanford site, and considers how else the Tentacle [TM] might be used at Hanford for decontamination work in the future.

251

V18/022817

Hanford Site Building 190-D Decontamination & Decommissioning

Thoren, S.D.

Bechtel Hanford, Inc., Richland, WA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1827-1831) (1996)

The 190-D complex equipment and structure was identified for decontamination and demolition by the United States Department of Energy (DOE) in 1992. The work was planned and field activities began in 1993. The building was imploded on August 17, 1995. The complex was decontaminated by removing the residual equipment, hazardous materials, dismantling and removing the radiologically

contaminated test loops, and mechanically decontaminating radiologically contaminated concrete surfaces. Demolition of the complex used lessons learned from previous similar jobs and was accomplished using conventional and explosive demolition techniques. The 190-D complex was the fourth 100 Area pumphouse to be demolished. The pumphouse complexes at the 100-F and 100-H Areas were demolished over ten years ago. The 190-F complex was leveled with explosives and the 190-H complex was pulled over with heavy equipment. Both the F and H pumphouse projects experienced some difficulties with their demolition method. The pumphouse complex at 100-B was demolished in fiscal year 1994 with a combination of heavy equipment and explosive demolition techniques.

252

V18/023564

Characterization Plan for the Hanford Generating Plant (HGP)

Marske, S.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00936; 38 pp. (September 1996)

This characterization plan describes the sample collection and sample analysis activities to characterize the Hanford Generating Plant and associated solid waste management units (SWMUs). The analytical data will be used to identify the radiological contamination in the Hanford Generating Plant as well as the presence of radiological and hazardous materials in the SWMUs to support further estimates of decontamination and demolition.

253

V18/023567

Data Quality Objectives Summary Report in Support of Hanford Generating Plant

Miller, M.S.; Marske, S.G.

Environmental Quality Management, Richland, WA; CH2M Hill Inc., Corvallis, OR; Bechtel Hanford, Inc., Richland, WA

BHI-00929; 128 pp. (September 1996)

The US Department of Energy, Richland Operations Office requested that the Environmental Restoration Contractor generate a sampling and analysis plan to assist in the assessment of decontamination and decommissioning and remediation of the Hanford Generating Plant (HGP) and 11 associated Solid Waste Management Units. This report summarizes the results of the Data Quality Objectives planning process as applied to HGP. This characterization data will be used to better estimate the cost for D&D and remediation. The sampling and analysis design is presented; it summarizes the design, number, location, analytes, and analytical methods to be used. The purpose of the sampling is to provide the nature and depth of contaminants. In locations where it was difficult to make assumptions related to extent, the design allows for limited characterization related to extent of contamination.

254

V18/022832

Optimizing N Reactor Fuel Spacer Disposal

Duncan, G.M.; Day, R.S.; Trumble, H.R.

Bechtel Hanford, Inc., Richland, WA; U.S. Department of

Energy, Richland Operations Office, Richland, WA
CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1944-1951) (1996)

Deactivation of the Hanford Site's N Reactor included the disposal of a large number of radioactive reactor fuel spacers buried in silos outside the reactor building. Optimizing the disposal effort involved simultaneously solving objectives of low cost, schedule, dose minimization, and contamination control while satisfying a variety of regulatory requirements. The selected approach included removing the radioactive fuel spacers by crane-mounted electro-magnet, spray painting for airborne control, using grouted large-diameter pipe sections for the burial container, and shipping by truck. Cost and schedule goals were achieved, doses were higher than predicted mainly due to delays in operations, surface contamination was minimized, and airborne contamination was precluded.

255 V18/023725

PUREX Deactivation Project Waste Minimization Efforts

Gonzalez, R.X.; Jasen, W.G.; Hilliard, J.; Romine, L.D.
U.S. Department of Energy, Richland Operations Office, Richland, WA; Westinghouse Hanford Company, Richland, WA

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (8 pp.) (1996)

The goal of the Plutonium Uranium Extraction (PUREX) Plant Deactivation Project is to perform the activities necessary to achieve a safe and environmentally secure configuration for facility turnover to the environmental restoration contractor. Waste minimization has been a high priority during all aspects of the project. Successes include (1) sale of 187,000 gal of slightly radioactive nitric acid to British Nuclear Fuels, Ltd., for reuse as a product; (2) elimination of about 200,000 gal of radioactive rinsate through the reuse of tank flush waters; (3) elimination of about 60,000 gal of radioactive wastewater through the use of the F11 concentrator; (4) redeployment of about 3,000 cubic feet of laboratory equipment and 2.5 million lb of chemicals for reuse; (5) strict inventory and project management controls to minimize wastes; (6) "defrocking" of 12 high-efficiency particulate air filters, thereby reducing the total amount of mixed waste generated by 169 cu ft; and (7) redeployment of batteries, oil, and office supplies to other Hanford facilities. Successful waste minimization efforts employed during the PUREX project resulted in cost savings in excess of \$30 million.

256 V18/021099

Sampling and Analysis Plan for PUREX Canyon Vessel Flushing [Rev. 1]

Villalobos, C.N.

Westinghouse Hanford Company, Richland, WA
WHC-SD-CP-PLN-027 (Rev. 1); 10 pp. (February 7, 1995)

A sampling and analysis plan is necessary to provide direction for the sampling and analytical activities determined by the data quality objectives. This document defines the sampling and analysis necessary to support the deactivation of the Plutonium-Uranium Extraction (PUREX) facility vessels that are regulated pursuant to Washington Administrative Code 173-303.

257 V18/022422

Energy Department Has Made Progress Cleaning Up Nuclear Weapons Plants

Hileman, B.

Chemical and Engineering News, Washington, DC
Chemical & Engineering News 74(3):14-20 (July 22, 1996)

The Department of Energy, after years of expensive false starts, has actually begun to make progress in addressing its own Cold War legacy - the detritus of nuclear weapons production. But for some aspects of nuclear waste cleanup - expected to cost \$230 billion - DOE has not yet settled on a preferred system. Its two largest production sites - Hanford near Richland, Washington, and Savannah River near Aiken, SC - are pursuing very different cleanup approaches. DOE's Savannah River facility started up a full-scale vitrification plant for high-level wastes in March. And it plans to start reprocessing its corroding, irradiated spent fuel rods, now stored in pools, later this year. That is a direct reversal of current U.S. policy. In 1992, the U.S. government voiced its opposition to all reprocessing of spent nuclear fuel because of proliferation concerns. The Hanford site, on the other hand, will be putting its corroded rods into dry storage. This paper examines these two approaches and the challenges they represent.

258 V18/023566

233-S Plutonium Concentration Facility Data Quality Objectives

Encke, D.B.

Bechtel Hanford, Inc., Richland, WA
BHI-00832; 22 pp. (August 1996)

This document is a summary of the decision-making associated with the Data Quality Objective process that pertains to the characterization activities in the 233-S Plutonium Concentration Facility at the Hanford Site in Richland, Washington. The 233-S Plutonium Concentration Facility is located adjacent to, and north of, the REDOX Plant. The facility was used to concentrate the plutonium nitrate product solution from the REDOX facility. The 233-S Pipe Gallery, Control Room, SWP Change Room, Toilet, Equipment Room and the Electrical Cubicle are currently scheduled for decontamination and cleanout to support future demolition (D and D). Identification of the radiological contamination and presence of hazardous materials is needed to allow for disposal of the D and D debris.

259 V18/022802

30 Foot Reach with a 2 Foot Pole

Millard, J.W.F.

Spar Environmental Systems, Brampton, Ontario, Canada
CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous

Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1742-1748) (1996)

When planning inspection of many nuclear installations a pair of questions commonly come up: (1) how do I get a good view from the restricted access points; and (2) how do I understand the data from that restricted viewpoint. The use of 3D mapping and STEM camera deployers allows the capture of more expansive and detailed information than conventional techniques giving the potential to decrease risk and schedule when planning remediation tasks. Experience at Savannah River Site (SRS), Idaho National Engineering Laboratory (INEL), and Westinghouse Savannah River Company (WHC) has helped to show the potential of these technologies. Typical usage in a number of applications is discussed.

260 V18/022257

94-1 Research and Development Project Lead Laboratory Support: Status Report - January 1-March 31, 1996

Dinehart, M.

Los Alamos National Laboratory, Los Alamos, NM
LA-13161-SR; 70 pp. (September 1996)

This document reports status and technical progress for Los Alamos 94-1 Research and Development projects. An introduction to the project structure and an executive summary are included. Projects included in this report fall under the following subject areas: electrolytic decontamination, combustibles, sand, slag and crucibles, surveillance, core technology, separations, and materials science

261 V18/024099

Abrasive Blasting Technology by Polymer Filtration

Los Alamos National Laboratory, Los Alamos, NM
LALP-95-203; 1 p. (1995)

A need exists for improved techniques to clean radioactively contaminated equipment and minimize secondary hazardous waste generation during in-situ abrasive blasting. Los Alamos proposed to develop a water soluble chelating polymer formulation used for the selective recovery of contaminants from the residue resulting from the blasting process. This technology, Polymer Filtration (PF), uniquely combines the most positive aspects of chelation and ultra-filtration technology with the convenience of ion-exchange. Polymer Filtration will be applicable as a method to minimize secondary aqueous solutions while achieving a high level of decontamination. The fixed contaminants resulting from the blasting process are washed with aqueous solutions of customized polymer extractant. Solid residue is allowed to settle and the metal-loaded polymer solution is filtered and concentrated using a well-known commercial process called ultrafiltration. The resulting solid residue may be disposed of in sanitary landfill rather than a mixed or radioactive waste disposal site.

262 V18/022310

Advanced Worker Protection System: Innovative Technology Summary Report

U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington,

DC

DOE/EM-0307; 12 pp. (April 1996)

The Advanced Worker Protection System (AWPS) is a liquid-air-based, self-contained breathing and cooling system with a duration of 2 hrs. AWPS employs a patented system developed by Oceaneering Space Systems (OSS), which was supported by the Department of Energy's (DOE's) Morgantown Energy Technology Center through a cost sharing research and development contract. The heart of the system is the life-support backpack that uses liquid air to provide cooling as well as breathing gas to the worker. The backpack is combined with advanced protective garments, an advanced liquid cooling garment (LCG), a respirator, and communications and support equipment.

263 V18/022303

Advanced Worker Protection System: Topical Report - Phase I

Myers, J.

Oceaneering Space Systems, Houston, TX
DOE/MC/30178-5181; 278 pp. (July 1995)

The Department of Energy (DOE) is in the process of defining the magnitude and diversity of Decontamination and Decommissioning (D&D) obligations at its numerous sites. The DOE believes that existing technologies are inadequate to solve many challenging problems such as how to decontaminate structures and equipment cost effectively, what to do with materials and wastes generated, and how to adequately protect workers and the environment. Preliminary estimates show a tremendous need for effective use of resources over a relatively long period (over 30 years). Several technologies are being investigated which can potentially reduce D&D costs while providing appropriate protection to DOE workers. The DOE recognizes that traditional methods used by the EPA in hazardous waste site clean up activities are insufficient to provide the needed protection and worker productivity demanded by DOE D&D programs. As a consequence, new clothing and equipment which can adequately protect workers while providing increases in worker productivity are being sought for implementation at DOE sites. This project will result in the development of an Advanced Worker Protection System (AWPS). The AWPS will be built around a life support backpack that uses liquid air to provide cooling as well as breathing gas to the worker. The backpack will be combined with advanced protective garments, advanced liquid cooling garment, respirator, communications, and support equipment to provide improved worker protection, simplified system, maintenance, and dramatically improve worker productivity through longer duration work cycles.

264 V18/020867

Aerosol Measurements from Plasma Torch Cuts on Stainless Steel, Carbon Steel, and Aluminum

Novick, V.J.; Nasiatka, J.; Brodrick, C.J.; Crawford, S.; Pierucci, K.; Reyes, V.; Sambrook, J.; Wrobel, S.; Yeary, J.

Argonne National Laboratory, Decontamination and Decommissioning Program, Argonne, IL

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical

Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 139-146) (1996)

The main purpose of this project is to quantify aerosol particle size and generation rates produced by a plasma torch when cutting stainless steel, carbon steel and aluminum. The plasma torch is a common cutting tool used in the dismantling of nuclear facilities. Eventually, other cutting tools will be characterized and the information will be compiled in a user guide to aid in the planning of both D&D and other cutting operations. The data will be taken from controlled laboratory experiments on uncontaminated metals and field samples taken during D&D operations at Argonne National Laboratory nuclear facilities. The plasma torch data was collected from laboratory cutting tests conducted inside of a closed, filtered chamber. The particle size distributions were determined by isokinetically sampling the exhaust duct using a cascade impactor. Cuts on different thicknesses showed there was no observable dependence of the total measured aerosol quantity as a function of material thickness for carbon steel. However, data for both stainless steel and aluminum revealed that the aerosol mass produced for these materials appear to have some dependence on thickness, with thinner materials producing more aerosols. The results of the laboratory cutting tests show that most measured particle size distributions are bimodal with one mode at about 0.2 μm and the other at about 10 μm . The average Mass Median Aerodynamic Diameters (MMAD's) for these tests are 0.36 plus or minus 0.08 μm for stainless steel, 0.48 plus or minus 0.17 μm for aluminum and 0.52 plus or minus 0.12 μm for carbon steel.

265 V18/021086

Affordable Recycling of Radioactive Scrap Steels

MSE, Inc., Butte, MT; Montana Tech of the University of Montana, Department of Metallurgical Engineering, Butte, MT

PTP-19; 20 pp. (June 1996)

This report summarizes Phase I of a proposed three-phase project to promote cost effective recycling of radioactive scrap steel (RSS) from Department of Energy (DOE) sources. The objective of this program is to develop an overall strategy to privatize RSS recycling. Phase I work was funded by the DOE Office of Science and Technology (OST) in a Technical Task Plan (TTP #PE152002) Contaminated Metal Recycle Integration and Optimization. DOE funds were directed to MSE Technology Applications, Inc. (MSE-TA), in Butte, Montana, who in turn selected subcontractors with specific expertise to perform appropriate segments of work. This report is organized into two sections, both of which supplement the Phase I Feasibility Analysis of Recycling Radioactive Scrap Steel, prepared largely by steelmaking and RSS recycling experts under subcontract to MSE-TA. Section I, prepared by MSE-TA, reviews the Phase I effort, supplements the Feasibility Analysis with further cost/benefit information, and suggests technologies and strategies that promise to bring the costs of RSS recycling in line with those in burial. Section II, prepared by the Department of Metallurgy at Montana Tech of the University of Montana under subcontract to MSE-TA, presents work on the development of melt decontamination and decarburization procedures to optimize the contaminated metal recycling process by lowering costs and improving worker safety.

266 V18/021349

Albuquerque Operations D&D Program [Package 3]

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U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (12 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. The presentation addressed the activities of the DOE Albuquerque Operations D&D Program as they applied to the Grand Junction Projects Office, Los Alamos National Laboratory, and the Pantex Plant. Characterization, decontamination, dismantlement and segmentation, demolition, and waste disposition were described for each facility.

267 V18/022073

Alpha Detection for Characterization of D&D Sites

MacArthur, D.W.; Allander, K.S.; Bolton, R.D.; Koster, J.E.; Rawool-Sullivan, M.W.; Rojas, S.P.; Sprouse, L.L.

Los Alamos National Laboratory, Los Alamos, NM

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 335-339) (1994)

Characterization of radioactive contaminants is required during D&D operations at any facility where radioactivity is suspected or known to exist. Alpha radiation is an excellent indicator of the presence of many isotopes (such as Pu-239) which are otherwise difficult to observe. However, traditional fieldable alpha detectors have been hampered by the short range of alpha particles in air and in detector windows. We have developed an alpha detection technology that avoids the problems mentioned above. In a monitor using the long-range alpha detector (LRAD) technology, we detect the ion pairs produced by an alpha particle's interaction with air rather than the particles themselves. In this paper, we discuss several applications to air and soil monitoring as well as potentially contaminated building surfaces and process equipment.

268 V18/024852

Analysis of Potential Concrete Floor Decontamination Technologies: Final Report

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Florida International University, Hemispheric Center for Environmental Technology, Miami, FL

TRP-OH16-DD21; TPP-001-RP-001; 55 pp. (June 1997)

As buildings undergo the D&D process, concrete floors contaminated with radionuclides such as uranium, thorium, and technetium-99 must be decontaminated before final disposal.

Choosing the appropriate technology to meet the decontamination objectives for concrete floors is a difficult process. A single information source with which to perform a detailed analysis comparing technologies in the areas of safety, cost, and effectiveness is not currently commercially available. To reduce risks to the environmental and human health and support the Operable Unit 3 Feasibility Study at the Fernald Environmental Management Project (FEMP) by providing comprehensive and comparable data, it was proposed to evaluate and test commercially available technologies for the surface decontamination of radiologically contaminated concrete material at the Hemispheric Center for Environmental Technology (HCET) at Florida International University (FIU). The resulting study presents comparable data related to operation, maintenance, cost, health and safety aspects for five technologies. To enhance the technology assessment process, the International Union of Operating Engineers (IUOE) provided the health and safety human factors review of the technologies tested. The technologies evaluated for their ability to remove one inch of concrete included ultra high pressure water (less than 55,000 psi and greater than or equal to 15,000 psi), centrifugal shot blasting, and scabbling. Two additional technologies, milling and steel grit, were evaluated for their ability to remove one-quarter inch of concrete.

269 V18/024886

Application of Laser Cutting Technology to High Radiation Environments

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CONF-961073; ICALEO '96: Laser Materials Processing, Proceedings of the 15th International Congress on Applications of Lasers and Electro-Optics, Detroit, MI, October 14-17, 1996. Laser Institute of America, Orlando, FL, 974 pp.; (pp. C86-C94) (1996)

A 2kW Nd:YAG laser system manufactured by the Lumonics Corporation will be used to cut various metals during the fall of 1996 as part of a United States Department of Energy (DOE)-funded technology demonstration at the Hanford Site. The laser cutting demonstration will focus on an evaluation of two issues as the technology applies to the decontamination and decommissioning (D&D) of aging nuclear facilities. An assessment will be made as to the ability of laser end effectors to be operated using electro-mechanical remote manipulators and the ability of both end effector and fiber optics to withstand the damage created by a high radiation field. The laser cutting demonstration will be conducted in two phases. The first phase will be a non-radioactive test to ensure the ability of hot cell remote manipulators to use the laser end effector to successfully cut the types of materials and geometries found in the hot cell. The second phase will introduce the laser end effector and the associated fiber optic cable into the hot cell radiation environment. The testing in the hot cell will investigate the degradation of the optical portions of the end effector and transmission cable in the high radiation field. The objective of the demonstration is to assess the cutting efficiency and life limitations of a laser cutting system for radioactive D&D operations. A successful demonstration will, therefore, allow the laser cutting technology to be integrated into the baseline planning

for the D&D of DOE facilities throughout the nation.

270 V18/021464

Application of the Graded Management Approach to Battelle's Nuclear Project

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CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 131-136) (1996)

Battelle's graded management approach provides an effective and efficient method to perform the Battelle Columbus Laboratories Decommissioning Project (BCLDP). The project is managed by Battelle under their US Nuclear Regulatory Commission (NRC) license but is partially funded by the US Department of Energy (DOE) on a cost-shared basis. Battelle's graded management approach adheres to the regulations and orders governing the BCLDP by the interaction of various plans, procedures, permits, and work instructions. By independent assessment, quality control, and worker training, Battelle has been able to establish a cost-effective approach to performing work and, at the same time, have a controlled checks and balance system to assure that the proper safety considerations and project particulars are taken into account.

271 V18/020706

Applying a Life Cycle Decision Methodology to Fernald Waste Management Alternatives

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CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (7 pp.) (1996)

During the past five years, a number of U.S. Department of Energy (DOE) funded efforts have demonstrated the technical efficacy of converting various forms of radioactive scrap metal (RSM) into usable products. From the development of large accelerator shielding blocks, to the construction of low-level waste containers, technology has been applied to this fabrication process in a safe and stakeholder-supported manner. The potential health and safety risks to both workers and the public have been addressed. The question remains: can products be fabricated from RSM in a cost efficient and market-competitive manner? This paper presents a methodology for use within DOE to evaluate the costs and benefits of recycling and reusing some RSM, rather than disposing of this RSM in an approved burial site. This life-cycle decision

methodology, developed by both the Oak Ridge National Laboratory (ORNL) and DOE Fernald, is the focus of the following analysis.

272 V18/022381

Assessment of DOE Radioactive Scrap Metal Disposition Options

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Waste Policy Institute, Morgantown, WV; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (16 pp.) (1997)

The DOE has amassed a large amount of radioactively-contaminated scrap metal (RSM) as a result of past operations and decontamination and decommissioning (D&D) projects. The volume of RSM will continue to increase as a result of the D&D of more than 6,000 surplus facilities and many of the 14,000 operating facilities in the DOE complex. RSM can be either surface contaminated or volumetrically contaminated, or both, with varying amounts of radioactivity. Several options exist for the disposition of this RSM, including disposal as radioactive waste, recycling by decontamination and free-release for unrestricted use, or recycling for restricted reuse inside a DOE controlled area.

273 V18/022333

Bench Scale Testing - Phase I: Task 4 - Topical Report, September 1994-January 1995

Babcock and Wilcox Company, Alliance, OH; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

DOE/MC/30168-5288; 115 pp. (July 1995)

Under contract to the U.S. Department of Energy, the Babcock & Wilcox Company is developing a chemical decontamination process using chelating agents to remove uranium compounds and other actinide species from process equipment. The overall goal of the program is to develop a solvent capable of selectively chelating uranium; an additional requirement of the process is the ability to control corrosion of the base metal during decontamination. In cases where reuse of the equipment is a possibility, corrosion must be controlled at a low rate. However, if contamination has migrated into the grain boundaries of the base metal, a more aggressive solvent is required to corrode away base metal and expose radioactive species for removal. Another objective of the program is to recycle the chelating solvent, thereby minimizing the generation of secondary waste streams.

274 V18/023544

Beneficial Reuse '96: Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp. (February

1997)

Beneficial Reuse '96 was jointly sponsored by the University of Tennessee's Energy, Environment and Resources Center along with the Oak Ridge National Laboratory's Center for Risk Management. Along with the traditional focus on radioactive scrap metals, this year's conference included a wide range of topics pertaining to naturally occurring radioactive materials (NORM), and contaminated concrete reuse applications. As with previous Beneficial Reuse conferences, the primary goal of this year's conference was to bring together stakeholder representatives for presentations, panel sessions and workshops on significant waste minimization issues surrounding the recycle and reuse of contaminated metals and other materials. A wide range of industry, government and public stakeholder groups participated in the conference. An international presence from Canada, Germany and Korea helped to make Beneficial Reuse '96 a well-rounded affair. Most of the individual papers from this conference have been indexed separately in the database.

275 V18/021261

Beneficial Reuse of U.S. DOE Radioactive Scrap Metal

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Fernald Environmental Restoration Management Corporation, Cincinnati, OH

CONF-950917 (Vol. 2); ICEM '95, Proceedings of the Fifth International Conference on Radioactive Waste Management and Environmental Remediation, Vol. 2: Management of Low-Level Waste and Remediation of Contaminated Sites and Facilities, S. Slate, R. Baker and G. Benda (eds.), Berlin, Germany, September 3-7, 1995. American Society of Mechanical Engineers, New York, NY, 913 pp.; (pp. 1743-1744) (1995)

The U.S. Department of Energy (DOE) has more than 2.5 million tons of radioactive scrap metal (RSM) that is either in inventory or expected to be generated over the next 25 years as major facilities within the weapons complex are decommissioned. Since much of this metal cannot be decontaminated easily, past practice has been to either retain this material in inventory or ship it to DOE disposal sites for burial. In an attempt to conserve natural resources and to avoid burial of this material at DOE disposal sites, options are now being explored to "beneficially reuse" this material. Under the beneficial reuse concept, RSM that cannot be decontaminated and free released is used in applications where the inherent contamination is not a detriment to its end use. This paper describes initiatives currently in progress in the United States that support the DOE beneficial reuse concept.

276 V18/022838

Biodecontamination of Concrete

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CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1977-1983)

(1996)

A novel technology for biologically decontaminating concrete is being jointly developed by scientists at the Idaho National Engineering Laboratory (INEL) and British Nuclear Fuels plc (BNFL). The technology exploits a naturally occurring phenomenon referred to as microbially influenced degradation (MID) in which bacteria produce acids that dissolve the cement matrix of concrete. Most radionuclide contamination of concrete is fixed in the outer few mm of the concrete surface. By capturing and controlling this natural process, a biological method of removing the surface of concrete to depths up to several mm is being developed. Three types of bacteria are known to be important in MID of concrete: nitrifying bacteria that produce sulfuric acid, and certain heterotrophic bacteria that produce organic acids. An investigation of natural environments demonstrated with scanning electron microscopy the presence of bacteria on concrete surfaces of a variety of structures, such as bridges and dams, where corrosion is evident. Enumeration of sulfur oxidizing and nitrifying bacteria revealed their presence and activity on structures to varying degrees in different environments. From information revealed in studying the natural processes of MID, accelerated tests under laboratory conditions were designed and conducted as proof of concept. Under ideal conditions, *Thiobacillus thiooxidans*, a sulfur oxidizing bacteria, attached to and colonized the surface of concrete specimens. Over 1mm depth of material from a 10cm X 10cm square surface was removed in 68 days in the *Thiobacillus* treated specimen compared to a sterile control. Laboratory and field demonstrations are currently being conducted using experimental chambers designed to be mounted directly to concrete surfaces where radionuclide contamination exists. Control of the environment and nutrient supply to the bacteria in the chambers has allowed surface colonization and maintenance of bacterial population densities of 10(6) cells/square centimeters with a single application of bacterial inoculum. Data is being obtained in order to determine actual rates of surface removal and limitations to the system. This information will be used to develop a full scale decontamination technology.

277

V18/024125

Cesium and Strontium Separations Using Cobalt Dicarbolide

Los Alamos National Laboratory, Los Alamos, NM
LALP-95-167; 1 p. (1995)

Los Alamos has significantly improved the separations agent called cobalt dicarbollide, which is a highly stable organometallic anion. Cobalt dicarbollide can separate both cesium and strontium simultaneously or separately. By modifying the cobalt dicarbollide with long chain alkyl groups, we now can use this agent in nonhazardous hydrocarbon diluents. We also have developed new halogenation methods to prepare acid-stable derivatives of this extractant. We have grafted this material to polymer backbones, thereby making ion-exchange materials that are selective for cesium and strontium over sodium. We are presently exploring a new area of materials chemistry using ion-selective membranes containing this material.

278

V18/021351

Characterization and Decommissioning of Jr. Hot Cell

Facility [Package 5]

Greene, T.

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (10 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. This presentation described activities associated with D&D of the Jr. Hot Cell Facility and covered characterization activities including strategy, scoping, background, and characterization surveys. Decontamination, dismantling and segmentation, demolition, and waste disposal strategies and technologies were also discussed.

279

V18/022334

Chelant Screening and Refinement Tests - Phase I: Task 2 - Topical Report, December 1993-June 1994

Babcock and Wilcox Company, Alliance, OH; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

DOE/MC/30168-5286; 350 pp. (July 1995)

Under contract to the U.S. Department of Energy, the Babcock & Wilcox Company is developing a chemical decontamination process using chelating agents to remove uranium compounds and other actinide species from process equipment. The overall goal of the program is to develop a solvent capable of selectively chelating uranium; an additional requirement of the process is the ability to control corrosion of the base metal during decontamination. In cases where reuse of the equipment is a possibility, corrosion must be controlled at a low rate. However, if contamination has migrated into the grain boundaries of the base metal, a more aggressive solvent is required to corrode away base metal and expose radioactive species for removal. Another objective of the program is to recycle the chelating solvent, thereby minimizing the generation of secondary waste streams.

280

V18/021468

Chemical Aspects of the Trapping and Recovery of Uranium Hexafluoride and Fluorine During Remediation Activities

Del Cul, G.D.; Toth, L.M.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-960376 (Part 1); Proceedings of the 211th American Chemical Society (ACS) National Meeting, New Orleans, LA, March 24-28, 1996. ACS, Washington, DC, Part 1, 1172 pp.; (p. 1052, Paper INOR 285) (1996)

Decontamination and decommission activities related to the Molten Salt Reactor Experiment (MSRE) involve the trapping and recovery of radiolytically generated uranium hexafluoride and fluorine. Although fission product radiolysis was known to generate F₂, the formation of UF₆ and its transport from the fuel salt was unexpected. Some of these gaseous radiolysis products have been

moving through the gas piping to a charcoal bed since the reactor was shut down in 1969. Current and planned remediation and clean-up activities involve the trapping of the gaseous products, deactivation and treatment of the activated charcoal bed, stabilization and reconditioning of the fuel salt, and recovery of the uranium. The chemical aspects of these processes, including radiolytic generation mechanisms, reactions between uranium hexafluoride and fluorine and trapping materials such as activated charcoal, activated alumina, and sodium fluoride, along with the analytical techniques used for the characterization of the materials and process control will be described.

281 V18/022511

Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent - Phase I: Final Report - September 1993-June 1995

Babcock and Wilcox Company, Alliance, OH

DOE/MC/30168-5290; 67 pp. (October 1995)

The Department of Energy (DOE) is now faced with the task of meeting decontamination and decommissioning obligations at numerous facilities by the year 2019. Due to the tremendous volume of material involved, innovative decontamination technologies are being sought that can reduce the volumes of contaminated waste materials and secondary wastes requiring disposal. With sufficient decontamination, some of the material from DOE facilities could be released as scrap into the commercial sector for recycle, thereby reducing the volume of radioactive waste requiring disposal. Although recycling may initially prove to be more costly than current disposal practices, rapidly increasing disposal costs are expected to make recycling more and more cost effective. Additionally, recycling is now perceived as the ethical choice in a world where the consequences of replacing resources and throwing away reusable materials are impacting the well-being of the environment. Under contract to the U.S. Department of Energy, the Babcock and Wilcox Company is developing a chemical decontamination process using chelating agents to remove uranium compounds and other actinide species from process equipment. The generic goal of this program is to develop a solvent capable of chelating uranium and other actinides, while having little or no effect on base metal constituents. This project is divided into two separate phases: (1) process development, and (2) field demonstration. This report describes the results of the Phase I Development effort, which covers the initial solvent screening and recycle testing through pilot scale application of the developed process.

282 V18/021127

Comprehensive Approach to Recycling Radioactive Scrap Metal

Rollor, M.A.; Taylor, J.N.

ALARON Corporation, Cayce, SC

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (17 pp.) (1996)

A market-driven trend toward integrating the four major disposal and recycling options for radioactive scrap metal (RSM) into a

single, comprehensive approach is described. Each of the four currently-available disposal/reuse options and the respective roles of RSM generators and processors are described as background for discussing shortcomings of traditional approaches to RSM disposition. Poor characterization and "bundling" of RSM into heterogeneous "lots" often result in critical errors in the selection of a single option for RSM disposal or reuse. A specific example of disadvantages associated with this "specialized" processing approach is provided. As a direct result of these problems and other important market forces, RSM processors have "diversified" their individual disposal/reuse processes to minimize risks associated with RSM recycling. A comprehensive approach integrating individual disposal/reuse options into a single, flexible scheme is described. Unlike the traditional methods, this comprehensive approach emphasizes up-front segregation of metal components into categories best-suited for specific technologies. An example of the new approach is provided.

283 V18/024859

Concrete Decontamination by Electro-Hydraulic Scabbling: Topical Report - March 30, 1996

Textron Defense Systems, Wilmington, MA

DOE/MC/30164-5559; 156 pp. (1996)

Electro-Hydraulic Scabbling (EHS) technology and equipment for decontaminating concrete structures from radionuclides, organic substances, and hazardous metals is being developed by Textron Systems Division (TSD). This wet scabbling technique involves the generation of powerful shock waves and intense cavitation by a strong pulsed electric discharge in a water layer at the concrete surface. The high pressure impulse results in stresses which crack and peel off a concrete layer of a controllable thickness. Scabbling produces contaminated debris of relatively small volume which can be easily removed, leaving clean bulk concrete. This new technology is being developed under Contract No. DE-AC21-93MC30164. The project objective is to develop and demonstrate a cost-efficient, rapid, controllable process to remove the surface layer of contaminated concrete while generating minimal secondary waste. The primary target of this program is uranium-contaminated concrete floors which constitute a substantial part of the contaminated area at DOE weapon facilities. This report describes Phase II of the program, which included tests and analyses carried out at the Fernald Site.

284 V18/022266

Contaminated Nickel Scrap Processing

Compere, A.L.; Griffith, W.L.; Hayden, H.W.; Johnson, J.S., Jr.; Wilson, D.F.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/TM-12900; 35 pp. (December 1994)

The DOE will soon choose between treating contaminated nickel scrap as a legacy waste and developing high-volume nickel decontamination processes. In addition to reducing the volume of legacy wastes, a decontamination process could make 200,000 tons of this strategic metal available for domestic use. Contaminants in DOE nickel scrap include Th-234, Pa-234, Cs-137, Pu-239 (trace), Co-60, U, Tc-99, and Np-237 (trace). This report reviews several industrial-scale processes - electrorefining, electrowinning,

vapometallurgy, and leaching - used for the purification of nickel. Conventional nickel electrolysis processes are particularly attractive because they use side-stream purification of process solutions to improve the purity of nickel metal. Additionally, nickel purification by electrolysis is effective in a variety of electrolyte systems, including sulfate, chloride, and nitrate. Conventional electrorefining processes typically use a mixed electrolyte which includes sulfate, chloride, and borate. The use of an electrorefining or electrowinning system for scrap nickel recovery could be combined effectively with a variety of processes, including cementation, solvent extraction, ion exchange, complex-formation, and surface sorption, developed for uranium and transuranic purification. Selected processes were reviewed and evaluated for use in nickel side-stream purification.

285

V18/025844

Cost Reduction Strategy for the Surveillance and Maintenance Program at the Department of Energy's Oak Ridge Operations

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U.S. Department of Energy, Oak Ridge Operations Office, Environmental Restoration Division, Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Oak Ridge K-25 Site, Oak Ridge, TN

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 207-210) (1996)

At the Department of Energy's Oak Ridge Operations (DOE-ORO), a cost reduction strategy has been implemented and is proving to be successful for the Surveillance and Maintenance (S&M) Programs at the five major sites directed by the Environmental Management (EM) organization. Because the Oak Ridge K-25 Site S&M Program is the largest of the five programs, this paper focuses on that site and the process developed for cost reduction with examples from the other four sites as applicable. The strategy implemented is not anything new or difficult; it focuses on basic management principles with communication and hard work added to the process. The concepts are simple, the work is challenging, and the results are tremendous.

286

V18/022506

Crashworthiness of the AT-400A Shipping Container: For Pu from Dismantled Nuclear Weapons

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Sandia National Laboratories, Albuquerque, NM

SAND96-1055C; CONF-961105 (Vol. 4); Proceedings of an American Society of Mechanical Engineers (ASME) Heat Transfer Division 1996 International Mechanical Engineering Congress and Exhibition: Natural Convection Within a Horizontal Circular Cylinder Heated from Below and Cooled from Above, Numerical Methods for Coupled Fluid-Thermal-Structural Interaction, Thermal Analysis in Waste Processing and Disposal, Heat Transfer in Fire and Combustion Systems, D.W. Pepper, R.W. Douglass and J.C.

Heinrich (eds.), Atlanta, GA, November 17-22, 1996. ASME, New York, NY, Vol. 4, 443 pp.; (8 pp.) (1996)

Shipping containers used for transporting radioactive material must be certified using federal regulations. These regulations require the container be tested or evaluated in severe mechanical and thermal environments which represent hypothetical accident scenarios. The containers are certified if the inner container remains leaktight. This paper presents results from finite element simulations of the accidents which include subjecting the AT-400A (for Pu from dismantled nuclear weapons) to a 30-foot (9 m) drop onto an unyielding target and crushing the container with an 1100 lb (500 kg) steel plate dropped from 30 feet. The nonlinear PRONTO3D finite element results were validated using test results. The simulations of the various impacts and crushes identified trends and worst-case orientations. They also showed that there is a significant margin of safety based on the failure of the containment vessel.

287

V18/022032

Creating Value Through Radiological Decontamination of Plant Components

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CONF-950414 (Vol. 57-II); Life Assessment Technology for Fossil Power Plants, R. Viswanathan and R.W. Porter (eds.), Proceedings of the 57th Annual American Power Conference, Chicago, IL, April 18-20, 1995. Illinois Institute of Technology, Chicago, IL, Vol. 57-II, 914 pp.; (pp. 953-957) (1995)

Since the invention of nuclear power, the need for radiological cleaning (decontamination) of plant components has presented a challenge to the nuclear industry. Radiological cleaning provides an added value, when plant components are contaminated and require refurbishment. The cost of refurbishment has often been compared to the replacement cost of components plus the disposal cost for the existing component. The value derived from radiological decontamination during component refurbishment has increased as the circumstances surrounding the disposal of radioactive material have changed. Specifically, prior to 1994, the majority of the producers of radioactive material had access to licensed disposal sites. Though the cost of disposal at these sites had risen dramatically, a disposal option still existed. Today, with the exclusion of the majority of nuclear power plants from the disposal sites, and requirements for producers to store their own waste, decontamination and refurbishment of otherwise discarded components has become an attractive alternative.

288

V18/021352

D&D Focus Area Workshop: RMI Environmental Services, Characterization Experience [Package 6]

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CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (7 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session

at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. This presentation discusses the D&D activities at the Ashtabula/RMI site. Topics covered include characterization experience, D&D experience with soils, groundwater, and buildings and equipment, and waste disposition strategies and technologies.

289 V18/025940

DD&R: Decommissioning, Decontamination, and Reutilization of Commercial and Government Facilities, Proceedings of a Topical Meeting of the American Nuclear Society, Knoxville, TN, September 7-12, 1997

CONF-970952; DD&R: Decommissioning, Decontamination, and Reutilization of Commercial and Government Facilities, Proceedings of a Topical Meeting of the American Nuclear Society, Knoxville, TN, September 7-12, 1997. American Nuclear Society, Inc., La Grange Park, IL, 648 pp. (1997)

This meeting was the first topical meeting for the American Nuclear Society (ANS) in the area of decommissioning, decontamination, and reutilization of government and commercial facilities. It was sponsored by the ANS Decommissioning, Decontamination and Reutilization and Fuel Cycle and Waste Management Divisions and hosted by the Oak Ridge/Knoxville Section of the ANS. Embedded within the conference were numerous innovative treatment, characterization, and handling methodologies. Papers were presented in sessions organized into the following areas: recycle of contaminated material; waste management; economic development; completed Decontamination, Decommissioning, and Reutilization (DD&R) activities; data sampling and analysis; facility, environment, and worker safety; rules and regulations; international DD&R activities; innovative treatment technology; risk determination; DD&R of commercial facilities; facility characterization.

290 V18/002312

DDER '94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites - Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Vol. 2, Washington, DC, November 13-18, 1994

CONF-941148 (Vol. 2); DDER-'94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp. (1995)

The American Nuclear Society (ANS) has had a history of change to reflect the technical interests of members and the nuclear community as a whole, and the recent ANS Decommissioning, Decontamination, and Environmental Restoration activities provide another timely response to those changing interests. A professional society is at its best when members are working together in the broader interests of the entire membership, to provide growth and development in current and future directions. The papers in this summary document reflect presentations made in the ANS DDER-'94 Embedded Topical Meeting and in the ANS Professional Development Committee sponsored Workshop, An

Update on Decommissioning, Decontamination, and Environmental Restoration Technologies. Both events were conducted during the American Nuclear Society Winter Meeting held in Washington, D.C., November 13-18, 1994. Some presentations were not received in full papers for this volume. The reader is referred to ANS TRANSACTIONS, Vol. 71, November 1994, in which the summaries and abstracts of the Embedded Topical presentations appears. The ANS WORKSHOP HANDBOOK also is available for material on additional workshop topics not covered in this volume.

291 V18/025825

DOE Decommissioning Benchmarking Study

Warren, S.W.; Daniel, P.R.; Hardwick, N.

U.S. Department of Energy, Germantown, MD; Booz-Allen & Hamilton, Inc., Germantown, MD

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 22-36) (1996)

The U.S. Department of Energy's (DOE) Office of Environmental Restoration (EM-40) is conducting a benchmarking study, jointly sponsored by the Environmental Protection Agency (EPA), to identify ranges of expected productivity and costs for decommissioning activities. Physical activities being studied include concrete demolition, steel demolition, pipe removal, and asbestos removal. Data are being collected, where possible, at the task level (e.g., man-hours required to decontaminate 'x' square feet of floor in building 'y'). Additional data will be collected to assure "apples to apples" comparisons, including technology deployed, protective gear worn, and facility conditions. Administrative functions also are being examined such as project management, environmental and safety documentation, and health and safety (H&S) oversight. These functions will be measured as a percentage of total project costs or cost per area of the facility being decommissioned. Data for the study is taken from ongoing or recently completed projects from DOE, EPA, commercial, and international programs. The final report will acknowledge the cooperation of participating organizations while protecting the identity of specific data. The final report will be issued in December 1996.

292 V18/022450

DOE Decommissioning Benchmarking Study - Preliminary Results

Warren, S.W.; Daniel, P.R.

U.S. Department of Energy, Office of Environmental Restoration, Washington, DC; Booz-Allen & Hamilton, Inc., Germantown, MD

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (18 pp.) (1996)

The U.S. Department of Energy's (DOE) Office of Environmental Restoration (EM-40) is conducting a benchmarking study, jointly separated by the Environmental Protection Agency (EPA), to

identify ranges of expected productivity and costs for decommissioning activities. Physical activities being studied include concrete demolition, steel demolition, pipe removal, and asbestos removal. Data are being collected, where possible, at the task level (e.g., man-hours required to decontaminate 'x' square feet of floor in building 'y'). Additional data will be collected to assure "apples to apples" comparisons, including technology deployed, protective gear worn, and facility conditions. Administrative functions also are being examined such as project management, environmental and safety documentation, and health and safety (H&S) oversight. These functions will be measured as a percentage of total project costs or cost per area of the facility being decommissioned. Data for the study is taken from ongoing or recently completed projects from DOE, EPA, commercial, and international programs. The final report will acknowledge the cooperation of participating organizations while protecting the identity of specific data. The final report will be issued in December 1996.

293 V18/023348

DOE's Decommissioning Policy and Framework

Warren, S.W.; Buller, J.; Gross, T.

U.S. Department of Energy, Washington, DC; Booz-Allen & Hamilton, Inc., Germantown, MD

Radwaste Magazine 3(2):82-88 (March 1996)

After decades of weapons production and testing at U.S. Department of Energy facilities across the nation, the DOE has hundreds of unneeded and unwanted buildings still in the complex, many of them contaminated with radioactive and hazardous substances. The DOE's environmental restoration program mission includes ensuring that risks posed by these surplus facilities are either eliminated or reduced to safe levels through decommissioning. More than 100 buildings in the former weapons complex have been decommissioned since the environmental restoration program began in late 1989. Another 800-plus structures have been declared surplus to the department's needs and placed in surveillance and maintenance (S&M) programs awaiting final decommissioning activities. Several thousand more facilities are expected to be declared surplus, then deactivated, and placed in S&M programs for eventual decommissioning by the Environmental Restoration program. The Baseline Environmental Management Report that the DOE prepared for Congress in March 1995 estimates that \$46.5 billion will be needed over the next 75 years to decommission the department's contaminated surplus facilities.

294 V18/024021

DOE's Radioactively Contaminated Metal Recycling: The Policy and Its Implementation

Warren, S.W.; Rizkalla, E.

U.S. Department of Energy, Washington, DC

Radwaste Magazine 4(1):38-42 (January 1997)

The development and issuance of EM's policy for recycling radioactive contaminated carbon steel (RCCS) has been a successful collaborative effort between DOE and its stakeholders. The recycling policy provides an environment in which recycling can be pursued. The policy itself cannot force sites to recycle because this decision will be based on an economic analysis with consideration

for stakeholder values. But, by establishing an end use for the department's recycled RCCS (LLW disposal containers) and selecting a lead site to broker metal and end products between sites, the EM hopes to cause recycling to be the "disposition mode of choice" for its radioactively contaminated scrap metals.

295 V18/024153

DOE's Radioactively-Contaminated Metal Recycling: The Policy and Its Implementation

Warren, S.W.; Rizkalla, E.

U.S. Department of Energy, Office of Environmental Restoration, Germantown, MD; U.S. Department of Energy, Office of Waste Management, Germantown, MD

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (23 pp.) (1996)

This paper discusses the development of the Office of Environmental Management's policy for recycling radioactively-contaminated carbon steel in detail, including the extensive interactions between the Department and its stakeholders. This paper also describes the development of standardized low-level waste disposal containers (to support recycling), as well as the actions undertaken at DOE-HQ to support site-specific implementation of recycling, including supporting the development of project-specific cost-benefit analyses and procurements specific to recycled metals.

296 V18/023908

Decommissioning Benchmarking Study: Final Report

U.S. Department of Energy, Washington, DC; U.S. Environmental Protection Agency, Washington, DC

Report; 498 pp. (January 15, 1997)

The purpose of this study is to analyze physical activities in facility decommissioning and determine approaches to improve the decommissioning process in DOE's Environmental Restoration Program. The study develops and presents productivity rates and unit cost factors, with and without waste disposal, for specific decommissioning tasks in the basis of project performance shared by DOE, commercial, and international partners. The final report will be available as of May 1, 1997 from DOE's Decommissioning Program Home Page at <http://www.em.doe.gov/dd/bench.html>. Background information, analysis approach and analysis findings are presented primarily in graphic or tabular format. Covered in the findings are: a decommissioning program overview; concrete surface decontamination; concrete demolition; steel surface decontamination; structural steel demolition; steel component cutting and sizing; asbestos removal; equipment and pipe removal; and, general demolition. The report also contains process improvement recommendations.

297 V18/021459

Decommissioning of U.S. Department of Energy Surplus Facilities Under the Comprehensive Environmental Response, Compensation, and Liability Act

Warren, S.W.; Dorries, J.

U.S. Department of Energy, Germantown, MD; Booz-Allen & Hamilton, Inc., Germantown, MD

CONF-960306 (Vol. 4); ICONE-4 (Vol. 4), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Plant Operations and Maintenance, Nuclear Fuel Cycle, Institutional and Energy Policy, Non-Proliferation and Safeguards, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 4, 745 pp.; (pp. 369-377) (1996)

The US Department of Energy (DOE) has identified more than 850 contaminated surplus facilities that require decommissioning through the environmental restoration program. This paper discusses the regulatory framework for decommissioning these facilities, specifically the framework established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLA jurisdiction covers releases of hazardous substances to the environment, substantial threats of such releases, and responses to these situations. DOE has determined that the use of CERCLA removal action authority is the appropriate means of responding to releases or threats of releases from contaminated surplus facilities under the jurisdiction, custody, or control of the Department. This paper focuses on the policy and process for decommissioning contaminated surplus facilities. Not all surplus facilities to be decommissioned will fall under CERCLA jurisdiction. In all instances, however, the same basic process will still be followed and a graded approach will be applied, consistent with DOE orders.

298 V18/025821

Decommissioning, Decontamination, and Reutilization Worldwide Experience - DD&R, What Does It Mean: Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp. (1996)

The embedded topical meeting was held in conjunction with the American Nuclear Society/European Nuclear Society International Conference. The "worldwide experience" aspect was addressed by bringing together experts from all sectors of the decommissioning, decontamination and reutilization (DD&R) community. A broad definition of DD&R was incorporated into the context of the meeting. Decommissioning was considered to constitute all functions and requirements from initial planning, organizational, technical, and financial activities through dismantlement to the predetermined final facility or site state. The broad spectrum of decommissioning perspectives reported at the meeting demonstrated the varied degree of description and applications for specific decommissioning objectives and technologies or processes employed. Decontamination is a key function of decommissioning. Technical presentations stressed this importance and described

various techniques that can be applied. The term reutilization was applied in the context of decommissioning and the final state of a project's objectives and activities. Final objectives ranged from "green field" to reuse of a facility as a nuclear technology-based activity, including the possibility of repowering nuclear power plants. Presentation focused on project experiences, technological evolutions, and regulatory trends from the project management perspective, with emphasis on key technical and environmental issues. Cost-effectiveness, risk assumption, developmental needs and recycle potential of various DD&R technology options were addressed. Of particular interest were reports on decommissioning project experience and discussions on future missions for the US national laboratories and US DOE sites.

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V18/021469

Decontamination Systems Information and Research Program: Quarterly Report - January-March 1996

West Virginia University, Department of Civil and Environmental Engineering, Morgantown, WV

DOE/MC/29467-5248; 252 pp. (April 1996)

West Virginia University (WVU) and the US Department of Energy, Morgantown Energy Technology Center (DOE/METC) entered into a Cooperative Agreement in August 1992 titled "Decontamination Systems Information and Research Programs". Requirements stipulated by the Agreement require WVU to submit quarterly Technical Progress reports. This report contains the efforts of the research projects comprising the Agreement for the 1st calendar quarter of 1996. It includes a breakdown of the funding status for each project. For the period January 1 through December 31, 1996 twelve projects have been selected for funding, and the Kanawha Valley will continue under a no-cost extension. Three new projects have also been added to the program. This document describes these projects involving decontamination, decommissioning and remedial action issues and technologies.

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V18/022508

Decontamination Systems Information and Research Program: Quarterly Report - April-June 1996

West Virginia University, Morgantown, WV

DOE/MC/29467-5265; 397 pp. (July 1996)

This report contains separate reports on the following subtasks: analysis of the Vortec cyclone melting system for remediation of PCB contaminated soils using CFD; drain enhanced soil flushing using prefabricated vertical drains; performance and characteristics evaluation of acrylates as grout barriers; development of standard test protocol barrier design models for desiccation barriers, and for in-situ formed barriers; in-situ bioremediation of chlorinated solvents at Portsmouth Gaseous Diffusion Plant; development of a decision support system and a prototype database for management of the EM-50 technology development program; GIS-based infrastructure for site characterization and remediation; treatment of mixed wastes via fluidized bed steam reforming; use of centrifugal membrane technology to treat hazardous/radioactive waste; environmental pollution control devices based on novel forms of carbon; development of instrumental methods for analysis of nuclear wastes and environmental materials; production and testing of biosorbents and cleaning solutions for D&D; use of SpinTek

centrifugal membrane and sorbents/cleaning solutions for D&D; West Virginia High Tech Consortium Foundation-Environmental support program; small business interaction opportunities; and approach for assessing potential voluntary environmental protection.

301

V18/022829

Decontamination Technologies Evaluations

Tripp, J.L.

Lockheed Martin Idaho Technologies Company, Idaho Falls, ID

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1915-1920) (1996)

Testing has been completed at the Idaho Chemical Processing Plant (ICPP) on insitu recyclable abrasive grit blasting, concrete cleaning (using scabbling, chemicals, and electro-kinetics) and laser light ablation of metals. Several small scale tests have also been conducted with strippable coatings, CO2 pellet blasting and various other techniques. The results of this testing is summarized in this paper.

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V18/021470

Decontamination and Decarburization of Stainless and Carbon Steel by Melt Refining

Mizia, R.E.; Worcester, S.A.; Twidwell, L.G.; Webber, D.S.; Paolini, D.J.; Weldon, T.A.

Lockheed Idaho Technologies Company, Idaho Falls, ID; Montana Tech of the University of Montana, Butte, MT

INEL-96/0146; 107 pp. (September 5, 1996)

With many nuclear reactors and facilities being decommissioned in the next ten to twenty years the concern for handling and storing Radioactive Scrap Metal (RSM) is growing. Upon direction of the DOE Office of Environmental Restoration and Waste Management, Lockheed Idaho Technology Company (LITCO) is developing technologies for the conditioning of spent fuels and high-level wastes for interim storage and repository acceptance, including the recycling of Radioactive Scrap Metals (RSM) for beneficial reuse with the DOE complex. In February 1993, Montana Tech of the University of Montana was contracted to develop and demonstrate technologies for the decontamination of stainless steel RSM. The general objectives of the Montana Tech research program included conducting a literature survey, performing laboratory scale melt refining experiments to optimize decontaminating slag compositions, performing an analysis of preferred melting techniques, coordinating pilot scale and commercial scale demonstrations, and producing sufficient quantities of surrogate-containing material for all of the laboratory, pilot and commercial scale test programs. Later on, the program was expanded to include decontamination of carbon steel RSM. Each research program has been completed, and results are presented in this report.

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V18/020842

Decontamination and Decommissioning Focus Area: Monthly Progress Report - April 1996 Activity

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (April 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); Diagnostics and Data Fusion of Robotic Sensors; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated

Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D) Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/021297

**Decontamination and Decommissioning Focus Area:
Monthly Progress Report - November 1995 Activity**

U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

Report; 80 pp. (November 1995)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; D&D of Fuel Storage Pool Metal Liner; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass

Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permeable Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Mobile Work System for Decontamination and Decommissioning; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Decontamination and Dismantlement (D&D) Robotics Technology Development Program; ROBCON: Operator Interface for Robotic D&D Applications; Reuse of Concrete From Contaminated Structures; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/021298

**Decontamination and Decommissioning Focus Area:
Monthly Progress Report - December 1995 Activity**

U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

Report; 80 pp. (December 1995)

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Decontamination and Decommissioning Focus Area: Monthly Progress Report - January 1996 Activity

U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

Report; 80 pp. (January 1996)

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V18/021300

**Decontamination and Decommissioning Focus Area:
Monthly Progress Report - March 1996 Activity**

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (March 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence

(LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); Diagnostics and Data Fusion of Robotic Sensors; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D) Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/021301

**Decontamination and Decommissioning Focus Area:
Monthly Progress Report - February 1996 Activity**

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (February 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale

demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); Diagnostics and Data Fusion of Robotic Sensors; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D) Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal

System; and Reconfigurable In-Tank Mobile Robot.

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V18/022258

Decontamination and Decommissioning Focus Area: Monthly Progress Report - May 1996

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (May 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); Diagnostics and Data Fusion of Robotic Sensors; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating

Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D) Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/022259

**Decontamination and Decommissioning Focus Area:
Monthly Progress Report - June 1996**

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (June 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool

for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); Diagnostics and Data Fusion of Robotic Sensors; ROBOCON: Operator Interface for Robotic Applications; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D) Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Demonstrations of Lighted Aided Technologies for Hanford D&D Projects; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/022260

**Decontamination and Decommissioning Focus Area:
Monthly Progress Report - July 1996**

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (July 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus

facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Accelerated Facility Characterization; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); ROBOCON: Operator Interface for Robotic Applications; Diagnostics and Data Fusion of Robotic Sensors; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D)

Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Demonstrations of Light Aided Technologies for Hanford D&D Projects; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/022261

Decontamination and Decommissioning Focus Area: Monthly Progress Report - August/September 1996

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 80 pp. (August/September 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide an overview of the D&D Focus area, a synopsis of the current program status and recent program and project accomplishments, and an overview of planned activities and program issues and opportunities. Project summaries for the following projects are included in this month's report: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Chemical Decontamination of TRU-Contaminated Components; Industry Solicitation for Facility Deactivation and Decontamination Technologies; PHOENIX: A Computer-Based Decisionmaking Tool for D&D of Nuclear Facilities; Florida International University Support; A Versatile, Miniature-Sized, and Real-Time Radiation Detector; Airborne and Ground-Based Laser Induced Fluorescence (LIF); In Situ Secondary Ion-Mass Spectrometry; Inductively Coupled Plasma-Mass Spectrometry for Analysis of Microliter Samples and Solids; Portable X-ray, K-edge Heavy Metal Detector; Special Technologies Laboratory CMST Support; Accelerated Facility Characterization; Multisensor Inspection & Characterization Robot for Small Pipes (MICROSPI); Advanced Worker Protection Systems (AWPS); Characterization of Radioactive Contamination Inside Pipes with the Pipe Explorer System; Coherent Laser Vision System (CLVS); High Sensitivity

Monitor for Radionuclides; Interactive Computer-Enhanced Remote Viewing System; Portable Sensor for Hazardous Waste; Protective Clothing Based on Permselective Membrane and Carbon Adsorption; Rapid Surface Sampling and Archive Record (RSSAR) System; Three Dimensional Integrated Characterization and Archiving System (3D-ICAS); ROBOCON: Operator Interface for Robotic Applications; Diagnostics and Data Fusion of Robotic Sensors; Demonstration and Evaluation of the CORPEX [TM] Nuclear Decontamination Process; Gas Phase Decontamination Process Demonstration; Chemical Decontamination of Process Equipment Using Recyclable Chelating Solvent; Concrete Decontamination by Electro-Hydraulic Scabbling; Electrokinetic Decontamination of Concrete; Laser Ablation of Contaminants from Concrete and Metal Surfaces; Remote Operated Vehicle Dry Ice Pellet Decontamination System; Depleted Uranium Recycling Products; Stainless Steel Beneficial Reuse Demonstration; Demonstrate Immobilization of Asbestos Using Mineralogical Conversion; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos Containing Material Into Non-Regulated Material; Demonstration of Standard Dismantlement System for Decommissioning (includes ROSIE and Argonne Coordination Projects); Mobile Work System for Decontamination and Decommissioning; Decontamination and Dismantlement (D&D) Robotics Technology Development Program; Reuse of Concrete From Contaminated Structures; Demonstrations of Light Aided Technologies for Hanford D&D Projects; Decontamination and Recycle of Concrete; Derivatives of Natural Complexing Agents for Removing Plutonium from Waste Streams; High Temp Vacuum Distillation Separation of Pu Waste Salts; Separation of HTO Using Membranes; Water Soluble Polymers for Removal of Pu, Am from Wastewaters; Advanced Technologies for Decontamination and Conversion of Scrap Metal; Asbestos Pipe-Insulation Removal System; and Reconfigurable In-Tank Mobile Robot.

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V18/024015

Decontamination and Decommissioning Focus Area: Quarterly Report - January-March 1997 Activity

Federal Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 55 pp. (1997)

The purpose of this document is to provide an overview of the Decontamination and Decommissioning (D&D) Focus Area and orient those readers not already familiar with the program. It presents a synopsis of the current program status and recent accomplishments, along with the overviews of planned activities, program issues and opportunities. Quarterly Reports are distributed to DOE Headquarters and Operations Office managers, site personnel, site operating contractors, technology developers, principal investigators, regulators, and other stakeholders. Issued in January, April, July, and October, the D&D Quarterly Reports summarize the activity of each preceding quarter. The D&D Update is published in all other months, highlighting specific advances with ongoing projects and introducing any new technologies.

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V18/022866

Decontamination and Decommissioning Focus Area: Quarterly Report - October-December 1996 Activity

Federal Energy Technology Center, Morgantown, WV; U.S. Department of Energy, Office of Environmental Management, Office of Science and Technology, Washington, DC

Report; 50 pp. (October-December 1996)

The mission of the D&D Focus Area is to develop and demonstrate improved technologies and systems to solve customer identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization and implementation of these technologies and systems. The cornerstone of the Morgantown Energy Technology Center's (METC) strategy to transfer technologies is a series of large scale demonstrations which will demonstrate innovative, improved D&D technologies at full scale, side-by-side with existing commercial technologies. The intent is to compare benefits from using a suite of innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test innovative technologies at a scale that will provide meaningful cost and performance information to the potential end users. The purpose of this report is to provide (1) an overview of the D&D Focus area, (2) a synopsis of the current program status and recent program and project accomplishments, and (3) an overview of planned activities and program issues and opportunities. Highlights for the quarter October-December, 1996 include the following: CP-5 Large Scale Technology Demonstration; Fernald Plant-I Large Scale Technology Demonstration; Hanford C-Reactor Large Scale Technology Demonstration; Characterization of Radioactive Contamination Inside Pipes with the PipeExplorer (TM) System; Coherent Laser Vision System; Rapid Surface Sampling and Archive Record System; Diagnostics and Data Fusion of Robotic Sensors; Gas Phase Decontamination Process Demonstration; Concrete Decontamination by Electro-Hydraulic Scabbling; Remote-Operated Vehicle Dry Ice Pellet Decontamination System; Removal of Contaminants from Equipment and Debris and Waste Minimization Using the TECXTRACT (TM) Technology; Decontamination and Dismantlement Robotics Technology Development Program; Depleted Uranium Recycling Products; Electromagnetic Mixed Waste Processing System for Asbestos Decontamination; Demonstration of Conversion of Asbestos-Containing Material into a Nonregulated material; Reuse of Concrete from Contaminated Structures; Asbestos Pipe Insulation Removal System; Reconfigurable In-Tank Mobile Robot; Demonstrations of Light-Aided Technologies for Hanford D&D Projects. Summaries of the Technical Task Plans in the D&D Focus Area Core Program are also presented including the objective and scope, status and accomplishments, and current activities.

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V18/021462

Decontamination and Decommissioning Focus Area: Technology Summary

U.S. Department of Energy, Office of Scientific and Technical Information, Oak Ridge, TN

DOE/EM-0300; 201 pp. (August 1996)

In January 1994, the U.S. Department of Energy, Office of Environmental Management (DOE, EM) formally introduced its new approach to managing DOE's environmental research and technology development activities. The goal of the new approach is to conduct research and development in critical areas of interest to DOE, utilizing the best talent in the Department and in the national science community. To facilitate this solutions-oriented approach, the Office of Science and Technology formed five Focus Areas to stimulate the required basic research, development, and demonstration efforts to seek new, innovative cleanup methods. In February 1995, EM-50 selected the DOE Morgantown Energy Technology Center (METC) to lead implementation of one of these Focus Areas: the Decontamination and Decommissioning (D&D) Focus Area.

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V18/020903

Decontamination and Decommissioning of Former Isotope Manufacturing Facility

Grabner, B.; Salame-Alfie, A.

NES, Inc., Danbury, CT; New York State Department of Health, Bureau of Environmental Radiation Protection, Albany, NY

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 105-111) (1996)

During the second half of 1994, NES, Inc. (NES), under the direction of The New York State Department of Health (DOH), performed the decontamination and decommissioning (D&D) of a source manufacturing facility which specialized in the production of americium-241 sources used in smoke detectors. The 9000 sq ft (836 sq meters) facility and surrounding grounds required decontamination prior to New York State Department of Labor (DOL) license to handle radioactive material could be terminated. The three month decommissioning operation consisted of the decontamination or removal of interior building surfaces (walls, ceilings, and floor surfaces), excavation of piping, removal of subterranean sump tank and pit, treatment (chemical and filtration) of 15,000 gallons (57,000 liters) of contaminated liquid, performance of a final release survey consistent with NUREG/CR 5849 requirements, and restoration of portions of the facility at a cost in excess of one million dollars. The facility was released from DOL licensing requirements and reoccupied with new tenants.

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V18/025288

Decontamination and Reuse of ORGDP Aluminum Scrap

Compere, A.L.; Griffith, W.L.; Hayden, H.W.; Wilson, D.F.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/TM-13162; 15 pp. (December 1996)

The Gaseous Diffusion Plants, or GDPs, have significant amounts of a number of metals, including nickel, aluminum, copper, and steel. This report is concerned with the recycle of aluminum stator and rotor blades from axial compressors. Most of the stator and rotor blades were made from 214-X aluminum casting alloy. Blades were

replaced during equipment upgrades, after compressor failure, or as a result of routine evaluations. Used compressor blades were contaminated with uranium both as a result of surface contamination and as an accumulation held in surface-connected voids inside of the blades. The blades remained contaminated even though they were acid washed prior to storage in fiber drums. A variety of GDP studies were performed to evaluate the amounts of uranium retained in the blades; the volume, area, and location of voids in the blades; and connections between surface defects and voids. Evaluations and inspections were focused primarily on improving quality and longevity of blades and on providing a basis for estimating uranium inventories within the GDP equipment. Based on experimental data on deposition, uranium content of the blades is 0.3%, or roughly 200 times the value expected from blade surface area. However, this value does correlate with estimated internal surface area and with lengthy deposition times. Based on a literature search, it appears that gaseous decontamination or melt refining using fluxes specific for uranium removal have the potential for removing internal contamination from aluminum blades. A melt refining process was used to recycle blades during the 1950s and 1960s. The process removed roughly one-third of the uranium from the blades. Blade cast from recycled aluminum appeared to perform as well as blades from virgin material. New melt refining and gaseous decontamination processes have been shown to provide substantially better decontamination of pure aluminum. If these techniques can be successfully adapted treat aluminum 214-X alloy, internal and, possibly, external reuse of aluminum alloys may be possible.

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V18/025008

Decontamination by Cleaning with Fluorocarbon Surfactant Solutions

Kaiser, R.; Benson, C.E.; Meyers, E.S.; Vaughn, V.C.A.

Entropic Systems, Inc., Winchester, MA; Vaughn Enterprises, Chemical Engineering and Safety Consulting Services, Knoxville, TN

ORNL/TM-12444; 53 pp. (February 1994)

In the nuclear industry, facilities and their components inevitably become contaminated with radioactive materials. This report documents the application of a novel particle-removal process developed by Entropic Systems, Inc. (ESI), to decontaminate critical instruments and parts that are contaminated with small radioactive particles that adhere to equipment surfaces. The tests were performed as a cooperative effort between ESI and the Chemical Technology Division of the Oak Ridge National Laboratory (ORNL). ESI developed a new, environmentally compatible process to remove small particles from solid surfaces that is more effective than spraying or sonicating with CFC-113. This process uses inert perfluorinated liquids as working media; the liquids have zero ozone-depleting potential, are nontoxic and nonflammable, and are generally recognized as nonhazardous materials. In the ESI process, parts to be cleaned are first sprayed or sonicated with a dilute solution of a high-molecular-weight fluorocarbon surfactant in an inert perfluorinated liquid to effect particle removal. The parts are then rinsed with the perfluorinated liquid to remove the fluorocarbon surfactant applied in the first step, and the residual rinse liquid is then evaporated from the parts into an air or nitrogen stream from which it is recovered. Nuclear

contamination is inherently a surface phenomenon. The presence of radioactive particles is responsible for all "smearable" contamination and, if the radioactive particles are small enough, for some of the fixed contamination. Because radioactivity does not influence the physical chemistry of particle adhesion, the ESI process should be just as effective in removing radioactive particles as it is in removing nonradioactive particles. The concept here was to use the ESI process to remove radioactive particles from large contaminated objects. The suspended radioactive particles were then removed from the process liquid by filtration to allow liquid recycle and disposal of the filter and particles as waste. The perceived advantage is that this process greatly reduces the volume of radioactive waste requiring disposal and allows valuable equipment to be salvaged. The main goals of the experiments performed at ORNL were to: (1) demonstrate that the ESI process removes a variety of radioactive particulates from complex parts; (2) demonstrate that these complex mechanical parts can be decontaminated to "green tag" tolerances by this process; (3) compare the rate and completeness of decontamination using a perfluorinated liquid with no additives with that of a perfluorinated liquid containing a perfluorinating surfactant; and (4) demonstrate that any radioactive materials present in the used perfluorinated liquid could be removed by simple physical means, such as filtration or decantation, to allow solvent recycle. This report discusses the fluorocarbon surfactant solutions and presents a summary of radiological and other data compiled during the demonstrations.

319 V18/021145

Decontamination of Actinides and Fission Products from Stainless Steel Surfaces

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ANL/CMT/CP-87865; CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 125-131) (1996)

Seven in-situ decontamination processes were evaluated as possible candidates to reduce radioactivity levels in nuclear facilities throughout the DOE complex. These processes were tested using stainless steel coupons (Type 304) contaminated with actinides (Pu and Am) or fission products (a mixture of Cs, Sr, and Gd). The seven processes were decontamination with nitric acid, nitric acid plus hydrofluoric acid, fluoboric acid, silver(II) persulfate, hydrogen peroxide plus oxalic acid plus hydrofluoric acid, alkaline persulfate followed by citric acid plus oxalic acid, and electropolishing using nitric acid electrolyte. Of the seven processes, the nitric acid plus hydrofluoric acid and fluoboric acid solutions gave the best results; the decontamination factors for 3- to 6-h contacts at 80 deg C were as high as 600 for plutonium, 5500 for americium, 700 for cesium, 15000 for strontium, and 1100 for gadolinium.

320 V18/021965

Demonstration of Gas-Phase Insitu Decontamination of

a Diffusion Cascade Cell

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CONF-9509139; Emerging Technologies in Hazardous Waste Management VII, D.W. Tedder (ed.), Proceedings of the Seventh American Chemical Society Industrial and Engineering Chemistry Division Special Symposium, Atlanta, GA, September 17-20, 1995. American Chemical Society, Washington, DC, 1291 pp.; (pp. 655-657) (1995)

For more than forty years, the Gaseous Diffusion Process has been used to produce enriched uranium. Three Gaseous Diffusion Plants are located in the United States; two operating plants in Paducah, Kentucky and Portsmouth, Ohio and one shutdown plant in Oak Ridge, Tennessee. With the eventual phase-out of the Gaseous Diffusion Process, all three of these plants will require decontamination and decommissioning (D&D). Existing methods for D&D of diffusion cascade equipment involve disassembly of contaminated equipment and wet decontamination. These methods are very costly and time consuming because of the extensive size of the diffusion plants. Each of the plants contain literally miles of piping and thousands of components such as compressors, converters and gas coolers. In addition, the wet decontamination process results in the generation of unusable uranium oxide which must be stored in a secure facility for an indefinite period of time.

321 V18/022967

Department of Energy's Recycle 2000 Initiative: A Stakeholder Analysis

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University of Tennessee, Energy, Environment, and Resources Center, Knoxville, TN; Oak Ridge National Laboratory, Oak Ridge, TN

Report; 53 pp. (April 1995)

This report is focused on those stakeholders with a potential "stake" in the Department of Energy's (DOE) Recycle 2000 Initiative. Two annual workshops held at the University of Tennessee have focused on radioactive scrap metal (RSM), stakeholders, and the public policy process. DOE is committed to involving stakeholders in Recycle 2000. This report gives an overview of the RSM problem, describes stakeholders in the Recycle 2000 initiative, discusses the results of a workshop held in Denver in 1994, and offers several conclusions and recommendations.

322 V18/024378

Depleted Uranium Hexafluoride: The Source Material for Advanced Shielding Systems

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (24 pp.) (1996)

The U.S. Department of Energy (DOE) has a management challenge and financial liability problem in the form of 50,000 cylinders containing 555,000 metric tons of depleted uranium hexafluoride (UF₆) that are stored at the gaseous diffusion plants. DOE is evaluating several options for the disposition of this UF₆, including continued storage, disposal, and recycle into a product. Based on studies conducted to date, the most feasible recycle option for the depleted uranium is shielding in low-level waste, spent nuclear fuel, or vitrified high-level waste containers. Estimates for the cost of disposal, using existing technologies, range between \$3.8 and \$11.3 billion depending on factors such as the disposal site and the applicability of the Resource Conservation and Recovery Act (RCRA). Advanced technologies can reduce these costs, but UF₆ disposal still represents large future costs. This paper describes an application for depleted uranium in which depleted uranium hexafluoride is converted into an oxide and then into a heavy aggregate. The heavy uranium aggregate is combined with conventional concrete materials to form an ultra high density concrete, DUCRETE, weighing more than 400 lb/cubic feet. DUCRETE can be used as shielding in spent nuclear fuel/high-level waste casks at a cost comparable to the lower of the disposal cost estimates. Consequently, the case can be made that DUCRETE shielded casks are an alternative to disposal. In this case, a beneficial long term solution is attained for much less than the combined cost of independently providing shielded casks and disposing of the depleted uranium. Furthermore, if disposal is avoided, the political problems associated with selection of a disposal location are also avoided.

323 V18/021018

Depleted Uranium: A DOE Management Challenge

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0262; 15 pp. (October 1995)

The U.S. Department of Energy (DOE) has a management challenge and financial liability in the form of 50,000 cylinders containing 555,000 metric tons of depleted uranium hexafluoride (UF₆) that are stored at the gaseous diffusion plants. The annual storage and maintenance cost is approximately \$10 million. This report summarizes several studies undertaken by the DOE Office of Technology Development (OTD) to evaluate options for long-term depleted uranium management.

324 V18/025341

Designs and Methods for the Manufacturing of Performance Oriented Packaging from Volumetrically Contaminated Scrap Steel and Concrete

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Scientific Ecology Group, Inc., Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

The Scientific Ecology Group, Inc. (SEG) has successfully completed the design, fabrication and testing of concrete packaging. This packaging is designed to utilize over 41 percent recycled materials. This achievement was realized during work performed as

part of a Program Research and Development Announcement (PRDA) between the US DOE and SEG. This unique concrete packaging met all design criteria and performance testing requirements for Type A packaging as stipulated by the US Department of Transportation (DOT) for performance oriented packaging. The focus of this paper is to present specific aspects of the work which resulted in the research and development, engineering, design, manufacturing and testing of US DOT 7A, Type A packaging comprised of high compressive strength, high impact resistant concrete. The uniqueness of this type of packaging with regard to the application of recycled constituents necessitates a concentration on the efforts specifically supporting its development. These development activities targeted a material that was formulated specifically for the utilization of scrap steel as structural reinforcement and recycled concrete as a portion of the aggregate for the cement matrix. Design data, manufacturing specifications, testing criteria and test results are considered and discussed. In addition, the applicability of the data and the results achieved are presented with respect to both short term and long term goals for scrap materials currently slated for remediation disposal.

325 V18/023940

Detailed Technology Report for the Field Raman Spectroscopy Technology Demonstrated as Part of the Fernald Plant 1 Large-Scale Technology Demonstration Project Between September 1996 and November 1996

Fluor Daniel Fernald, Cincinnati, OH

2503-RP-0006; 435 pp. (March 1997)

This demonstration was conducted as part of the Fernald Environmental Management Project's Plant 1 Large Scale Technology Project (LSTP) sponsored by the Decontamination and Decommissioning (D&D) Focus Area at the Federal Energy Technology Center located in Morgantown, West Virginia. An LSTP has two primary objectives. First, fully developed but unproven technologies in the D&D field are identified that address defined problems/needs of a particular D&D project. Following extensive screening and review, the most applicable technologies are approved for a full scale technology demonstration and integrated into a DOE D&D project. The second objective is to quantify and document the derived benefits (i.e., cost, schedule, and/or safety), that can be achieved through the use of each of the demonstrated technologies when compared against a baseline technology. This effort is intended to provide the D&D sector, new and/or enhanced D&D technologies that have been proven to be superior D&D tools through side-by-side comparative technology demonstrations.

326 V18/021253

Development of Cleanup Criteria for DOE Nuclear Facilities

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CONF-941148 (Vol. 1); DDER-'94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded

Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 229-232) (1994)

Establishment of criteria for radiological contamination levels for residual radioactivity and criteria for the release of materials is a crucial requirement for decommissioning of nuclear installations. Newly proposed DOE criteria for protection of the public and the environment requires that sites be surveyed to determine both mass and surface contamination, that doses to members of the public not exceed primary or secondary guidelines and that these exposures are as low as is reasonably achievable (ALARA). In this evaluation, doses from actual or likely use scenarios should be shown to be only a small fraction of the applicable dose limits and doses from the worst plausible use must be below the dose limit for members of the public of 1 mSv in a year (30 mrem/yr). These requirements are based on 1987 DOE guidelines which were incorporated into Order DOE 5400.5 and are proposed for inclusion in 10 CFR Part 834. DOE is also working with the Environmental Protection Agency in their development of specific cleanup criteria. The DOE has prepared several guidance documents to aid in estimating radiation doses from residual radioactive materials. These documents include compilations of dose factors, a guide for radiation surveys, and ALARA guidance. DOE also sponsored the development of a computer code for calculating on-site doses from RESidual RADioactivity that can be used to derive cleanup levels.

327

V18/022330

Development of a High Sensitivity Monitor for Radionuclides Characterization: Final Report - August 1995-April 1996

NeuTek, Darnestown, MD; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV
DOE/MC/32090-5257; 30 pp. (June 1996)

In the base phase of this Research Opportunity Announcement (ROA) program to develop a high sensitivity monitor for radionuclides, the feasibility of applying a new radiation imaging concept developed for medical research was examined. The concept utilizes sensors with storage photostimulable phosphor (SPP) technology as radiation detectors. They are applicable to all types of radiation including tritium and their imaging capability can be used to locate and identify hot spots. The design allows the deployment of multiple sensor plates simultaneously to increase the area of coverage. The technique can be used either in-situ or in a mobile-lab setting. Tests have found that radiation at regulatory levels can be measured accurately in minutes. It has been shown that radioactivity from environmental samples as well as from uranic, transuranic elements can be measured quickly, accurately and economically. The types of radiation studied include alpha, beta, gamma-ray and neutrons.

328

V18/022372

Development of a K3A Robot for Deployment in Radioactive Environments

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DOE/MC/29115-96/C0686; CONF-9605145; ISRAM '96, Proceedings of the Sixth International Symposium on Robotics and Manufacturing, Montpellier, France, May 27-30, 1996; (8 pp.) (1996)

Radioactive materials make up a significant part of the hazardous-material inventory of the United States Department of Energy. Much of the radioactive material will be inspected or handled by robotic systems that contain electronic circuits that may be damaged by gamma radiation and other particles emitted from radioactive material. To use a mobile robot in the vicinity of high-level gamma radiation requires a special design. Since materials and electronic circuits can withstand some radiation without failure, the simplest approach would be simply to use an unmodified commercial mobile robot in the radioactive environment but remove it before failure occurs. Unpowered backup is another method of extending system lifetime in an ionizing radiation environment. When the primary system fails or degrades sufficiently, the backup system can be switched in to maintain system operation. By careful design and production-lot testing, the shelf commercial parts cannot be guaranteed to meet a specified total-dose tolerance. We can define the Basic Radiation-Hardened System to be a teleoperated K3A transport capable of deploying a radiation-hardened video camera for initial entry and inspection applications. The electronics in the K3A mobile base has three essential modules: MA-2 Motor Amplifier Circuit, DC-1 Drive Control Computer, and DC/DC Converter for powering the electronics. The design of the system will be discussed.

329

V18/025336

Development of a Process for the Disposition of Buildings with Actual or Potential Radiological Contamination

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (10 pp.) (1997)

The Cleanup Standards Committee, which consists of participants from the Department of Energy (DOE-Mound and DOE-Fernald), Wright Patterson Air Force Base, the Ohio Environmental Protection Agency (OEPA), the United States Environmental Protection Agency (U.S. Environmental Protection Agency), and the Ohio Department of Health's Bureau of Radiological Protection, has been working to develop a process for the disposition of buildings which have actual or potential radiological contamination. The purpose of developing this process is to provide a consistent approach in Ohio that meets all Federal and State requirements, for the unconditional release of buildings for public occupancy, as well as to facilitate all end-disposition decisions for buildings that may or do contain radiological contamination. The objective of the Federal Facility Forum committee was to develop a process that establishes when a building is radiologically clean, determines disposition alternatives when a building is known to have a radiological contamination, and addresses determination of disposition for potentially contaminated buildings. This paper describes four key

elements of the disposition process: (1) the approach for development of the process, (2) a summary of how the process works, (3) a description of how the process can facilitate all end-use disposition decisions, and (4) the flexibility of the process that allows for modification to address site-specific issues.

330 V18/022725

Development of an X-Ray K-Edge Heavy Metal Detector

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CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 418-424) (1996)

One need for the cleanup of heavy metals contamination is a safe, efficient, and accurate method for quantifying the presence of different heavy elements prior to, during, and after cleanup. Because of the hazardous nature of heavy metals, a nondestructive non-invasive characterization method is desirable. We are constructing a portable non-invasive detection system based on x-ray K-edge absorption. The sensitivity of the K-edge technique has been demonstrated through measurements of gold, uranium and plutonium. Specifically, a uranium sample of 1.85 μm equivalent thickness placed inside a 0.5 inch wall steel pipe (equivalent to 41 ppm) was measured with 10% accuracy. The time required to obtain the measurement was 10 minutes with no sample preparation.

331 V18/020901

Documentation of Decontamination and Decommissioning Activities Using Geographic Information Systems

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CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 100-103) (1996)

A common problem which licensees face in the decontamination and decommissioning process is the management of large quantities of data which are generated to document verification surveys in order to demonstrate compliance with release standards. This paper describes a geographic information system (GIS) which was developed to manage and track this type of data on a real time basis. Use of the system allowed for rapid review of survey results and laboratory analyses using color-coded maps to reflect the verification status of each unit of interest (i.e., verified, failed, incomplete, etc.). The maps were then used as the decision basis for directing cleanup and resurveying, and sampling activities.

332 V18/024375

Economic Analysis of Recycling Contaminated Concrete

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (11 pp.) (1996)

Decontamination and Decommissioning activities in the DOE complex generate large volumes of radioactively contaminated and uncontaminated concrete. Currently, this concrete is usually decontaminated, the contaminated waste is disposed of in a LLW facility and the decontaminated concrete is placed in construction & demolition (C&D) landfills. A number of alternatives to this practice are available including recycling of the concrete. Cost estimates for six alternatives were developed using a spreadsheet model. The results of this analysis show that recycling alternatives are at least as economical as current practice.

333 V18/021991

Economic Feasibility of Radioactive Scrap Steel Recycling

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CONF-9509139; Emerging Technologies in Hazardous Waste Management VII, D.W. Tedder (ed.), Proceedings of the Seventh American Chemical Society Industrial and Engineering Chemistry Division Special Symposium, Atlanta, GA, September 17-20, 1995. American Chemical Society, Washington, DC, 1291 pp.; (pp. 213-216) (1995)

In the past, government and commercial nuclear operators treated Radioactive Scrap Steel (RSS) as a liability and disposed of it by burial; this was an accepted and economical solution at that time. Today, environmental concerns about burial are changing the waste disposal picture by: (1) causing burial costs to soar rapidly; (2) creating pressure to close existing burial sites; and (3) making it difficult and expensive to open and operate burial facilities. To exacerbate the problem, planned dismantling of nuclear facilities will substantially increase volumes of RSS "waste" over the next 30 years. The U.S. Department of Energy (DOE) recognizes these changes and DOE Environmental Management (EM) programs now favor solutions that treat "wastes" as "resources" rather than liabilities. The "Recycle 2000 Initiative" and other DOE/EM programs, such as funding from DOE's Office of Technology Development DOE/OTD for this effort, will facilitate the development of resource minded recycling solutions.

334 V18/022116

Electromagnetic Conductivity and Magnetic Surveys for Characterization of an Abandoned Nuclear Reactor Facility

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Fromm Applied Technology, Mequon, WI; University of Wisconsin, Milwaukee, WI; Bechtel National, Inc., Oak Ridge, TN

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver,

CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 1125-1134) (1996)

Electromagnetic conductivity and total field magnetic surveys were conducted over a 14 acre portion of a site used during the Manhattan Project for nuclear research and plutonium production. While the facility was decommissioned and abandoned in 1953, there is presently some concern related to the potential for movement of radioactively contaminated groundwater and sediments through high permeability underground features, such as tunnels or pipes. In addition, a number of underground storage tanks were left in place when the site was abandoned. The objectives of the surveys were to enhance the available data base related to the locations of underground features. The electromagnetic results clearly defined the presence of steam lines, water mains, electrical utility lines, building foundations, underground storage tanks, and a tunnel. The magnetic results were ineffective in detecting elongated subsurface features and provided relatively poor definition of building foundations. However, the magnetic results did detect disposal areas and reactor remains that were poorly defined by the electromagnetic data. The differences in the two data sets demonstrate the need for both electromagnetic and magnetic surveys in site characterization studies. Thirteen of the excavated anomalies were associated with buried utility features that could serve as high permeability conduits for groundwater or sediment movement. The deepest of these was a 6-inch water main at a depth of 6 feet. The remainder of the utilities were at depths of 4 feet or less. Three of the anomalies resulted from underground storage tanks that ranged in size from 1000 gallons to 5000 gallons. Seven of the anomalies resulted from general waste disposal areas. The use of historical documentation combined with electromagnetic and magnetic surveys provided a cost effective method for baseline characterization of the complex underground features associated with a nuclear reactor facility.

335 V18/022820

End Points Method for Facility Deactivation

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U.S. Department of Energy, Office of Nuclear Material and Facility Stabilization, Germantown, MD; Oak Technologies, Washington Grove, MD; Westinghouse Hanford Company, Richland, WA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1847-1851) (1996)

DOE's Office of Nuclear Material and Facility Stabilization mission includes deactivating surplus nuclear facilities. Each deactivation project requires a systematic and explicit specification of the conditions to be established. End Point methods for doing so have been field developed and implemented. These methods have worked well and are being made available throughout the DOE establishment.

336 V18/022859

Environmental Review of Options for Managing

Radioactively Contaminated Carbon Steel

Argonne National Laboratory, Argonne, IL

ANL/EA/RP-91539; 40 pp. (October 1996)

The U.S. Department of Energy (DOE) is proposing to develop a strategy for the management of radioactively contaminated carbon steel (RCCS). Currently, most of this material either is placed in special containers and disposed of by shallow land burial in facilities designed for low-level radioactive waste (LLW) or is stored indefinitely pending sufficient funding to support alternative disposition. The growing amount of RCCS with which DOE will have to deal in the foreseeable future, coupled with the continued need to protect the human and natural environment, has led the Department to evaluate other approaches for managing this material. This environmental review (ER) describes the options that could be used for RCCS management and examines the potential environmental consequences of implementing each. Because much of the analysis underlying this document is available from previous studies, wherever possible the ER relies on incorporating the conclusions of those studies as summaries or by reference.

337 V18/020952

Equipment Decontamination: The Benefits of Reuse and Avoided Disposal Using the TECHXTRACT [TM] Process [February 1996]

Bonem, M.W.

EET, Inc., Bellaire, TX

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (5 pp.) (1996)

The need for and benefits of effective and economical decontamination technologies for nuclear facility decommissioning are substantial and without question. Decontamination and decommissioning (D&D) programs in the U.S. Department of Energy (DOE), nuclear utility industry, and international markets are growing rapidly. With this growth, the acceptability and costs of traditional D&D approaches, which rely largely on demolition and disposal, are being increasingly called into question. Disposal in particular is a major complicating factor as disposal costs are rising, and the long-term availability/public acceptability of disposal capacity is a significant uncertainty for the industry. Thus, the stage is set for innovative technologies which can decontaminate structures and equipment to below regulatory levels, thereby avoiding large-scale bulk disposal. Such technologies must be effective in the removal of a variety of contaminants from different types of materials and substrates. They must also offer total economics (considering process costs, disposal, reuse, future liabilities, and other factors) which are attractive versus demolition and disposal. The TECHXTRACT [TM] process is a chemical technology for the extraction of radionuclides, heavy metals, PCBs, and hazardous organics from solid materials such as concrete and metal. Specifically designed chemical blends are used to penetrate below the surface and remove contaminants which have leached into the substrate. The technology has very high decontamination rates (e.g., 90-99% per cycle). In addition to decontamination performance, economic analysis indicates that TECHXTRACT [TM] can save 25-75% of total project cost versus traditional

methods. It is a full-scale, commercialized technology which has been used in the DOE complex, electric utility, and private industry. This paper discusses the technology in more detail and offers a case history from a recent full scale decontamination project for a private industry manufacturer.

338 V18/023724

Equipment Decontamination: The Benefits of Reuse and Avoided Disposal Using the TECHXTRACT [TM] Process [July 1996]

Bonem, M.W.

EET, Inc., Bellaire, TX

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (7 pp.) (1996)

Tools and equipment often become contaminated during nuclear operations or restoration projects. Routine decontamination is often ineffective on certain items because of the nature or severity of the contamination. The costs associated with these items, including replacement and disposal as radioactive waste, can be quite significant. One estimate places the volume of radioactively contaminated metals at 1.5 million tons, with a scrap value of \$1.7 to \$1.8 billion. The sheer magnitude of such estimates has fostered a high degree of interest in this market and in the technologies that can allow for this value to be realized. Much of the industry's current attention is focused on metal melting, the creation of "restricted use" products, and policy issues. Interest has also been generated, however, in niche technologies that may allow for the unrestricted reuse of equipment and metals. The TECHXTRACT [TM] process is a chemical technology for the extraction of radionuclides, heavy metals, polychlorinated biphenyls, and hazardous organics from solid materials such as metal and concrete. TECHXTRACT [TM] uses specially designed chemical formulas to penetrate below the surface and remove contaminants that have leached into the voids of the material or that have become electrostatically bonded to the substrate. The technology has very high decontamination rates (e.g., 90-99% per cycle) and has been effective in a wide variety of complex situations. TECHXTRACT [TM] is a full-scale, commercialized technology that has been used in the U.S. Department of Energy complex and by electric utilities and private industry. The TECHXTRACT [TM] process is discussed in detail, and reports on several recently completed equipment decontamination projects are presented.

339 V18/021144

Estimating Boiling Water Reactor Decommissioning Costs: A User's Manual for the BWR Cost Estimating Computer Program (CECP) Software - Final Report

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Pacific Northwest National Laboratory, Richland, WA
PNL-10086; NUREG/CR-6270; 204 pp. (June 1996)

Nuclear power plant licensees are required to submit their decommissioning cost estimates to the U.S. Nuclear Regulatory Commission (NRC) for review. The user's manual and the accompanying Cost Estimating Computer Program (CECP) software provide a cost-calculating methodology to the NRC staff

that will assist them in assessing the adequacy of the licensee submittals. The CECP, designed to be used on a personal computer, provides estimates for the cost of decommissioning boiling water reactor (BWR) power stations to the point of license termination. Such cost estimates include component, piping, and equipment removal costs; packaging costs; decontamination costs; transportation costs; burial costs; and manpower costs. In addition to costs, the CECP also calculates burial volumes, person-hours, crew-hours, and exposure person-hours associated with decommissioning.

340 V18/023722

Evaluation and Demonstration of Aqueous Cleaning Systems for U.S. Department of Energy Decontamination Applications

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CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (13 pp.) (1996)

The National Defense Center for Environmental Excellence (NDCEE) was tasked by the U.S. Army Environmental Research, Development, and Engineering Center to identify, test, and evaluate the most environmentally compliant, technically and economically feasible, nonhalogenated metal parts cleaning system for the widest range of Department of Defense (DoD) applications. As part of the task, production testing was performed in NDCEE's Environmental Technology Facility to demonstrate the viability of nonhalogenated cleaning systems. During testing, qualitative and quantitative cleanliness results and process information were collected for material compatibility and economic and environmental analyses. By means of statistical analysis techniques, the optimal operating conditions were identified and verified for both cleaning systems. Projected annual material and utility usage was calculated from the production trial testing material and energy balances. This information will be used as the basis for economic analyses and environmental assessments. Both cleaning systems and the results of the production and cleanliness baseline testing are applicable to the cleaning of radioactively contaminated materials from nuclear processes. Technologies that optimize waste minimization and cleaner reuse must be tested and evaluated to reduce waste disposal costs.

341 V18/024376

Evaluation of Concrete Recycling and Reuse Practices

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Sanford Cohen & Associates, Inc., Kirtland, WA; U.S.
Environmental Protection Agency, Washington, DC

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (32 pp.) (1996)

Nuclear facilities operated by the Department of Energy (DOE), Department of Defense (DOD), and NRC licensees contain many concrete structures that are contaminated with radioactivity.

Dismantling these structures will result in significant quantities of waste materials, both contaminated and uncontaminated. Bartlett 94 estimates the total volume of waste from demolition of concrete structures to be on the order of 4 million cubic meters, but that only 20,000 cubic meters would be contaminated with radioactivity. Other studies suggest that as much as 5% of the concrete in these facilities would be contaminated with radioactivity. While the actual quantity of contaminated material should be fixed with greater precision, the fact that so much uncontaminated concrete exists (over 95% of the total 4 million cubic meters) suggests that a program that recycles concrete could produce substantial savings for both government agencies (DOE, DOD) and private companies (NRC licensees). This paper presents a fundamental discussion of: (1) various methods of processing concrete, (2) demolition methods, especially those compatible with recycling efforts, and (3) state-of-the-art concrete dismantlement techniques.

342 V18/021425

Evaluation of Department of Energy Scrap Metal Inventory

Hyde, J.M.; Colburn, S.J.; Grubb, R.G.; Keener, D.E.

U.S. Department of Energy, Washington, DC; Martin Marietta Energy Systems, Inc., Hazardous Waste Remedial Action Program, Oak Ridge, TN; Parsons Engineering Science, Inc., Oak Ridge, TN

CONF-950877; Mixed Waste, A.A. Moghissi, B.R. Love and R.K. Blauvelt (eds.), Proceedings of the Third Biennial Symposium, Baltimore, MD, August 7-10, 1995, 545 pp.; (pp. 11.8.1-11.8.6) (1995)

U.S. Department of Energy (DOE) sites contain many tons of scrap metal in various forms and types. Some of these materials are contaminated to varying degrees with radioactive materials, hazardous chemicals, lead paint, and other contaminants. Because some of the material is contaminated with both radioactive material and hazardous substances, disposition of the material as waste or recyclable material must be carefully planned as part of each facility's mixed waste program. The DOE is developing a strategy for reusing some of this material. The Scrap Metal Inventory Recycle Project, funded by the DOE's Office of Technology Development, supported this effort by producing data in the first two categories. These data will be used by DOE as part of the basis for developing a national policy, strategy, and implementation plan for material recycle. This project involved the identification of scrap metal storage locations and visits to those locations to identify and document the amounts of scrap materials at DOE sites and the potential value of that material. The Project Team visited 10 sites specified by DOE and met with personnel identified in pre-visit calls to examine storage sites and document the locations of material, amounts of material and personnel involved in the collection and storage of scrap metal at the DOE sites. Collection of the data for this project involved the review of existing literature to identify personnel involved in the storage and disposal of scrap metal and locations where material is managed. A strategy was developed to identify the correct personnel and to collect the data needed to support recycle planning efforts. This paper presents the method used to inventory the material and the results from the inventory.

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V18/022426

Evaluation of Nuclear Facility Decommissioning Projects (ENDFP) Program

Pacific Northwest Laboratory, Richland, WA

Database; 30 pp. + 3 MB [3 3.5 in. diskettes] (1996)

The Nuclear Regulatory Commission (NRC), through the Office of Nuclear Regulatory Research (RES), funded this program to chronicle and evaluate decommissioning experience. Decommissioning information was collected from nuclear reactor facilities in the United States and West Germany for both completed and ongoing projects. Information on international decommissioning projects was obtained from the DOE through its International Technology Transfer Agreements. The primary objective of this program was to provide the NRC staff with information from nuclear reactor decommissioning activities to support future requirements in proposed decommissioning regulations for nuclear facilities and to support assessment of radiation exposure during decommissioning and the implementation of ALARA techniques. Data collected from selected decommissioning projects are evaluated and placed into formatted reports in a computerized data collection system, the Decommissioning Data System (DDS). The DDS electronic database is to be made available through the US DOE Remedial Action Program Information Center (RAPIC), which serves as a central clearinghouse for information relating to environmental restoration of contaminated facilities. In addition to a printed description of the eleven formatted reports and an index table of the DDS database, 3 diskettes are also available. The first diskette contains WordPerfect files for a report providing a short description of the ENDFP program and the DDS electronic database with sample records and an example of how to access the information and an index of the files contained in the two DDS database diskettes. The two DDS database diskettes were created with MSBACKUP for DOS, Version 6.0. They have been transferred to ASCII format and zipped.

344

V18/022926

Expediting Decommissioning Under the DOE's Environmental Restoration Program: Setting the Standard, Improving the Process, and Enhancing Technological Applications

Warren, S.W.; Dorries, J.; Buller, J.

U.S. Department of Energy, Office of Environmental Restoration, Washington, DC; Booz-Allen & Hamilton, Inc., Germantown, MD

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:59 (1995)

The U.S. Department of Energy's (DOE's) Office of Environmental Restoration has developed a joint policy with the U.S. Environmental Protection Agency for decommissioning under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The policy establishes CERCLA removal action (specifically, non-time-critical removal action) as the appropriate means of responding to releases or threats of releases

from contaminated surplus facilities under the jurisdiction, custody, or control of the DOE. Additional means to expedite decommissioning involve enhancing the development and communication of new technologies. The DOE Focus Area approach to technology development is a team effort between DOE headquarters management and the field to reduce cost of remediation, decrease risk to the workers and the public, and solve problems that have no present solutions. As part of this effort, the Decommissioning/Facility Stabilization Focus Area is working to develop, demonstrate, and commercialize improved technologies to dismantle and dispose of surplus facilities.

345

V18/025330

Experience with End Points Specification for Surplus Facility Deactivation

Negin, C.A.; Szilagyi, A.P.; Hayfield, J.; Stefanski, L.D.; Zinsli, L.; Schmidt, R.

Oak Technologies, Washington Grove, MD; U.S. Department of Energy, Washington, DC; B&W Hanford Company, Richland, WA

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Deactivation is the conduct of a surplus facility's termination of operations within the scope of DOE's Office of Nuclear Material and Facility Stabilization (EM-60). This occurs prior to making a facility available for decommissioning and environmental restoration. EM-60 has stipulated that an end points approach be used for deactivation projects. End point specifications define the facility conditions to be achieved prior to transferring a facility to those responsible for post-deactivation management, whether it be for surveillance, decommissioning, or conversion to non-defense use. Thus, all individuals and contractor organizations involved in either deactivation or decommissioning of surplus facilities necessarily have a need to understand the use of end points specifications. This paper is one vehicle to further such understanding.

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V18/021101

Facility Deactivation End Points Handbook: Volume 1 - Methods and Examples [3rd Draft - for Use and Comment]

U.S. Department of Energy, Washington, DC
Report; 125 pp. (November 16, 1995)

The methods described here build on the original concepts and ideas of several individuals. The basic approach was created during the cleanup of the Three Mile Island Unit 2 by J.C. DeVine and C.A. Negrin where it was used to define the completion of the cleanup prior to long-term storage. That method was modified for application at the Uranium Trioxide (UO₃) and PUREX facilities at Hanford during 1994. The purpose of this handbook is to make available field-developed and applied experience to all of EM-60's projects to support formalizing an approach for end point planning, conducting the work, and recording of results. As such, the handbook itself is anticipated to evolve over the next couple of years as field deactivation experience is accumulated. Specific end

points will vary from facility to facility. The methods by which facility-specific end points are defined should, however, be consistent. Therefore, this handbook does not attempt to define what end points should be. Rather, it provides methods by which each project's manager can devise their facility's end points based on objectives and principles common to all deactivation. A longer term goal of this handbook is to relay field experience for deactivation tasks and practices that implement end points, some of which has been accomplished in Volume 2.

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V18/021102

Facility Deactivation End Points Handbook: Volume 2 - Deactivation Practices [3rd Draft - for Use and Comment]

U.S. Department of Energy, Washington, DC
Report; 53 pp. (November 16, 1995)

The material here is a variety of examples, criteria, and methods that have resulted from successful experience in carrying out deactivation type activities. The purpose of this volume is to provide this experience for gaining insights or as starting points by others who must conduct similar tasks. In various examples, organization specific procedures and facility specific equipment designation has been left as is to make the examples readable, even though they may not have meaning to the reader. It was felt that if the discussions were to be generalized, the value of the examples would be diminished. No attempt has been made to force all items to have the same format and content. The list of subjects in this Volume 2 is not all inclusive. Additional subjects should be added as useful experience is accumulated. At this writing, the examples are based primarily on experience at the UO₃ and PUREX Facilities at Hanford because that is the origin of the comprehensive end points specification method in Volume 1. Additional examples are needed. The primary criteria for inclusion of additional examples in this handbook is that they represent what has worked successfully or are in the process of implementation. That is, hypothetical constructs and concepts without demonstrated success should be tested first.

348

V18/024080

Facility Deactivation Guide: Methods and Practices Handbook - Emphasizing End Points Implementation

U.S. Department of Energy, Office of Environmental Management, Office of Nuclear Material and Facility Stabilization, Washington, DC
DOE/EM-0318; 378 pp. (December 1996)

In July 1995, the Office of Nuclear Material and Facility Stabilization (EM-60) published its Project Policies and Supplementary Information guidance that presents DOE/EM-60 policies for planning, managing, and conducting its projects. The policy requires that a formal project management approach be used, and presents the basic project management concepts and proven system engineering tools for stabilization and deactivation projects. The standardized project approach established in this guidance includes deactivation end points as one of its core elements. Consistent with this policy, each deactivation project must address the fundamental question: How do you know when the project is complete? That is, end points must be specified. The purpose of this handbook is to make available field-developed and applied

experience to all of EM-60's projects to support formalizing an approach for end point planning, conducting the work, and documenting the results.

349 V18/024374

Fatal and Nonfatal Risk Associated with Recycle of D&D-Generated Concrete

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (14 pp.) (1996)

As decontamination and decommissioning activities proceed within the U.S. Department of Energy Complex, vast volumes of uncontaminated and contaminated concrete will be generated. The current practice of decontaminating and landfilling the concrete is an expensive and potentially wasteful practice. Research is being conducted at Vanderbilt University to assess the economic, social, legal, and political ramifications of alternate methods of dealing with waste concrete. An important aspect of this research work is the assessment of risk associated with the various alternatives. A deterministic risk assessment model has been developed which quantifies radiological as well as non-radiological risks associated with concrete disposal and recycle activities. The risk model accounts for fatal as well as non-fatal risks to both workers and the public. Preliminary results indicate that recycling of concrete presents potentially lower risks than the current practice. Radiological considerations are shown to be of minor importance in comparison to other sources of risk, with conventional transportation fatalities and injuries dominating. Onsite activities can also be a major contributor to non-fatal risk.

350 V18/025306

Fernald's Life Cycle Analysis of Recycle of Radioactively Contaminated Structural Metal

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

During the past five years, a number of U.S. Department of Energy (DOE) funded efforts have demonstrated the technical efficacy of converting various forms of radioactive scrap metal (RSM) into usable products. From the development of accelerator shielding blocks, to the construction of low level waste containers, technology has been applied to this fabrication process in a safe and stakeholder-supported manner. The potential health and safety risks to both workers and the public have been addressed. The question remains: do the benefits of fabricating products from RSM outweigh the costs? The DOE Fernald Environmental Management

Project (FEMP) has developed a methodology based on life cycle analysis to evaluate the costs and benefits of recycling and reusing RSM, rather than disposing of this RSM in an approved burial site. This paper presents the life cycle analysis conducted to determine whether the DOE Fernald site should recycle some of the radioactively contaminated structural steel from Plant 4 D&D project.

351 V18/020855

Field Lysimeter Investigations - Test Results: Low-Level Waste Data Base Development Program for Fiscal Years 1994 and 1995 [Vol. 3]

McConnell, J.W., Jr.; Rogers, R.D.; Jastrow, J.D.; Sanford, W.E.; Sullivan, T.M.; Neilson, R.M., Jr.; Hilton, L.D.

Idaho National Engineering Laboratory, Idaho Falls, ID
NUREG/CR-6256; INEL-95/0073 (Vol. 3); 120 pp. (June 1996)

The Field Lysimeter Investigations: Low-Level Waste Data Base Development Program, funded by the U.S. Nuclear Regulatory Commission (NRC), is (a) studying the degradation effects in EPICOR-II organic ion-exchange resins caused by radiation, (b) examining the adequacy of test procedures recommended in the Branch Technical Position on Waste Form to meet the requirements of 10 CFR 61 using solidified EPICOR-II resins, (c) obtaining performance information on solidified EPICOR-II ion-exchange resins in a disposal environment, and (d) determining the condition of EPICOR-II liners. Results of the final 2 (10 total) years of data acquisition from operation of the field testing are presented and discussed. During the continuing field testing, both portland type I-II cement and Dow vinyl ester-styrene waste forms are being tested in lysimeter arrays located at Argonne National Laboratory - East in Illinois and at Oak Ridge National Laboratory. The experimental equipment is described and results of waste form characterization using tests recommended by the NRC's "Technical Position on Waste Form" are presented. The study is designed to provide continuous data on nuclide release and movement, as well as environmental conditions, over a 20-year period. At the end of the tenth year, the experiment was closed down. Examination of soil and waste forms is planned to be conducted next and will be reported later.

352 V18/022085

Field Study of Alpha Characterization of a D&D Site Using Long-Range Alpha Detectors

Rawool-Sullivan, M.W.; Allander, K.S.; Bounds, J.A.; Koster, J.E.; MacArthur, D.W.; Sprouse, L.L.; Stout, D.S.; Vaccarella, J.A.; Vu, T.Q.

Los Alamos National Laboratory, Los Alamos, NM

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 340-344) (1994)

A successful and cost-effective D&D effort relies upon an accurate, real-time, in situ, and non-destructive method of characterization of

contamination both before and after the decontamination process. Detector systems based on long-range alpha detection (LRAD) technology meet these criteria. Currently, Los Alamos National Laboratory (LANL) is in the process of investigating, designing, or building various surface monitors, various pipe monitors, and glove-box monitors. This paper describes the field studies conducted using detectors based on LRAD technology.

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V18/021465

Fluid-Based Radon Mitigation Technology Development for Decontamination and Decommissioning

Liu, K.V.; Gabor, J.D.; Holtz, R.E.; Gross, K.C.

Argonne National Laboratory, Reactor Engineering Division, Argonne, IL

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 111-117) (1996)

The objective of the radon mitigation technology development effort is to develop an efficient and economical radon gas removal technology based on a fluid absorption process. The technology must be capable of cleaning up a wide range of radon gas stream concentrations to a level that meets EPA gas emission standards for decontamination and decommissioning (D&D) sites. Argonne has recently identified a phenomenon that offers the possibility of radon recovery from the atmosphere with high efficiency at room temperature, and radon release at slightly elevated temperatures (50-60 degrees C). This discovery has led to the possibility of a simple and inexpensive device for continuous separation and concentration of heavy noble gases from air or from a mixture of lighter noble gases. Such a device would offer numerous substantial advantages such as lower cost and complexity, higher system reliability, and reduced affinity for water vapor, over conventional cryogenic charcoal systems for the removal of radon. A key early goal of this D&D project was to establish the feasibility of oil-based liquid absorbent technology for radon removal. Controlled sources of radon in Argonne's radon research facility are being used to quantitatively assess the performance of a selected class of absorbing fluids over a range of radon concentrations prototypic of DOE facility concentrations and to select various system performance parameters. This paper will discuss the design of laboratory- and engineering-scale radon absorption units and present some preliminary experimental test results.

354

V18/025854

Future Resources for Decommissioning: A Call to ARMS

Warren, S.W.

U.S. Department of Energy, Office of Environmental Restoration, Washington, DC

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean,

M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 285-288) (1996)

The purpose of this paper is to consider the trends and projections in facility decommissioning, nuclear work-force, and nuclear-related education, in order to determine the outlook for future decommissioning resources. The scope includes facilities requiring decommissioning, the nuclear decommissioning workforce, the status of nuclear-related education, interim findings, initiatives for improving future outlook and examining what needs to be done.

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V18/024883

ICALEO '96 - Laser Materials Processing: Proceedings of the 15th International Congress on Applications of Lasers and Electro-Optics, Detroit, MI, October 14-17, 1996

CONF-961073; ICALEO '96: Laser Materials Processing, Proceedings of the 15th International Congress on Applications of Lasers and Electro-Optics, Detroit, MI, October 14-17, 1996. Laser Institute of America, Orlando, FL, 974 pp. (1996)

This document contains a large number of papers from the title conference. The papers are arranged in sections entitled as follows: (1) Surface Modifications, (2) Modeling/Control, (3) Cutting, (4) Welding, and (5) New Developments in Laser Sources and Applications. Papers within the scope of this data base have been indexed separately.

356

V18/021982

In situ Carbonyl Extraction of Ni from Gaseous Diffusion Cells

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U.S. Bureau of Mines, Salt Lake Research Center, Salt Lake City, UT; Pacific Northwest Laboratory, Richland, WA; Battelle Memorial Institute, Oak Ridge Operations, Oak Ridge, TN

CONF-9509139; Emerging Technologies in Hazardous Waste Management VII, D.W. Tedder (ed.), Proceedings of the Seventh American Chemical Society Industrial and Engineering Chemistry Division Special Symposium, Atlanta, GA, September 17-20, 1995. American Chemical Society, Washington, DC, 1291 pp.; (pp. 210-212) (1995)

Much of the waste generated from five decades of weapons production in the U.S. Department of Energy complex contains highly radioactive constituents. With the high cost of permanent disposal space, it is necessary to separate as much of the nonradioactive species away from the radioactive as possible to reduce the volume of the high level waste that must be permanently stored. Many of the nonradioactive species have significant economic value, and if separated without carry-over of the radioactive contaminants, can be returned into the materials cycle. This paper discusses the transfer of carbonyl processing technology from mineral beneficiation and powder metallurgy to recovery of Ni from U isotope separation diffusion cells and other potential applications to recover Ni, Fe, Cr, Co and other carbonyl forming metals from nuclear waste while reducing the volume of the high

level residue for more economic disposal.

357 V18/021130

Industry Response to Recycle 2000

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Fernald Environmental Restoration Management Corporation, Cincinnati, OH

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (9 pp.) (1996)

The United States Department of Energy (DOE) is expected to issue a policy early this year articulating DOE's position on the recycle of DOE radioactive scrap metal. In anticipation of this "Recycle 2000" initiative, the nuclear industry has formed a new trade association called the Association of Radioactive Metal Recyclers (ARMR). This article describes the Recycle 2000 initiative, provides some background on ARMR and its membership, and identifies industry views on the actions to be taken and issues to be resolved if Recycle 2000 is to become a reality.

358 V18/022824

Innovative Chemical Decontamination System for Free Release of Metals

Kohli, R.; Hanulik, J.

Battelle Memorial Institute, Columbus, OH; Deco-Hanulik AG, Zurich, Switzerland

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1878-1885) (1996)

A cost-effective optimized system has been developed for chemically decontaminating metals to free release levels. The system, based on a patented formic acid process, DECOFOR [TM], is applicable to a wide range of metals, such as nickel, lead, copper, carbon steels, and aluminum. The process has major advantages in that it is economical, employs no toxic chemicals, generates no liquid waste and only minimal solid wastes, and the water from decontamination is completely recycled. This system also incorporates a precision metal sampling technique to measure the effectiveness of the process before and after decontamination and, in turn, to develop an overall decontamination strategy tailored to the specific application at hand. Decontamination is rapid and effective: removal kinetics at room temperature are approximately 1.0 mg per square centimeters of surface area per minute for Pb and Cu; and 0.1 to 1.0 mg per square centimeters of surface area per hour for Al, carbon steels, and Ni, at acid concentration of 0.5% to 1%. The process is directly applicable to decontamination to free release levels of the contaminated metals inventory within the U.S. Department of Energy (DOE) complex and at other decommissioning projects.

359 V18/024383

Internal Duct Characterization System

Idaho National Engineering Laboratory, Idaho Falls, ID;

Inuktun Services, Limited, Cedar, British Columbia, Canada
Report; 3 pp. (January 5, 1996)

Inspection systems for the inside of ductwork are an integral part of characterization, decontamination, and dismantlement efforts. The ventilation ductwork systems of contaminated facilities are likely to contain materials of concern and require proper characterization in order to complete U.S. Department of Energy (DOE) remediation efforts. Numerous remotely operated visual inspection systems are available, but they have limitations in several key areas, including maneuverability, adaptability, and the incorporation of characterization equipment. A remote characterization vehicle that is adept at inspection tasks within ventilation duct systems would be an outstanding advancement in characterization technology. The objective of the Internal Duct Characterization System (IDCS) is to develop a state-of-the-art robotics system for characterizing the inside of ductwork with design and development participation by industry.

360 V18/021279

Issues in Environmental Control Data Used in DD&ER Worker Dose Exposures

White, M.G.

Argonne National Laboratory, Argonne, IL

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:32 (1995)

Sites designated for decontamination and decommissioning (D&D) or remediation are frequently from the U.S. Department of Energy operations that began during and shortly after World War II. In addition, sites have been identified that were contaminated by nuclear energy industrial activities, which have been operating in this country for several decades. The source term at each site differs and may include broad categories of several forms of contamination with radionuclides, chemicals, or combinations of radioactive and chemical materials. The reasons for the cleanup process may include the need for reutilization of the land and facilities or may come from a concern for the impact on populations surrounding these sites. Scientifically based health protection from the source terms being cleaned up is not only important for those in the surrounding communities but also is a key concern for the workers involved in the D&D and environmental restoration (ER) cleanup process. This paper discusses selected problems in the use of environmental data for D&D and ER worker dose exposure calculations.

361 V18/024861

Laser Cleaning of Contaminated Painted Surfaces: Task 12 - Semiannual Report, April 1-September 30, 1996

Grisanti, A.A.; Hassett, D.J.

North Dakota University, Energy and Environmental Research Center, Grand Forks, ND

DOE/MC/31388-5503; 18 pp. (1996)

Paint contaminated with radionuclides and other hazardous materials is common in Department of Energy (DOE) facilities.

Facility decommissioning and decontamination requires the removal of contaminated paint. Paint removal technologies include laser- and abrasive-based systems. F2 Associates are utilizing a pulsed-repetition CO₂ laser that produces a 2.5- x 2.5-cm beam which can be scanned across a 30- x 100-cm raster and, when placed on a robot, can be designed to clean any surface that the robot can be programmed to follow. Causing little or no damage to the substrate (concrete, steel, etc.), the laser ablates the material to be removed from a given surface. Ablated material is then pulled into a filtration and collection (VAC-PAC) system to prevent the hazardous substances from entering into the atmosphere. The VAC-PAC system deposits the ablated material into waste drums which may be removed from the system without compromising the integrity of the seal, allowing a new drum to be set up for collection without leakage of the ablated material into the atmosphere.

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V18/024877

**Laser Cleaning of Contaminated Painted Surfaces:
Task 12 - Semiannual Report, November 1, 1995-March
31, 1996**

Grisanti, A.A.; Hassett, D.J.

North Dakota University, Energy and Environmental
Research Center, Grand Forks, ND

DOE/MC/31388-5251 (Task 12); 15 pp. (April 1996)

Paint contaminated with radionuclides and other hazardous materials is common in Department of Energy (DOE) facilities. Facility decommissioning and decontamination requires the removal of contaminated paint. Paint removal technologies include laser- and abrasive-based systems. F2 Associates are utilizing a pulsed-repetition CO₂ laser that produces a 2.5-cm x 2.5-cm beam which can be scanned across a 30- x 100-cm raster and, when placed on a robot, can be designed to clean any surface that the robot can be programmed to follow. Causing little or no damage to the substrate (concrete, steel, etc.), the laser ablates the material to be removed from a given surface. Ablated material is then pulled into a filtration and collection (VAC-PAC) system to prevent the hazardous substances from entering into the atmosphere. The VAC-PAC system deposits the ablated material into waste drums which may be removed from the system without compromising the integrity of the seal, allowing a new drum to be set up for collection without leakage of the ablated material into the atmosphere.

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V18/024170

**Laser-Based Characterization and Decontamination of
Contaminated Facilities**

Leong, K.H.; Hunter, B.V.; Grace, J.E.; Pellin, M.J.; Leidich,
H.F.; Kugler, T.R.

Argonne National Laboratory, Argonne, IL; Lumonics
Corporation, Livonia, MI

ANL/TD/CP-90094; CONF-961073; ICALEO '96: Laser Materials
Processing, Proceedings of the 15th International Congress on
Applications of Lasers and Electro-Optics, Detroit, MI, October
14-17, 1996. Laser Institute of America, Orlando, FL, 974 pp.; (pp.
A85-A94) (1996)

This study examines the application of laser ablation to the
characterization and decontamination of painted and unpainted

concrete and metal surfaces that are typical of many facilities within the US Department of Energy complex. The utility of this promising technology is reviewed and the essential requirements for efficient ablation extracted. Recent data obtained on the ablation of painted steel surfaces and concrete are presented. The affects of beam irradiance, ablation speed and efficiency, and characteristics of the aerosol effluent are discussed. Characterization of the ablated components of the surface offers the ability of concurrent determination of the level of contamination. This concept can be applied online where the ablation endpoint can be determined. A conceptual system for the characterization and decontamination of surfaces is proposed.

364

V18/020746

**Lead Decontamination and Recycling Under RCRA
Regulatory Implications**

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Benchmark Environmental Corporation, White Rock, NM;
Los Alamos National Laboratory, Los Alamos, NM; Hardin
Simmons University, Abilene, TX

LA-UR-96-1286; CONF-960804 (Vol. 1); Spectrum '96: Nuclear
and Hazardous Waste Management, Proceedings of an International
Topical Meeting, Seattle, WA, August 18-23, 1996. American
Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 327-330)
(1996)

Radioactively contaminated lead is a significant scrap metal recycling opportunity for the Department of Energy (DOE) facilities. Unfortunately, the regulatory maze to determine exactly how to manage scrap metal before it goes to the market may deter facilities from pursuing this opportunity. This paper presents an analysis of the regulatory issues, provides some management guidelines and identifies recycling and reuse opportunities within the DOE complex and the commercial markets.

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V18/022090

**Lessons Learned from Commercial Experience with
Nuclear Plant Deactivation to Safe Storage**

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Los Alamos National Laboratory, Los Alamos, NM; Sandia
National Laboratories, Albuquerque, NM

CONF-941148 (Vol. 2); DDER-94: Decommissioning,
Decontamination, and Environmental Restoration at Contaminated
Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded
Topical Symposium of the American Nuclear Society Winter
Meeting, Washington, DC, November 13-18, 1994. American
Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp.
385-389) (1994)

The Department of Energy (DOE) has successfully performed decontamination and decommissioning (D&D) on many production reactors. DOE now has the challenge of performing D&D on a wide variety of other nuclear facilities. Because so many facilities are being closed, it is necessary to place many of them into a safe-storage status before conducting D&D-for perhaps as much as 20 yr. The challenge is to achieve this safe-storage condition in a cost-effective manner while remaining in compliance with applicable regulations. The DOE Office of Environmental

Management, Office of Transition and Management, commissioned a lessons-learned study of commercial experience with safe storage and transition to D&D. Although the majority of the commercial experience has been with reactors, many of the lessons learned presented in this paper are directly applicable to transitioning the DOE Weapons Complex.

366 V18/023721

Level II Pollution Prevention Opportunity Assessment for Building Decontamination and Decommissioning

Michaud, S.R.C.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (6 pp.) (1996)

A pollution prevention opportunity assessment provides the decontamination and decommissioning (D&D) project manager with a tool for addressing pollution prevention (P2) options during the planning process. The recommendations are generic and offer a framework for project-specific selections and detailing. The recommended options support P2 during D&D operations; their relative impacts are specific to each site.

367 V18/022384

Light Aided Decontamination 1996 (LAD), Surface Cleaning, Cutting, and Welding with Light: A "NOW" Technology

Flesher, D.J.; Miller, R.D.

Westinghouse Hanford Company, Richland, WA

WHC-SA-3110-S; 15 pp. (May 1996)

This paper is based upon information from past tests, recent operations and proposed demonstrations related to Decontamination Tasks at various Department of Energy and Department of Defense Sites. Invented in 1972, and evaluated at DOE and DoD Labs since the 1980's, this technology has reached a state of maturity that should soon see rapid deployment in field decontamination operations. One tool serves as a cutting, welding, and surface decontamination tool. With the built in capacity for on-line real-time analysis, the technology can dramatically cut the time and cost for DOE defense operations clean up, facility re-use, and site reclamation.

368 V18/024124

Long-Range Alpha Detector for Decontamination and Decommissioning

Los Alamos National Laboratory, Los Alamos, NM

LALP-95-46; 1 p. (1995)

Many government and industrial facilities have large amounts of contaminated concrete, equipment, and miscellaneous items. Plutonium and other transuranic elements that are primarily alpha emitters are often difficult or impossible to detect in field conditions, such as a decontamination and decommissioning (D&D) site. The long-range alpha detector (LRAD) operates by detecting the ions created by alpha particles in ambient air rather than detecting the alpha particles directly. The ions can travel many

meters in air, as compared to the few centimeters an alpha particle tends to travel. Los Alamos has developed several types of LRAD monitors to handle a range of environmental problems.

369 V18/023300

M-100 Container: Project Summary and Final Report

Gresalfi, M.J.

Oak Ridge National Laboratory, Oak Ridge, TN

Report; 265 pp. (March 21, 1997)

The M-100 program's mandated goal was to provide 80% of the DOE's low level waste container requirements. From this beginning, two (2) principle container designs evolved; one to be produced from 12 gallons of carbon steel and the other from 7 gallons of carbon steel. The program successfully produced five (5) container models all suitable for manufacture from either contaminated or commercially produced steels. The project's mandate requires that the container designs meet the Waste Acceptance Criteria of Nevada Test Site (NTS), Hanford, Idaho National Engineering Laboratory (INEL), Oak Ridge National Laboratory (ORNL), and Savannah River Plant (SRP). Specific container geometry aside, the designs meet or exceed such criteria. Upon completion of the prototype container construction and testing, the designs were value analyzed for unit cost reduction. This concluding final summary report represents not only the summation of the project's events, but the results of the value analysis and the test reports of the value analyzed test containers.

370 V18/020937

M-100 Program: A Logical Use of Radioactive Scrap Metal (RSM)

Greaves, J.D.; Gresalfi, M.J.; Jwuc, K.J.

Brainard Associates, Inc., Solon, OH; Oak Ridge National Laboratory, Germantown, MD; KJJ and Associates, Brecksville, OH

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (14 pp.) (1996)

The concept of a consolidated effort to provide standardized waste containers for the DOE contractor network and the commercial nuclear industry has been discussed for some time. With the advent of the Recycle 2000 Program and the M-100 Container Project, a serious effort is under way to develop a family of standard containers to be manufactured essentially from RSM, radioactive scrap metal. The DOE's Recycle 2000 has as its mission: Produce 50% of the low level waste containers from radioactive scrap metal (RSM) by the year 2000. The headquarters initiative M-100 Container Project has as its mission: Produce a family of containers to be manufactured from RSM that will satisfy 80% of the DOE's requirements. For the M-100 Container project to succeed, site consensus is essential. This paper describes: (1) the M-100 family of containers; (2) the methods used in gaining consensus from the contractor network; (3) the determination of unique container requirements from each of the several disposal sites; (4) the integration of such requirements into a universal design; and (5) the adaptation of unique closure and materials handling techniques. The

integration of the Recycle 2000 Program, the Beneficial Reuse Program, and the M-100 Container Project will have a profound effect upon the availability of low cost, certified and documented containers as the DOE continues to clean its house over the next several decades. It is reasonable to assume that the commercial nuclear industry will judge the efficacy of the project and sign on as well. The eminent logic of constructing contaminated waste containers from contaminated steel cannot be denied. Ultimately, the cost benefit will accrue to the tax payer.

371 V18/023299

Market Assessment Decontamination of Radiologically Contaminated Concrete

Global Environment and Technology Foundation, Annandale, VA

Report; 120 pp. (December 1996)

The decontamination of radiologically contaminated concrete is a potentially large market that is dominated by the facilities in the U.S. Department of Energy (DOE) nuclear complex. So far, some 600 million sq ft of radiologically contaminated concrete has been identified within the DOE complex and it is expected that much more could be identified as characterization proceeds. The commercial market potential is smaller by two orders of magnitude. Despite this potentially large market, the expected demand for concrete decontamination over the next 10-15 years is only about 1.6 million sq ft per year, based on reported plans by DOE sites and electric utilities. At that rate, only 4 percent of the contaminated concrete would be decontaminated by the year 2010.

372 V18/021951

Measurement Methods for Radiological Surveys in Support of New Decommissioning Criteria: Draft Report for Comment

Huffert, A.M.; Miller, K.M.

U.S. Department of Energy, Environmental Measurements Laboratory, New York, NY

NUREG-1506; 65 pp. (August 1995)

This report contains a description of proposed methodologies for measuring low-level radiation and radioactivity that could be used in conducting surveys associated with decommissioning of licensed NRC facilities. Guidance on survey planning within the context of the Data Quality Objective approach and on specific instrumentation for measurements of gross and nuclide-specific radiation and radioactivity is given. Scanning, direct measurements, and sampling are discussed in terms of the application to particular measurement locations. The basic survey meter techniques that are commonly used at present are outlined and more detailed information is given on the capabilities and application of in situ spectrometric techniques for providing high sensitivity for individual photon-emitting radionuclides. The use of various techniques in concert is recommended as the different measurements, taken collectively, serve as a quality control check. The methodologies described provide the means to measure residual radionuclides at concentrations corresponding to the proposed decommissioning criteria which are in the range of 3 to 15 mrem per year for unrestricted release of a facility.

373 V18/024076

Melt Processing of Radioactive Waste: A Technical Overview

Schlienger, M.E.; Buckentin, J.M.; Damkroger, B.K.

Sandia National Laboratories, Albuquerque, NM

SAND97-0811C; 15 pp. (1997)

Nuclear operations have resulted in the accumulation of large quantities of contaminated metallic waste which are stored at various DOE, DOD, and commercial sites under the control of DOE and the Nuclear Regulatory Commission (NRC). This waste will accumulate at an increasing rate as commercial nuclear reactors built in the 1950s reach the end of their projected lives, as existing nuclear powered ships become obsolete or unneeded, and as various weapons plants and fuel processing facilities, such as the gaseous diffusion plants, are dismantled, repaired, or modernized. For example, recent estimates of available Radioactive Scrap Metal (RSM) in the DOE Nuclear Weapons Complex have suggested that as much as 700,000 tons of contaminated 304L stainless steel exist in the gaseous diffusion plants alone. Other high-value metals available in the DOE complex include copper, nickel, and zirconium. Melt processing for the decontamination of radioactive scrap metal has been the subject of much research. A major driving force for this research has been the possibility of reapplication of RSM, which is often very high-grade material containing large quantities of strategic elements. To date, several different single and multi-step melting processes have been proposed and evaluated for use as decontamination or recycling strategies. Each process offers a unique combination of strengths and weaknesses, and ultimately, no single melt processing scheme is optimum for all applications since processes must be evaluated based on the characteristics of the input feed stream and the desired output. This paper describes various melt decontamination processes and briefly reviews their application in developmental studies, full scale technical demonstrations, and industrial operations.

374 V18/025322

Melt Processing of Radioactive Waste: A Technical Overview

Schlienger, M.E.; Buckentin, J.M.; Damkroger, B.K.

Sandia National Laboratories, Albuquerque, NM

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (12 pp.) (1997)

Nuclear operations have resulted in the accumulation of large quantities of contaminated metallic waste which are stored at various DOE, DOD, and commercial sites under the control of DOE and the Nuclear Regulatory Commission (NRC). This waste will accumulate at an increasing rate as commercial nuclear reactors built in the 1950s reach the end of their projected lives, as existing nuclear powered ships become obsolete or unneeded, and as various weapons plants and fuel processing facilities, such as the gaseous diffusion plants, are dismantled, repaired, or modernized. For example, recent estimates of available Radioactive Scrap Metal (RSM) in the DOE Nuclear Weapons Complex have suggested that as much as 700,000 tons of contaminated 304L stainless steel exist

in the gaseous diffusion plants alone. Other high-value metals available in the DOE complex include copper, nickel, and zirconium. Melt processing for the decontamination of radioactive scrap metal has been the subject of much research. A major driving force for this research has been the possibility of reapplication of RSM, which is often very high-grade material containing large quantities of strategic elements. To date, several different single and multi-step melting processes have been proposed and evaluated for use as decontamination or recycling strategies. Each process offers a unique combination of strengths and weaknesses, and ultimately, no single melt processing scheme is optimum for all applications since processes must be evaluated based on the characteristics of the input feed stream and the desired output. This paper describes various melt decontamination processes and briefly reviews their application in developmental studies, full scale technical demonstrations, and industrial operations.

375 V18/024100

Mercury Recovery and Removal by Polymer Filtration

Los Alamos National Laboratory, Los Alamos, NM
LALP-95-204; 1 p. (1995)

Removal of mercury contaminated from processing equipment during D&D activities is a formidable problem, particularly for hard to reach surfaces such as the interiors of pipes and duct work. A need exists for decontamination technology applicable to mercury contaminated equipment, primarily at the DOE lithium processing facility at Y-12. Los Alamos proposes to develop a water soluble polymeric decontamination system for removing mercury. This technology called, Polymer Filtration, combines the most positive aspects of chelation technology with the convenience of ion-exchange technology to both in-situ and exsitu decontamination of equipment. Chelating polymers are applied to the contaminated surfaces along with surfactants or other dissolution-enhancing chemicals as aqueous solutions or foams. The metal-laden polymer is then rinsed into an ultra-filtration chamber where the polymer is captured. The other chemicals in the solution are recycled and the mercury-laden polymer is regenerated with the mercury eluted in a concentrated solution.

376 V18/021128

Metals Recycling in the Year 2000

Gardner, F.

U.S. Ecology, Inc., Nuclear Materials Management Center, Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (16 pp.) (1996)

The future size of the radioactive scrap metals (RSM) recycling industry hinges on major policy decisions by the Department of Energy (DOE) and the implementation of a regulatory framework by the US Environmental Protection Agency (EPA) and Nuclear Regulatory Commission (NRC). If the industry meets its aggressive forecasts, over 50,000 tons from government and 20,000 tons from commercial, radioactively-contaminated scrap metal will be processed and recycled in the year 2000. Alternatively, without these key changes by the federal agencies listed above, the current

industry will remain essentially flat consisting primarily of commercially generated waste at an annual rate of 15 to 20 thousand tons/year. This paper forecasts a moderate view of metals recycling in the year 2000 - processing approximately 30-40,000 tons of radioactive scrap per year with 45% from DOE/Department of Defense (DOD) and 50% from commercial generators. This segment of the nuclear industry will have annual revenues of approximately \$200 million per year spread over a half dozen or more competitors. Services provided will primarily be decontamination for free release, melting for fabrication of containers or industrial items and melting for burial. This paper presents a detailed discussion of the market and RSM industrial processing capacity, the policy and regulatory drivers, and the financial projections.

377 V18/021467

Method for Decontamination of Radioactive Metal Surfaces

Bray, L.A.

Battelle Memorial Institute, Richland, WA

U.S. Patent 05545794; 10 pp. (June 19, 1995; August 13, 1996)

Disclosed is a method for removing radioactive contaminants from metal surfaces by applying steam containing an inorganic acid and cerium IV. Cerium IV is applied to contaminated metal surfaces by introducing cerium IV in solution into a steam spray directed at contaminated metal surfaces. Cerium IV solution is converted to an essentially atomized or vapor phase by the steam.

378 V18/020930

Methodology for Assessing Recycling and Disposal Costs Associated with Surface Contaminated Scrap Metal

Kluk, A.F.; Phillips, J.W.; Culp, J.P.

U.S. Department of Energy, Washington, DC; Analytical Services, Inc., Columbia, MD

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (22 pp.) (1996)

Decommissioning and demolition of facilities or the discontinuation of some programs has left the Department of Energy (DOE) with radioactively contaminated scrap metal, some of which is potentially recoverable or recyclable while the rest requires disposal. While there is pressure within DOE to conserve resources and recycle scrap metal, there is also a demand that actions be cost effective, and it is often unknown whether recycling is economically viable. This problem is increased by the lack of a consistent approach to making appropriate cost comparisons and by changing market and other variables. This paper, based on a report in preparation, addresses this issue as it relates to surface contaminated scrap metals, especially carbon steel. More specifically, the report attempts to standardize and facilitate the cost analysis process and analyzes the sensitivity of various cost factors. A series of graphs are included which facilitate the analysis of costs associated with the survey, decontamination and recycling of surface contaminated scrap metal and allow comparisons of these

factors to the cost of sizing, packaging, transportation, and disposal of those metals. The graphs have been developed to cover the range of costs covered by these elements. The range of costs were identified using data in the literature and actual costs incurred at DOE sites that are decontaminating metal for free release and are compared to data from sites currently disposing of radioactively contaminated scrap metal. The graphs facilitate analysis of the effects that various cost elements have on the overall cost. If the total cost of recycling exceeds the cost of disposal, the graphs can be used to determine areas requiring cost reductions necessary to achieve comparability with the cost of disposal. Cost elements include: (1) costs for preparing the metal for transportation; (2) options for purchasing or renting a variety of containers that could be used for recycling; (3) transportation costs, including transportation of metal that cannot be decontaminated and secondary waste from the decontamination process; (4) decontamination costs; and (5) disposal costs, including disposal of metal that cannot be decontaminated and secondary waste from the decontamination process.

379 V18/022842

Mineralogical Conversion of Asbestos Containing Materials

Pulsford, S.K.; Foltz, A.D.; Ek, R.B.

Bechtel Hanford, Inc., Richland, WA; Asbestos Recycling, Inc., Kent, WA; Asbestos Conversion System, Inc., Issaquah, WA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 2004-2008) (1996)

The principal objective of the Technical Task Plan (TTP) is to demonstrate a thermal-chemical mineralogical asbestos conversion unit at the Hanford Site, which converts non-radiological asbestos containing materials (ACMs) into an asbestos-free material. The permanent thermal-chemical mineralogical conversion of ACMs to a non-toxic, non-hazardous, potentially marketable end product should not only significantly reduce the waste stream volumes but terminate the "cradle to grave" ownership liabilities.

380 V18/023763

Minimization of D&D Waste Using Self Cleaning Cartridge Filters

Amar, R.; Green, P.M.; King, K.

Rockwell International Corporation, Rocketdyne Division, Canoga Park, CA; U.S. Department of Energy, Oakland Operations Office, Oakland, CA

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 201-205) (November 1995)

Decontamination and decommissioning (D&D) activities such as torch cutting and concrete scabbling operations generate large quantities of potentially harmful airborne particulates and dust. Exhaust air from these operations is typically cleaned by passing it

through High Efficiency Particulate Air (HEPA) filters. The HEPA filters are, in turn, protected by single-use prefilters. A problem with the current air pollution control system is that due to heavy particulate loading frequent changeouts (sometimes every hour) of these single-use prefilters are required. This results in a significant volume of radioactive waste due to the bulky nature of the filters. Additionally, frequent filter changeouts are labor intensive and interrupt D&D operations. To minimize waste generation and improve the efficiency of D&D operations, the use of self-cleaning filters is being investigated by the Energy Technology Engineering Center (ETEC). An assessment of alternatives was completed by ETEC and included the evaluation of electrostatic precipitators and several self-cleaning cartridge prefilter systems. The assessment resulted in the selection of a self-cleaning cartridge prefilter system with a particulate collection feature (Torit Model 3DF6) for demonstration. A Torit unit was procured to evaluate performance under field conditions and compare it with the single-use disposable prefilters. The first demonstration consisted of evaluating the performance of the Torit unit relative to the existing single-use prefilter assembly under a simulated D&D operation using torch cutting of a carbon steel plate. The Torit unit demonstrated equivalent particulate capture efficiency and superiority in the resulting waste form as it was a more easily handled and compact waste. The single-use prefilter became fully particulate laden and required a changeout after twenty-three minutes. The superiority of the self-cleaning cartridge filter has also been confirmed via a long-term (6 weeks) performance test under real D&D conditions consisting of metal cutting and concrete demolition operations. Findings from these tests indicate a 98.5% reduction in the waste volume with the use of the Torit unit. Estimates of relative costs for one year of D&D operations using a Torit unit indicate savings of over \$100,000. These savings result from eliminating the labor intensive prefilter changeout process and significantly reduced waste disposal fees. Use of self-cleaning filters should be evaluated for other DOE sites with similar D&D operations.

381 V18/021741

Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions: Draft Report for Comment

Huffert, A.M.; Abelquist, E.W.; Brown, W.S.

U.S. Nuclear Regulatory Commission, Division of Regulatory Applications, Office of Nuclear Regulatory Research, Washington, DC; Oak Ridge Institute for Science and Education, Oak Ridge, TN; Brookhaven National Laboratory, Human Factors and Performance Analysis Group, Upton, NY

NUREG-1507; 152 pp. (August 1995)

This report describes and quantitatively evaluates the effects of various factors on the detection sensitivity of commercially available portable field instruments being used to conduct radiological surveys in support of decommissioning. The U.S. Nuclear Regulatory Commission (NRC) is currently involved in a rulemaking effort to establish residual contamination criteria for release of facilities for restricted or unrestricted use. In support of the rulemaking, the Commission has prepared a draft Generic Environmental Impact Statement (GEIS), consistent with the

National Environmental Policy Act (NEPA). The effects of this new rulemaking on the overall cost of decommissioning are among the many factors considered in the GEIS. The overall cost includes the costs of decontamination, waste disposal, and radiological surveys to demonstrate compliance with the applicable guidelines. An important factor affecting the costs of such radiological surveys is the minimum detectable concentrations (MDCs) of field survey instruments in relation to the residual contamination guidelines. The purpose of this study was two-fold. First, the data were used to determine the validity of the theoretical MDCs used in the NRC draft GEIS. Second, the results of the study, published herein, provide guidance to licensees for (a) selection and proper use of portable survey instruments and (b) understanding the field conditions and the extent to which the capabilities of those instruments can be limited. The types of instruments commonly used in field radiological surveys were evaluated, such as gas proportional, Geiger-Mueller (GM), zinc sulfide (ZnS), and sodium iodide (NaI) detectors.

382

V18/025499

Modeling the Electrokinetic Decontamination of Concrete

Harris, M.T.; DePaoli, D.W.; Ally, M.R.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-951057; Proceedings of the Ninth Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 22-26, 1995; Separation Science and Technology 32(1-4):827-848 (January-February 1997)

The decontamination of concrete is a major concern in many Department of Energy (DOE) facilities. Numerous techniques (abrasive methods, manual methods, ultrasonics, concrete surface layer removal, chemical extraction methods, etc.) have been used to remove radioactive contamination from the surface of concrete. Recently, processes that are based on electrokinetic phenomena have been developed to decontaminate concrete. Electrokinetic decontamination has been shown to remove from 70 to over 90% of the surface radioactivity. To evaluate and improve the electrokinetic processes, a model has been developed to simulate the transport of ionic radionuclide constituents through the pores of concrete and into the anolyte and catholyte. The model takes into account the adsorption and desorption kinetics of the radionuclide from the pore walls and ion transport by electro-osmosis, electromigration, and diffusion. A numerical technique, orthogonal collocation, is used to simultaneously solve the governing convective diffusion equations for a porous concrete slab and the current density equation. This paper presents the theoretical framework of the model and the results from the computation of the dynamics of ion transport during electrokinetic treatment of concrete. The simulation results are in good agreement with experimental data.

383

V18/022756

Monitoring Pipes for Residual Alpha Contamination [August 1996]

MacArthur, D.W.; Rawool-Sullivan, M.W.; Dockray, T.

Los Alamos National Laboratory, Los Alamos, NM; BNFL Instruments Limited, Seascale, Cumbria, United Kingdom

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1086-1090) (1996)

The sensitivity and application of traditional alpha monitors is limited by the short range of alpha particles in air (typically 10 cm) and in solid materials (typically tens of μ m). Detecting small amounts of alpha-emitting contamination inside pipes presents particular problems. The alpha particle cannot penetrate the walls of the pipe. Associated gamma-ray detection and active neutron interrogation is often used to detect large amounts of radioactive material in pipes, but these methods are of limited use for detecting small amounts of contamination. Insertion of traditional alpha probes works well in large-diameter straight pipes, but is increasingly difficult as the pipe network becomes smaller in diameter and more complex. Monitors based on long-range alpha detection (LRAD) detect ionization of the ambient air rather than the alpha particles themselves. A small fan draws the ions into an externally mounted ion detector. Thus, the air in the pipe serves as both the detector gas and the mechanism for transporting the alpha-induced ions to a detection grid outside of the pipe. All of the ions created by all of the contamination in the pipe can be measured in a single detector. Since ambient air serves as the "probe," crushed or twisted sections of pipe can be monitored almost as effectively as straight sections. The pipe monitoring system described in this paper was tested both at Los Alamos and at BNFL's Sellafield reprocessing facility in the UK. In this paper, we report on the first field tests of the pipe monitoring system.

384

V18/022114

Monitoring Pipes for Residual Alpha Contamination [July 1996]

MacArthur, D.W.; Rawool-Sullivan, M.W.; Dockray, T.

Los Alamos National Laboratory, Los Alamos, NM; British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom

LA-UR-96-2793; CONF-960767; Proceedings of the 37th Annual Meeting of the Institute of Nuclear Materials Management, Naples, FL, July 28-31, 1996; (8 pp.) (1996)

The sensitivity and application of traditional alpha monitors is limited by the short range of alpha particles in air and in solid materials. Detecting small amounts of alpha-emitting contamination inside pipes presents particular problems. The alpha particle cannot penetrate the walls of the pipe. Associated gamma-ray detection and active neutron interrogation is often used to detect large amounts of radioactive material in pipes, but these methods are of limited use for detecting small amounts of contamination. Insertion of a traditional alpha probes works well in large diameter straight pipes, but is increasingly difficult as the pipe network becomes smaller in diameter and more complex. Monitors based on long-range alpha detection (LRAD) detect ionization of the ambient air rather than the alpha particles themselves. A small fan draws the ions into an externally mounted ion detector. Thus, the air in the pipe serves as both the detector gas and the mechanism for transporting the alpha-induced ions to a detection grid outside the pipe. All of the ions created by all of the contamination in the pipe can be measured in a single detector. Since ambient air serves as the probe, crushed or twisted sections of

pipe can be monitored almost as effectively as straight sections. The pipe monitoring system described in the paper was tested both at Los Alamos National Laboratory (LANL) and at BNFL Sellafield reprocessing facility in the UK. In this paper, we report on the first field tests of the pipe monitoring system.

385 V18/022505

Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM): Draft for Public Comment

U.S. Nuclear Regulatory Commission, Washington, DC
NUREG-1575; EPA/402/R-96/018; 570 pp. (December 1996)

The owners and managers of a number of sites would like to determine if these sites are contaminated, clean them up, and release them for public use. The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and the Department of Energy (DOE) are preparing regulations for the release of certain categories of radioactively contaminated sites following such cleanup. The primary objective of the EPA, NRC, and DOE regulations is to ensure that human health and the environment are protected from radioactive contamination at sites that are to be released to the public. The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) addresses the need to have a nationally consistent approach to conducting radiation surveys and investigations of potentially contaminated sites. The decommissioning that follows remediation will normally require a demonstration to the responsible Federal or state agency that the cleanup effort was successful, and that the release criterion was met. This manual assists site personnel or others in performing or assessing such a demonstration.

386 V18/022562

Multiagency Radiation Survey and Site Investigation Manual (MARSSIM): Overview/Update

Petullo, C.F.; Doehnert, M.; Meck, R.A.

U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, Las Vegas, NV; U.S. Environmental Protection Agency, Washington, DC; U.S. Nuclear Regulatory Commission, Washington, DC

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):34a (June 1996)

The Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), the Department of Energy (DOE), and the Department of Defense (DOD - Army, Navy and Air Force) are jointly developing a single federal guidance document for investigating and characterizing sites that have been contaminated with radioactive materials. The multi-agency radiation survey and site investigation manual (MARSSIM) is being written to support implementation of Federal rules, currently under development, for the cleanup of sites contaminated with radioactive materials. The MARSSIM will provide guidance for planning, conducting, evaluating, and documenting environmental and structural radiation and sampling surveys in support of remediation of radioactive contamination. The philosophy, standardized techniques and methodologies that form the basis for this manual are consistent with Federal limits, guidelines, and procedures. The sampling and radiation surveys that will be depicted in the manual will only entail

the use of commercially available instrumentation and equipment. Survey designs and evaluation of results will only incorporate standard statistical approaches.

387 V18/022563

Multiagency Radiation Survey and Site Investigation Manual (MARSSIM): Survey Design

Abelquist, E.W.; Berger, J.D.

Oak Ridge Institute for Science and Education, Oak Ridge, TN; Auxier and Associates, Inc., Knoxville, TN

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):34-35 (June 1996)

This paper describes the Multiagency Radiation Survey and Site Investigation Manual (MARSSIM) strategy for designing a final status survey. The purpose of the final status survey is to demonstrate that release criteria established by the regulatory agency have been met. Survey design begins with identification of the contaminants and determination of whether the radionuclides of concern exist in background. The decommissioned site is segregated into Class 1, Class 2, and Class 3 areas, based on contamination potential, and each area is further divided into survey units. Appropriate reference areas for indoor and outdoor background measurements are selected. Survey instrumentation and techniques are selected in order to assure that the instrumentation is capable of detecting the contamination at the derived concentration guideline level (DCGL). Survey reference systems are established and the number of survey data points is determined, with the required number of data points distributed on a triangular grid pattern. Two statistical tests are used to evaluate data from final status surveys. For contaminants that are present in background, the Wilcoxon Rank Sum test is used; for contaminants that are not present in background, the Wilcoxon Signed Rank (or Sign) test is used. The number of data points needed to satisfy these nonparametric tests is based on the contaminant DCGL value, the expected standard deviation of the contaminant in background and in the survey unit, and the acceptable probability of making Type I and Type II decision errors. The MARSSIM also requires a reasonable level of assurance that any small areas of elevated residual radioactivity that could be significant relative to regulatory limits are not missed during the final status survey. Measurements and sampling on a specified grid size are used to obtain an adequate assurance level that small locations of elevated radioactivity will still satisfy DCGLs applicable to small areas.

388 V18/024382

Multirobot Automated Indoor Floor Characterization Team

Idaho National Engineering Laboratory, Idaho Falls, ID
Brochure; 6 pp. (January 5, 1996)

Many facilities exist in the Department of Energy (DOE) which have become radiologically contaminated through years of research and service. These facilities include hot cells, glove boxes, fuel storage buildings, and process buildings. As many of these facilities are prepared for decontamination and decommissioning (D&D), the need arises for surveillance and characterization prior to and during clean up activities. Characterization is currently being performed in

these areas by having a radiation control technician (RCT) manually monitor radiation levels with hand held instruments. Although these methods are effective for small or hard to reach areas, in large buildings such as the 300+ acre K-25 facilities located at the Oak Ridge National Laboratory (ORNL) such methods are tedious and better suited for automated floor characterization systems. The Office of Technology Development's (OTD) Robotics Technology Development Program (RTDP) D&D application area is currently funding research to improve upon these characterization efforts using robots. The purpose of this paper is to describe the multirobot Mobile Automated Characterization System (MACS) and Reduced Access Characterization Subsystem (RACS) system, their cooperative activities, and their current status and future directions. Both the MACS and RACS platforms have been purchased from industry and are being developed for floor characterization by DOE laboratories.

389 V18/024154

Noneconomic Factors Influencing Scrap Metal Disposition Decisions at DOE and NRC-Licensed Nuclear Facilities

Robinson, L.A.; Ewen, M.D.

Industrial Economics, Inc., Cambridge, MA

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (21 pp.) (1996)

The U.S. Environmental Protection Agency (EPA) is currently developing radiation protection standards for scrap metal, which will establish criteria for the unconditional clearance of scrap from nuclear facilities. In support of this effort, Industrial Economics, Incorporated is assessing the costs and benefits attributable to the rulemaking. The first step in this analysis is to develop an in-depth understanding of the factors influencing scrap disposition decisions, so that we can predict current and future practices under existing requirements and compare them to the potential effects of EPA's rulemaking. These baseline practices are difficult to predict due to a variety of factors. First, because decommissioning activities are just beginning at many sites, current practices do not necessarily provide an accurate indicator of how these practices may evolve as site managers gain experience with related decisions. Second, a number of different regulations and policies apply to these decisions, and the interactive effects of these requirements can be difficult to predict. Third, factors other than regulatory constraints and costs may have a significant effect on related decisions, such as concerns about public perceptions. In general, our research suggests that these factors tend to discourage the unconditional clearance of scrap metal.

390 V18/022925

Nontypical Hazards Associated with D&D of Power, Weapons, and Research and Reactor Plants

Renk, F.A., Jr.

Bechtel Environmental, Inc., Oak Ridge, TN

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the

American Nuclear Society 73:56-57 (1995)

Nontypical hazards such as asbestos and lead exist throughout the U.S. Department of Energy (DOE) weapons and research and reactor plants and commercial power plants. Most plants have encountered and identified these hazards during routine maintenance, modification, and repair activities. The decision to abate asbestos and lead is often cost-prohibitive and outweighed by the hazards created by the removal process; therefore, management-in-place concepts were and continue to be chosen as an alternative. This concept controls the hazard by using encapsulation, enclosure, and barrier installation techniques. Long-term operation and maintenance plans are then developed and implemented for periodic inspection, air monitoring, and repair. Although in-place-management plans tend to cover up the hazard, they provide an excellent source for the hazard recognition and identification phase by the paper trail they create.

Decommissioning and decontamination of these facilities and associated utilities poses unique challenges in accurately and safely assessing hazards in these technologically complex, multisubstance, and often radiological work environments.

391 V18/022029

Nuclear Facility Decommissioning and Site Remedial Actions: A Selected Bibliography - Volume 17, Part 1A - Citations with Abstracts, Sections 1 Through 9

Owen, P.T.

Lockheed Martin Energy Systems, Inc., Remedial Action Program Information Center, Oak Ridge, TN

ES/ER/TM-203/Pt1A; 410 pp. (September 1996)

This bibliography contains 3452 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D&D), uranium mill tailings management, and site remedial actions. This report is the seventeenth in a series of bibliographies prepared annually for the U.S. Department of Energy (DOE) Office of Environmental Restoration. Citations to foreign and domestic literature of all types - technical reports, progress reports, journal articles, symposia proceedings, theses, books, patents, legislation, and research project descriptions - have been included in Part 1 of the report. The bibliography contains scientific, technical, economic, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including: (1) DOE Environmental Restoration Program Planning and Management; (2) DOE Decontamination and Decommissioning (D&D) Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Program (FUSRAP); (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action (UMTRA) Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank (UST) Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues. Within the 16 sections, the citations are sorted by geographic location. If a geographic location is not specified, the citations are sorted according to the document title. In Part 2 of the report,

indexes are provided for author, corporate affiliation, title word, publication description, geographic location, subject category, and keyword.

392 V18/022030

Nuclear Facility Decommissioning and Site Remedial Actions: A Selected Bibliography - Volume 17, Part 1B - Citations with Abstracts, Sections 10 Through 16

Owen, P.T.

Lockheed Martin Energy Systems, Inc., Remedial Action Program Information Center, Oak Ridge, TN

ES/ER/TM-203/Pt1B; 415 pp. (September 1996)

This bibliography contains 3452 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D&D), uranium mill tailings management, and site remedial actions. This report is the seventeenth in a series of bibliographies prepared annually for the U.S. Department of Energy (DOE) Office of Environmental Restoration. Citations to foreign and domestic literature of all types - technical reports, progress reports, journal articles, symposia proceedings, theses, books, patents, legislation, and research project descriptions - have been included in Part 1 of the report. The bibliography contains scientific, technical, economic, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including: (1) DOE Environmental Restoration Program Planning and Management; (2) DOE Decontamination and Decommissioning (D&D) Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Program (FUSRAP); (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action (UMTRA) Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank (UST) Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues. Within the 16 sections, the citations are sorted by geographic location. If a geographic location is not specified, the citations are sorted according to the document title. In Part 2 of the report, indexes are provided for author, corporate affiliation, title word, publication description, geographic location, subject category, and keyword.

393 V18/022031

Nuclear Facility Decommissioning and Site Remedial Actions: A Selected Bibliography - Volume 17, Part 2 - Indexes

Owen, P.T.

Lockheed Martin Energy Systems, Inc., Remedial Action Program Information Center, Oak Ridge, TN

ES/ER/TM-203/Pt2; 440 pp. (September 1996)

This bibliography contains 3452 citations with abstracts of documents relevant to environmental restoration, nuclear facility decontamination and decommissioning (D&D), uranium mill tailings

management, and site remedial actions. This report is the seventeenth in a series of bibliographies prepared annually for the U.S. Department of Energy (DOE) Office of Environmental Restoration. Citations to foreign and domestic literature of all types-technical reports, progress reports, journal articles, symposia proceedings, theses, books, patents, legislation, and research project descriptions-have been included in Part 1 of the report. The bibliography contains scientific, technical, economic, and regulatory information that pertains to DOE environmental restoration programs. The citations are separated by topic into 16 sections, including: (1) DOE Environmental Restoration Program Planning and Management; (2) DOE Decontamination and Decommissioning (D&D) Program; (3) Nuclear Facilities Decommissioning; (4) DOE Formerly Utilized Sites Remedial Action Program (FUSRAP); (5) NORM-Contaminated Site Restoration; (6) DOE Uranium Mill Tailings Remedial Action (UMTRA) Project; (7) Uranium Mill Tailings Management; (8) DOE Site-Wide Remedial Actions; (9) DOE Onsite Remedial Action Projects; (10) Contaminated Site Remedial Actions; (11) DOE Underground Storage Tank (UST) Remediation; (12) DOE Technology Development, Demonstration, and Evaluation; (13) Soil Remediation; (14) Groundwater Remediation; (15) Environmental Measurements, Analysis, and Decision-Making; and (16) Environmental Management Issues. Within the 16 sections, the citations are sorted by geographic location. If a geographic location is not specified, the citations are sorted according to the document title. In Part 2 of the report, indexes are provided for author, corporate affiliation, title word, publication description, geographic location, subject category, and keyword.

394 V18/021104

Nuclear Reactors Built, Being Built, or Planned: 1995

U.S. Department of Energy, Office of Scientific and Technical Information, Washington, DC

DOE/OSTI-8200-R59; 64 pp. (August 1996)

This report contains unclassified information about nuclear facilities built, being built, or planned in the United States for domestic use or export as of December 31, 1995. The book consists of three major divisions as follows: A commercial reactor locator map and tables of the characteristic and statistical data that follow; a table of abbreviations; tables of data for reactors operating, being built, or planned; and, tables of data for reactors that have been shut down permanently or disabled. The reactors are subdivided into the following parts: Civilian, Production, Military, Export, and Critical Assembly. Reactors are further classified as follows: Central-station electric power plant; Dual-purpose plant; Experimental power reactor; General irradiation test reactor; High-power research and test reactor; Safety-research and test reactor; General research reactor; and, University research and training reactor. Tables presenting a statistical summary of reactors have the following column headings: Location, Principal nuclear contractor, operator, designer, shipbuilder, Type, Power, Designation, Date

395 V18/020702

Overview of the Changing Environment for Decommissioning at the U.S. Department of Energy

Murphie, W.E.; Fulner, J.; Perotti, D.

U.S. Department of Energy, Office of Energy Research, Washington, DC; Booz-Allen & Hamilton, Inc., Bethesda, MD; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 61-70) (1995)

The U.S. Department of Energy (DOE) is redefining its mission as a result of the end of the Cold War and the significantly revised mission for nuclear weapons. The downsizing of the nation's defense complex, as well as the nuclear energy research complex, has resulted in a dramatic increase in the inventory of facilities surplus to DOE's mission. At the same time that the surplus facility inventory is growing rapidly, the recent annual increase in the nation's budget for environmental cleanup has ended. This paper will discuss the Decommissioning Program's re-evaluation of its future and the strategies necessary to meet the responsibilities of the expanding inventory of surplus facilities.

396 V18/022980

PCB Regulations and Their Application to Deactivation and Decommissioning Activities: Technical Assistance Project - Oil Contaminated by PCB

U.S. Department of Energy, Office of Environment, Safety, and Health, RCRA/CERCLA Division, Washington, DC
DOE/EH-97001175; 6 pp. (April 1996)

DOE's economic development plans involve efforts to deactivate and decommission or refurbish site buildings and operational facilities for other uses. Site personnel must decide on disposition of stored materials, which include increasing numbers of excess and/or unwanted oil-filled equipment (e.g., transformers, hydraulic systems, heat transfer systems) and oil-containing 'orphaned' drums. Because oil in these items can also contain polychlorinated biphenyls (PCB), it is essential that site personnel become aware of the regulations applicable to PCBs (adherence will minimize DOE hazardous material management liabilities). A recent incident at a DOE facility provides a case in point with important lessons to be learned for all sites within the DOE complex.

397 V18/020878

Parametric Modeling of Decontamination and Decommissioning Costs Using MCACES Gold

Deiters, M.G.

Project Time & Cost, Inc., Arlington, VA

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 274-281) (1996)

Due to constricting Federal budgets, detailed, well-documented, and traceable planning estimates are now required to verify the appropriateness of funding requests for projects and programs. To

meet this requirement, the U.S. Department of Energy (DOE), Richland Operations, employed a parametric modeling approach using the "Micro Computer Assisted Cost Engineering System" (MCACES Gold) to produce defensible baseline estimates for decontamination and decommissioning (D&D) and environmental restoration (ER) projects at DOE's Hanford Site in northwest Washington. Approximately 35 parametric D&D and ER cost models have been developed and are used to produce 1400 baseline estimates on an annual basis. This manuscript provides an overview of parametric estimating and cost modeling with MCACES Gold and discusses the D&D cost model development and estimating methodology employed at the Hanford Site.

398 V18/024274

Pathways to Privatization: Issues and Concerns on the Road to Privatization of Facilities on the Oak Ridge Reservation

Yard, C.R.

Tennessee Department of Environment and Conservation, DOE Oversight Division, Oak Ridge, TN

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (26 pp.) (February 1997)

Through the cooperative efforts of the State of Tennessee and the Department of Energy, privatization of the first federal facility on the Oak Ridge Reservation has become a reality. One section of the facility has been transferred to private industry while the other portion of the facility remains in control of the government's prime contractor. Due to this unusual arrangement, there are significant issues to be dealt with. This paper will describe the issues and concerns expressed by the participants in the process. The State of Tennessee's efforts are primarily conducted by two Divisions of the Department of Environment and Conservation (TDEC). These two Divisions (Radiological Health and DOE-Oversight) share the responsibility of assuring that the privatization effort is properly implemented. This shared responsibility is divided along distinct lines by the Divisions respective regulatory and nonregulatory functions. DOE responsibilities during transfer are delineated in the Federal Facilities Agreement (FFA) section XLIII. Property Transfer. The FFA states (in part) that "the DOE shall include notice of this agreement in any document transferring ownership or operation of the site to any subsequent owner and/or operator of any portion of the site and shall notify EPA and TDEC of any such sale or Transfer." The FFA continues by stating that "No change in ownership of the site or any portion thereof or notice pursuant to Section 120 (h) (3) (B) of CERCLA, 42 U.S.C. 9620 (h) (3) (B), shall relieve the DOE of its obligation to perform pursuant to this agreement. No change of ownership of the site or any portion thereof shall be consummated by the DOE without provision for continued maintenance of any containment system, treatment system, or other response action(s) installed or implemented pursuant to this Agreement. This provision does not relieve the DOE of its obligation under 40 C.F.R. Part 270."

399 V18/025340

Peace Pipe: Recycling Nuclear Weapons Into a TRU Storage/Shipping Container

Floyd, D.R.; Edstrom, C.; Biddle, K.; Orlowski, R.; Geinitz, R.; Keenan, K.; Rivera, M.

Manufacturing Sciences Corporation, Golden, CO; British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom; Safe Sites of Colorado, Golden, CO; U.S. Department of Energy, Rocky Flats Field Office, Golden, CO; Science Applications International Corporation, Albuquerque, NM; Los Alamos Technical Associates, Albuquerque, NM

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

This paper describes results of a contract undertaken by the National Conversion Pilot Project (NCP) at the Rocky Flats Environmental Technology Site (RFETS) to fabricate stainless steel "pipe" containers. The containers are for use in certification testing at Sandia National Laboratory, Albuquerque to qualify the container for both storage of transuranic (TRU) waste at RFETS and other DOE sites and shipping of the waste to the Waste Isolation Pilot Project (WIPP). The paper includes a description of the nearly ten-fold increase in the amount of contained plutonium enabled by the product design, the preparation and use of former nuclear weapons facilities to fabricate the components, and the rigorous quality assurance and test procedures that were employed. It also describes how stainless steel nuclear weapons components can be converted into these pipe containers, a true "swords into plowshares" success story.

400 V18/022308

Pipe Explorer [TM] System: Innovative Technology Summary Report

U.S. Department of Energy, Washington, DC
DOE/EM-0306; 15 pp. (April 1996)

The Pipe Explorer [TM] System, developed by Science and Engineering Associates, Inc. (SEA), under contract with the U.S. Department of Energy (DOE) Morgantown Energy Technology Center, has been used to transport various characterizing sensors into piping systems that have been radiologically contaminated. DOE's nuclear facility decommissioning program must characterize radiological contamination inside piping systems before the pipe can be recycled, remediated, or disposed. Historically, this has been attempted using hand-held survey instrumentation, surveying only the accessible exterior portions of pipe systems. Various measuring difficulties, and in some cases, the inability to measure threshold surface contamination values and worker exposure, and physical access constraints have limited the effectiveness of traditional survey approaches. The Pipe Explorer [TM] system provides a viable alternative.

401 V18/023765

Pollution Prevention Tool for Decontamination and Decommissioning and Environmental Restoration Activities Workshop

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN,

May 16-18, 1995, 495 pp.; (pp. 262-272) (November 1995)

The Waste Minimization Contractor Coordination Group (WMinCCG) is chartered by the U.S. Department of Energy, Office of Environmental Management, Waste Minimization Division to share pollution prevention/waste minimization (P2/WMin) information among DOE contractors. The group developed and presented two workshops at the DOE Pollution Prevention Conference XI. This workshop, Pollution Prevention Tools for Decontamination and Decommissioning (D&D) and Environmental Restoration (ER) Activities, was developed and presented by Fred Brunner (ANL-East), Bill Schlosberg (KCP), and Keith Stone (SRS). This workshop was designed and formatted to both extract and to transfer the greatest amount of pollution prevention opportunities and tools to the participants in a relatively short amount of time. A hypothetical D&D/ER scenario at a fictitious DOE site was presented and workshop participants were required to take a "hands-on" approach to identify P2/WMin practices that could be implemented. The D&D/ER process was divided into the following stages: (1) Planning and Scheduling; (2) Safe Shutdown, Monitoring/Surveillance, and Maintenance; (3) Sampling and Analysis; (4) D&D and ER Implementation, and (5) Waste Handling.

402 V18/023759

Pollution Prevention and Waste Minimization in Material Stabilization and Facility Deactivation

Szilagyi, A.P.; D'Andrea, V.B.

U.S. Department of Energy, Germantown, MD; Science Applications International Corporation, Germantown, MD
CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 123-127) (November 1995)

The Office of Nuclear Material and Facility Stabilization is to assume line management responsibilities for contaminated facilities that are surplus to the Department of Energy's mission. These responsibilities are primarily in the areas of facility deactivation and stabilization, safeguards and security, surveillance and maintenance, and preparations for transfer to environmental restoration activities. At Department of Energy sites the majority activities are under the auspices of the Office of Environmental Management, the Office of Facility Transition and Management assumes landlord responsibility. Since its inception in the summer of 1992, this office had assumed responsibility for individual facilities and landlord activities at Hanford, Idaho, Rocky Flats, and very soon Savannah River Sites. Accompanying the line management responsibilities for these sites and facilities are the management responsibilities for the facility and site waste streams. It is the goal of the Office of Facility Transition and Management to support implementation of waste minimization and pollution prevention considerations in all program and project management decisions and activities. Doing this requires a complete understanding of the entire waste minimization and pollution prevention picture, close coordination with organizations that have overlapping/competing responsibilities, and complete integration of waste minimization and pollution prevention philosophy and support in all levels of line management. This paper summarizes the activities and status of the facility transition program, integrated picture of waste

minimization and pollution prevention as it applies to the facility transition activities, barriers to implementing comprehensive waste minimization and pollution prevention considerations by line organizations overburdened by competing requirements, and where the facility transition program is going with waste minimization and pollution prevention.

403 V18/023730

Pollution Prevention for Construction and Demolition Activities

Del Mar, R.A.

ICF Kaiser Hanford Company, Richland, WA

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (7 pp.) (1996)

Construction and demolition (C/D) activities present unique challenges to a waste minimization/pollution prevention (Wmin/P2) program because C/D activities cover a wide variety of operations, with varying amounts and types of waste. Multiple contractors with rapid personnel turnover and frequently changing job locations may be involved. C/D projects are typically under strict budget and schedule constraints. Thus, C/D activities occur in a state of constant flux, and implementing WMin/P2 programs may be more difficult at C/D sites than at fixed facilities, where the processes, waste generation, and personnel are consistent from day to day. ICF Kaiser Hanford Company (ICF KH), a contractor to the U.S. Department of Energy at the Hanford Site in south-central Washington State, is using the Pollution Prevention Opportunity Assessment (PPOA) process to tackle the WMin/P2 challenges posed by C/D activities. ICF KH performed 25 PPOAs during a 7-month period in 1995. This dedicated effort addressed the major waste streams generated at C/D sites and formed the basis for future investigations and corrective action.

404 V18/021347

Preferred Decommissioning Technologies (PDT) Guide [Package 1]

Lilly, M.J., III

U.S. Department of Energy, Washington, DC

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (12 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. The purpose of this Guide is to act as a screening aid in selecting decommissioning techniques for in-house performance; to provide guidance and information to contractors bidding on decommissioning work; and, to indicate where additional technology development effort may be needed.

405 V18/021255

Proposed Approach and Decision Matrix for Integration of Regulatory Considerations into Department of Energy Field Office Decontamination and Decommissioning Programs

Kuykendall, T.A.

Parsons Engineering Science, Inc., Denver, CO

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 237-244) (1994)

It is likely that decontamination and decommissioning (D&D) programs to be implemented at U.S. Department of Energy (DOE) nuclear sites will be required to integrate environmental regulatory requirements into conduct of activities. If DOE and DOE contractors are to manage D&D projects under stringent environmental requirements, an interactive, decision-based process must be defined that will allow an appropriate application of these requirements. It is proposed that a policy should be developed that is based on 'graded approach' to the application of regulatory restrictions, permits, and requirements. The approach recommended in this presentation is based on nine decision points that define in sequence a proposed method of determining a 'common-sense' application of regulatory cooperation.

406 V18/024155

Radioactive Scrap Metal Recycle Programs at DOE Sites: Panel Discussion

Burns, D.; Boettinger, B.; Clinard, J.; Fewell, T.; Winston, R.; Hartwig, P.G.; Meehan, R.W.; King, K.; Rule, K.; Yerace, P.; Thoren, S.D.

Westinghouse Savannah River Company, Aiken, SC; Oak Ridge National Laboratory, Oak Ridge, TN; Lockheed Martin Idaho Technologies Company, Idaho Falls, ID; Atomic Energy of Canada Limited, Chalk River Laboratories, Chalk River, Ontario, Canada; U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; U.S. Department of Energy, Oakland Operations Office, Oakland, CA; Princeton Plasma Physics Laboratory, Princeton, NJ; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH; Bechtel Hanford, Inc., Richland, WA

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (11 pp.) (1996)

The purpose of this panel session is to provide the conference attendees with a deeper understanding of the radioactive scrap metal (RSM) and Recycle Programs at various DOE sites. Each of the panelists has been invited to share and communicate the scope, objectives, implementation initiatives, operational and budgetary constraints, and other considerations associated with the responsible management of RSM and other waste which may be candidates for alternative disposition. Panelists represented the Hanford, Oakland, Oak Ridge, Savannah River, Fernald and Idaho National Engineering Laboratory (INEL) DOE sites as well as the Princeton Plasma Physics Lab and the Atomic Energy of Canada, Chalk River Labs.

407 V18/023046

**Radioactive Scrap Metal: Keep It, Dump It, or Clean It?
A Billion Dollar Question: A Life Cycle Cost Benefit
Analysis [Draft]**

Clemens, B.

University of Tennessee, Energy, Environment, and
Resources Center, Knoxville, TN

Report; 19 pp. (December 11, 1993)

The federal government of the United States, principally the Department of Energy (DOE), controls millions of tons of radioactively contaminated scrap metals (RSM). Once decontaminated, the RSM has a potential market value in excess of one billion dollars. In addition to DOE, the domestic nuclear power industry generates RSM and will produce significantly more RSM during the eventual decommissioning of existing nuclear power plants. Moreover, the extraction of petroleum causes naturally occurring radium to deposit, or scale, on pipelines producing additional RSM. The public and private sector have recently focused attention on obtaining good estimates of the total amount of RSM. The DOE, the Nuclear Regulatory Commission, the Environmental Protection Agency, and the American Petroleum Institute are currently performing inventories. The current public policy debate centers on how the nation should use the RSM. A recent report identifies scores of stakeholders that have joined the debate. The report discusses the view of the major stakeholders including industry, regulatory agencies, environmental advocates, and the public. The industries that use scrap metal are also becoming concerned about the levels of radioactive contamination in scrap metal. One key aspect in the public policy debate is the cost benefit analysis of the different public policy options. This paper will investigate the economic issues and set the groundwork for a comprehensive cost-benefit analysis.

408

V18/024156

Rationales for Regulatory Activity

Perhac, R.M.

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (9 pp.) (1996)

This paper consists of the outline for this presentation. The rationales for regulatory activity are: paternalism, promotion of social welfare, and protection of individual rights. An acceptable level of individual risk must be defined either arbitrarily or on the basis of public preferences and values. The promotion of social welfare and problems associated with it are presented. Issues associated with the protection of individual rights are also discussed. While this material was presented in conjunction with the recycling of radioactive scrap metals, the principals can be applied to other areas of risk analysis.

409

V18/022331

**Record of the Decontamination and Decommissioning
(D&D) Workshop: Defining Research Needs**

Bedick, R.C.; Frohne, K.H.; Hart, P.W.

U.S. Department of Energy, Morgantown Energy
Technology Center, Morgantown, WV

DOE/METC-96; Defining Research Needs, Proceedings of a
Decontamination and Decommissioning (D&D) Workshop,
Roanoke, VA, August 8-9, 1996; 110 pp. (August 1996)

The Decontamination and Decommissioning (D&D) Workshop: Defining Research Needs was held August 8 and 9, 1996 at the Hotel Roanoke & Conference Center in Roanoke, Virginia. Ninety-six persons attended the workshop, which was sponsored by the Morgantown Energy Technology Center (METC), the lead organization for the D&D Focus Area. The workshop was co-sponsored by the US DOE, Office of Environmental Management (EM), Office of Science and Technology (OST). The purpose of the workshop was to bring together representatives from industry, universities, and DOE to discuss the D&D needs of DOE and industry and to determine what research capabilities and expertise universities have to meet identified needs. The workshop included presentations on METC, the EM program, and OST's D&D program. An industry panel representing commercial nuclear utilities, service organizations for commercial nuclear utilities, and technology development organizations talked about general industrial needs for D&D research. A proposal to establish a D&D center of excellence was explained. The first day concluded with breakout sessions where industry and university representatives explored opportunities for universities to conduct research to meet industries' and DOE's D&D needs. The participants in the breakout sessions discussed D&D needs in the areas of: characterization, decontamination, dismantlement, waste disposal and recycling, and systems integration. On the second day, group leaders from each breakout session presented the groups' findings to the workshop as a whole.

410

V18/021460

**Record of the Facility Deactivation, Decommissioning,
and Material Disposition (D&D) Workshop: A New
Focus for Technology Development, Opportunities for
Industry/Government Collaboration**

Bedick, R.C.; Bossart, S.J.; Hart, P.W.

U.S. Department of Energy, Morgantown Energy
Technology Center, Morgantown, WV

DOE/METC-96/1022; CONF-9507185 (Summary); Facility
Deactivation, Decommissioning, and Material Disposition (D&D):
A New Focus for Technology Development, Opportunities for
Industry/Government Collaboration, Proceedings of a Workshop,
Morgantown, WV, July 11-12, 1995, 116 pp. (July 1995)

This workshop was held at the Morgantown Energy Technology Center (METC) in Morgantown, West Virginia, on July 11-12, 1995. The workshop sought to establish a foundation for continued dialogue between industry and the DOE to ensure that industry's experiences, lessons learned, and recommendations are incorporated into D&D program policy, strategy, and plans. The mission of the D&D Focus Area is to develop improved technologies, processes and products, and to characterize, deactivate, survey, maintain, decontaminate, dismantle, and dispose of DOE surplus structures, buildings, and contents. The target is a five-to-one return on investment through cost avoidance. The cornerstone of the D&D focus area activities is large-scale demonstration projects that

actually decontaminate, decommission, and dispose of a building. The aim is to demonstrate innovative D&D technologies as part of an ongoing DOE D&D project. The DOE Office of Technology Development (OTD) would pay the incremental cost of demonstrating the innovative technologies. The goal is to have the first demonstration project completed within the next 2 years. The intent is to select a project with visible impact so all of the stakeholders know that a building was removed, and to demonstrate at a scale that is convincing to EM program customers so they will be comfortable using it in subsequent D&D projects. The expertise gained by the integrating contractor in this project can then be used at other DOE sites.

411 V18/025317

Recycle and Reuse of Uranium as a Nonmetallic Shielding Material

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Germantown, MD

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

Depleted uranium (DU) exists at many nuclear fuel cycle facilities around the world. DU is a byproduct from enrichment operations, and, while not a waste, no country currently has plans for large-scale recycle and reuse of DU. This paper presents several potential uses of DU, and concludes that any significant reuse requires a high density form, typically over 8 g/cc. Dense, nonmetallic forms of DU as shielding represents the most significant reuse opportunity. This paper presents a new, integrated, large-scale approach for producing such shielding. The approach accepts the DU as either the hexafluoride, oxide, or the metal, and produces a dense, uranium dioxide based shielding material using an internal precipitation technique. Waste streams and quantities have been estimated. Designs and layouts for the manufacturing facility have been generated. The paper presents preliminary cost information for several plant designs with capacities of 5,000 to 30,000 tons (U) per year. The paper determines that shielding requirements for spent nuclear fuel (SNF) represent the largest potential application and would easily consume the existing inventory of DU in the United States. The conversion process does not require unusual reagents and equipment, and all input and construction materials are available from existing and established markets. The paper estimates similar size and waste disposal volumes as experienced by existing, fuel fabrication plants, even though the DU throughput is twenty-times larger. The economic analyses clearly demonstrate the economics of scale achieved by larger plants, allowing finished product cost of \$5-\$6 per kilogram of dense DU dioxide. The use of DU in SNF containers pays for the processing costs. The paper concludes that this represents a cost effective approach for using the stored inventory of DU in an environmentally compatible manner.

412 V18/021129

Recycling for Profit Through Quantum-CEP [TM]

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M4 Environmental Management, Inc., Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (14 pp.) (1996)

M4 Environmental L.P. provides the DOE a unique opportunity to commercially recycle mixed waste or convert depleted uranium hexafluoride (UF₆) while simultaneously purifying radioactive scrap metal (RSM). No other Low-Level mixed low-level (LLMW), or RSM processing technology offers this unique recycling/conversion solution to the multiple waste challenges faced by DOE. The dissociation and partitioning capabilities inherent to Quantum-CEP allow the creation of useful products from the elemental constituents of a multitude of wastes. This co-processing approach will allow safe, economical disposition of the majority of DOE wastes. The life cycle costs associated with co-processing RSM, LLMW, and depleted UF₆ utilizing the Quantum-CEP technology are anticipated to be significantly lower than individually processing these wastes/materials through separate, standard industrial processes. Potential RSM feedstocks for co-processing LLMW and depleted UF₆ include: (1) approximately 200,000 tons of contaminated ferrous and non-ferrous metals in the current national DOE inventory (1); (2) barrier nickel in the intact buildings that house the gaseous diffusion operations; (3) PCB-contaminated ductwork, copper instrument tubing and copper wire (with and without insulating encasement) present in the still-intact gaseous diffusion plants; (4) aluminum from compressors and other process equipment in the still-intact gaseous diffusion plants; and (5) ferrous alloys present in the still-intact gaseous diffusion plants. LLMW streams such as inorganic sludges, organic sludges and liquids, soils, scintillation fluids, inorganic debris, batteries, laboratory packs and reactive metals can be co-processed with the RSM. Products from the co-processing of LLMW include a synthesis fuel that can be used as either a fuel or a chemical feedstock; ingots of RSM for: (1) feed material for the fabrication of radioactive waste containers; (2) shield blocks for DOE operations; or (3) free-release into the European Community or other areas that have existing release standards; and a stable ceramic phase that contains most of the radioactive contaminants from the LLMW and RSM, which can either be reused within the DOE or disposed of at a site such as Envirocare's facility in Utah. Review of DOE's inventory of depleted UF₆ indicates approximately 50,000 cylinders containing more than 1.2 billion pounds of material that can be co-processed with radioactive scrap nickel, copper, aluminum or ferrous alloys. Products generated from the Quantum-CEP conversion of the depleted UF₆ include anhydrous hydrogen fluoride (AHF), aluminum fluoride, a reusable uranium oxide ceramic, a reusable uranium-iron alloy for feedstock to the Atomic Vapor Laser Isotope Separation (AVLIS) uranium enrichment process, and purified ingots of the RSM.

413 V18/024377

Recycling of Mixed Wastes Using Quantum-CEP [TM]

Sameski, B.

M4 Environmental Management, Inc., Oak Ridge, TN

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (10 pp.)

(1996)

This is a series of viewgraphs which describes the Quantum-CEP process and its potential in the recycling of mixed wastes at DOE sites. The process is described along with summary information from treatability studies. The market for commercially viable by-products is also discussed in terms of product applications.

414

V18/022320

Regulation and Oversight of Decommissioning Activities at Department of Energy: Defense Nuclear Facilities Safety Board Technical Report

Andersen, R.M.; MacEvoy, J.A.

Defense Nuclear Facilities Safety Board, Washington, DC
DNFSB/TECH-12; 10 pp. (August 19, 1996)

Congress directed the Defense Nuclear Facilities Safety Board (Board) to oversee Department of Energy (DOE) practices at defense nuclear facilities that could adversely affect public health and safety during any stage in the life cycle of those facilities, from design, construction and operation through decommissioning. Since the Board was established, DOE's mission has changed from production of special nuclear materials, weapons, and related materials to safe stewardship of existing weapon stockpile materials, activities leading to the decommissioning of surplus or outdated facilities, waste storage, and environmental restoration. This technical report: (1) reviews the detailed definitions of decommissioning currently in use by nuclear organizations; (2) delineates the Board's statutory oversight role during decommissioning activities at DOE defense nuclear facilities; (3) identifies how the Board's oversight role during decommissioning relates to the regulatory roles played by other federal and state agencies during decommissioning; and (4) outlines possible principles for structuring federal and state cooperation in the regulation and oversight of decommissioning activities. One of the purposes of this report is to facilitate the application of existing Board recommendations regarding safety standards and safety management plans to DOE decommissioning activities. Another is to assist the Board and its staff in structuring future reviews and oversight of the decommissioning process at defense nuclear facilities. Finally, the Board shares responsibility for public health, safety, and environmental issues at defense nuclear facilities with state agencies and the United States Environmental Protection Agency (EPA). A careful delineation of the Board's responsibilities will facilitate a smooth transition from Board oversight to regulation as defense nuclear facilities pass from operations, deactivation, and decommissioning to state and EPA-regulated cleanup, demolition, and environmental restoration activities.

415

V18/022922

Regulations Incorporating Background Values: Can Compliance Be Verified?

Walker, E.

Bechtel National, Inc., Oak Ridge, TN

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:50-52 (1995)

Federal regulatory agencies, specifically the U.S. Environmental Protection Agency (EPA) and the U.S. Nuclear Regulatory Commission (NRC), have promulgated and continue to propose regulatory standards for remediation and decommissioning activities that approach the levels of naturally occurring background quantities. The most recent proposals by both EPA and NRC are the radiological cleanup standards of 15 mrem/yr above the natural background of a particular site for residual radioactivity remaining at the completion of remediation. This paper discusses the results of a radiological background determination for a typical remediation site and provides a summary of the way that variations in this natural background affect the verification efforts to demonstrate that the cleanup criteria have been satisfied.

416

V18/020625

Regulatory and Technical Reports: Compilation for First Quarter 1996 - January-March, Vol. 21, No. 1 (Abstract Index Journal)

U.S. Nuclear Regulatory Commission, Division of Freedom of Information and Publications Services, Washington, DC
NUREG-0304 (Vol. 21, No. 1); 41 pp. (June 1996)

This journal includes all formal reports in the Nuclear Regulatory Guide (NUREG) series prepared by the NRC staff and contractors, proceedings of conferences and workshops, grants, and international agreement reports. The entries in this compilation are indexed for access by title and abstract, secondary report number, personal author, subject, NRC organization for staff and international agreements, contractor, international organization, and licensed facility.

417

V18/025494

Remediation of Borosilicate Raschig Rings

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CONF-951057; Proceedings of the Ninth Symposium on Separation Science and Technology for Energy Applications, Gatlinburg, TN, October 22-26, 1995; Separation Science and Technology 32(1-4):405-411 (January-February 1997)

A remediation methodology for borosilicate Raschig rings contaminated with radioactivity at a Department of Energy (DOE) Nuclear Facility is demonstrated in which greater than 99% of the residual radioactive contamination was successfully removed with a combination of nitric acid and ultrasonic agitation. The results obtained from this methodology are directly applicable to other radioactively contaminated Raschig ring waste streams. However, the universal application of the developed methodology is limited to similar historical processing applications of the borosilicate Raschig rings.

418

V18/025832

Remote Mechanical Methods for Decontaminating Concrete Walls

Marshall, R.A.; Kneff, D.W.; Hardy, R.B.; Horton, P.H.; Subbaraman, G.

Energy Technology Engineering Center, Canoga Park, CA

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 121-125) (1996)

A demonstration test was performed to evaluate a commercially available vertical wall positioning system, integrated with end effectors to provide remote radiological characterization and surface removal capabilities. The system was developed by Pentek, Inc. and demonstrated in a radioactive materials storage facility at the Energy Technology Engineering Center. Test results show that the integrated system has high potential for the remote decontamination of vertical concrete walls.

419 V18/021999

Removal and Treatment of Radioactive, Organochloride, and Heavy Metal Contaminants from Solid Surfaces

Grieco, S.A.; Neubauer, E.D.; Rhea, J.R.; Escue, L.S.

O'Brien & Gere Engineers, Inc., Syracuse, NY

CONF-9509139; Emerging Technologies in Hazardous Waste Management VII, D.W. Tedder (ed.), Proceedings of the Seventh American Chemical Society Industrial and Engineering Chemistry Division Special Symposium, Atlanta, GA, September 17-20, 1995. American Chemical Society, Washington, DC, 1291 pp.; (pp. 217-220) (1995)

Increasing waste disposal costs and decreasing storage facility capacity are prompting the DOE and commercial utilities to explore new waste minimizing decommissioning and decontamination (D&D) techniques. Current D&D activities are generally labor intensive, use chemical reagents that are difficult to treat, and may expose workers to hazardous chemicals. Therefore, new technologies are desired that minimize waste, allow much of the decommissioned materials to be reused rather than disposed as waste, and produce wastes that will meet disposal criteria. To support this D&D objective, the O'Brien & Gere Companies tested a decontamination system on concrete and steel surfaces contaminated with radioactive (U-238 and Tc-99) and hazardous (PCBs and lead) waste in Oak Ridge, TN. The principal objectives of this on-site soda blasting demonstration project were to evaluate the effectiveness of decontamination by blasting with sodium bicarbonate and to minimize waste volume by dissolving and treating blasting residuals through a wastewater treatment system.

420 V18/022840

Removal and Treatment of Radioactive, Organochlorine, and Heavy Metal Contaminants from Solid Surfaces

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O'Brien & Gere Engineers, Inc., Syracuse, NY; O'Brien & Gere Technical Services, Inc., Syracuse, NY

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1988-1995) (1996)

The U.S. Department of Energy (DOE) is defining decontamination and decommissioning (D&D) obligations at its sites. Current D&D activities are generally labor intensive, use chemical reagents that are difficult to treat, and may expose workers to radioactive and hazardous chemicals. Therefore, new technologies are desired that minimize waste, allow much of the decommissioned materials to be reused rather than disposed of as waste, and produce wastes that will meet disposal criteria. The O'Brien & Gere companies tested a scouring decontamination system on concrete and steel surfaces contaminated with radioactive and hazardous wastes under the sponsorship of Martin Marietta Energy Systems, Inc. (MMES) at DOE's K-25 former gaseous diffusion plant in Oak Ridge, Tennessee. The scouring system removes fixed radioactive and hazardous contamination yet leaves the surface intact. Blasting residuals are treated using physical/chemical processes. Bench- and pilot-scale testing of the system was conducted on surfaces contaminated with uranium, technetium, heavy metals, and PCBs. Areas of concrete and metal surfaces were blasted. Residuals were dissolved in tap water and treated for radioactive, hazardous, and organochlorine constituents. The treatment system comprised pH adjustment, aeration, solids, settling, filtration, carbon adsorption, and ion exchange. This system produced treated water and residual solid waste. Testing demonstrated that the system is capable of removing greater than 95% of radioactive and PCB surface contamination to below DOE's unrestricted use release limits; aqueous radionuclides, heavy metals, and PCBs were below DOE and U.S. Environmental Protection Agency treatment objectives after treatment. Waste residuals volume was decreased by 71%. Preliminary analyses suggest that this system provides significant waste volume reduction and is more economical than alternative surface decontamination techniques that are commercially available or under development.

421 V18/024161

Results of Chemical Decontamination of DOE's Uranium-Enrichment Scrap Metal

Levesque, R.G.

CORPEX Technologies Inc., Knoxville, TN;

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (28 pp.) (1996)

The CORPEX [R] Nuclear Decontamination Processes were used to decontaminate representative scrap metal specimens obtained from the existing scrap metal piles located at the Department of Energy (DOE) Portsmouth Gaseous Diffusion Plant (PORTS), Piketon, Ohio. In September 1995, under contract to Lockheed Martin Energy Systems, MELE Associates, Inc. performed the on-site decontamination demonstration. The decontamination demonstration proved that significant amounts of the existing DOE scrap metal can be decontaminated to levels where the scrap metal could be economically released by DOE for beneficial reuse. This simple and environmentally friendly process can be used as an alternative, or in addition to, smelting radiologically contaminated scrap metal.

422 V18/025851

Reuse of Concrete from Contaminated Structures:

Economic and Risk Considerations

Parker, F.L.; Ayers, K.W.; Boren, J.K.; Stephen, A.
Vanderbilt University, Nashville, TN

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 263-267) (1996)

As Decontamination and Decommissioning activities proceed within the DOE complex, tremendous volumes of both radioactively contaminated and non-contaminated concrete will be processed for disposal. Current practice is to decontaminate the concrete, dispose of the contamination at low-level waste (LLW) facilities and ship the concrete rubble to construction and demolition (C&D) landfills for disposal. This study evaluates the economic feasibility of recycling the concrete and the risks associated with recycling operations. Preliminary results indicate that the radioactively contaminated concrete can be recycled at the same or lower cost than current practice. The risks from recycling are the same as for the current practice.

423 V18/020866

Review of Chemical Decontamination Systems for Nuclear Facilities

Chen, L.; Chamberlain, D.B.; Conner, C.; Vandegrift, G.F.
Argonne National Laboratory, Chemical Technology Division, Argonne, IL

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 87-94) (1996)

With the downsizing of the Department of Energy (DOE) complex, many of its buildings and facilities will be decommissioned and dismantled. As part of this decommissioning, some form of decontamination will be required. To develop an appropriate technology for in situ chemical decontamination of equipment interiors in the decommissioning of DOE nuclear facilities, knowledge of the existing chemical decontamination methods is needed. This paper attempts to give an up-to-date review of chemical decontamination methods. This survey revealed that aqueous systems are the most widely used for the decontamination and cleaning of metal surfaces. We have subdivided the aqueous systems by types of chemical solvent: acid, alkaline permanganate, highly oxidizing, peroxide, and proprietary. Two other systems, electropolishing and foams and gels, are also described in this paper.

424 V18/025839

Risk-Based Waste Clearance Concept for the D&D Program

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IL

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 166-170) (1996)

In the United States, no specific standards have been developed for the unrestricted release of bulk contaminated materials, although standards for unrestricted release of radioactive surface contamination have existed for more than 20 years. The release of materials is not commonly practiced because of the lack of risk-based justifications. Recent guidance from international bodies has established a basis for deriving risk-based release limits for radioactive materials. It is important, therefore, to evaluate the feasibility of recycling because if it is feasible, risk-based release limits for the reusable materials will have to be established.

425 V18/022912

Role of Packaging in Decommissioning: A Case Study

Smith, A.C.; Blanton, P.S.

Westinghouse Savannah River Company, Aiken, SC

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:63-64 (1995)

Decontamination and decommissioning of a facility typically requires removal of waste materials from the site. Hazardous materials, including components with radioactive contamination, require packaging and shipment in accordance with the applicable regulations such as U.S. Department of Transportation (DOT) regulations, 49 CFR 173. In addition, packaging and transportation of radioactive materials are controlled by U.S. Nuclear Regulatory Commission regulation 10 CFR 71. These regulations establish requirements for transporting hazardous materials in public commerce, including proper identification, packaging, and shipping with appropriate labels and emergency response information. Their objective is to ensure the safety of the public and the environment. The movement of hazardous materials on U.S. Department of Energy (DOE) sites is controlled by DOE orders, which require protection equivalent to that required of off-site movement.

426 V18/021023

Rosie: A Mobile Worksystem for Decontamination and Dismantlement Operations [February 1996]

Bares, L.C.; Thompson, B.R.

RedZone Robotics, Inc., Pittsburgh, PA

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (16 pp.) (1996)

RedZone Robotics, Inc. and Carnegie Mellon University's Field Robotics Center have undertaken development of an advanced remote worksystem capable specifically designed to meet the challenges of performing a wide range of decontamination and

dismantlement operations in nuclear environments. This project is funded by the US Department of Energy's (DOE's) Environmental Management Office of Technology Development through the Morgantown Energy Technology Center. Currently, we are working on the third phase of this effort; having completed the design and fabrication of the worksystem Rosie, we are concluding endurance testing and characterization of Rosie's work capabilities, and commencing enhancement of the system design to ensure suitability for use in a DOE facility decommissioning project. The Rosie worksystem includes a locomotor, heavy manipulator, operator console, and control system for remote operations. The locomotor is a highly mobile platform with tether management and hydraulic power onboard. The heavy manipulator is a high-payload, long-reach boom used to deploy a wide variety of tools and/or sensors into the work area, Rosie's advanced control system, broad work capabilities, and hardening/reliability for hazardous duty make it a new and unique capability that facilitates completion of significant cleanup projects throughout the DOE and private sector. The paper presents a system overview, summarized results from endurance testing, and future plans.

427 V18/021151

Rosie: A Mobile Worksystem for Decontamination and Dismantlement Operations [April 1996]

Thompson, B.R.; Conley, L.

RedZone Robotics, Inc., Pittsburgh, PA

DOE/MC/29104-96/C0698; CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 155-161) (1996)

RedZone Robotics, Inc. and Carnegie Mellon University's Field Robotics Center have undertaken a contract to develop a next-generation worksystem for decommissioning and dismantlement tasks in Department of Energy (DOE) facilities. Currently, the authors are closing the second phase of this three phase effort and have completed the design and fabrication of the worksystem: Rosie. Rosie includes a locomotor, heavy manipulator, control center, and control system for robot operation. The locomotor is an omni-directional platform with tether management and hydraulic power capabilities. The heavy manipulator is a high-payload, long-reach system intended to deploy tools into the work area. The heavy manipulator is capable of deploying systems such as the Dual-Arm Work Module—a five degree-of-freedom platform supporting two highly dexterous manipulators—or a single manipulator for performing simpler, less dexterous tasks. Rosie is telerobotic to the point of having servo-controlled motions which can be operated and coordinated through the control center.

428 V18/024164

Savannah River Site Stainless Steel Beneficial Reuse Program

Boettinger, W.L.

Westinghouse Savannah River Company, Aiken, SC

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (6 pp.)

(1996)

The U.S. Department of Energy's (DOE) Savannah River Site (SRS) has thousands of tons of stainless steel radioactive scrap metal (RSM). Much of the metal is volumetrically contaminated. There is no "de minimis" free release level for volumetric material, and therefore no way to recycle the metal into the normal commercial market. If declared waste, the metal would qualify as low level radioactive waste (LLW) and ultimately be dispositioned through shallow land burial at a cost of millions of dollars. The metal however could be recycled in a "controlled release" manner in the form of containers to hold other types of radioactive waste. This form of recycle is generally referred to as "Beneficial Reuse". Beneficial reuse reduces the amount of disposal space needed and reduces the need for virgin containers which would themselves become contaminated. Stainless steel is particularly suited for long term storage because of its resistance to corrosion. To assess the practicality of stainless steel RSM recycle the SRS Beneficial Reuse Program began a demonstration in 1994, funded by the DOE Office of Science and Technology. This paper discusses the experiences gained in this program.

429 V18/020886

Shutting Down Style: Managing Nuclear Decommissioning Transition Risks

McGarvey, D.S.

Johnson and Higgins of Arizona, Inc., Phoenix, AZ

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 264-269) (1996)

The transition of a nuclear plant site from active to shutdown for decommissioning presents challenges at all levels of the corporate decision-making ladder. Among those whose activity has the potential to materially impact the pace, safety and cost of post shutdown operations is the risk manager. The risk manager is charged with analyzing the many risks faced by the corporation, evaluating risk treatment alternatives, and implementing the selected treatment employing a strategy which may include avoidance, financing, loss prevention, or risk transfer. The latter method involves contractual risk transfer, the purchase of tradition insurance products, or a combination thereof. The nuclear utility risk manager has historically relied upon insurance transfers to treat the "nuclear energy hazard", which involves the radiological, toxic, or explosive properties of nuclear material. Potential liabilities generated by the nuclear energy hazard are reduced, but certainly not eliminated by the permanent shutdown of a generating facility. Personnel related exposures generated by the same shutdown are similar but potentially much more significant than those faced by any firm closing any large production facility.

430 V18/024384

Small Pipe Characterization System

Idaho National Engineering Laboratory, Idaho Falls, ID

Brochure; 3 pp. (January 5, 1996)

Conducting characterization and inspection activities within piping

systems is critical to comprehensive decontamination and dismantlement activities throughout the Department of Energy (DOE) facilities. Current technologies for characterizing large piping exist. However, the ability to accurately characterize small-diameter piping is not currently available. Because contaminated facilities have a wide range of pipe in systems that require characterization, a system has the capability to enter and inspect small pipe systems would promote inclusive characterization efforts. The research objective of the Small Pie Characterization System (SPCS) is to develop a robotic system to characterize the internal surfaces of horizontal and vertical piping with a diameter of 2-3 inches without removal from the pipe for reconfiguration. A further objective is to achieve advances in miniature system components such as cameras, actuators, gears, and power supplies.

431 V18/020950

Soda Blasting Demonstration for Removal and Treatment of Radioactive, Organochlorine, and Heavy Metal Contaminants from Solid Surfaces: A Demonstration at the Oak Ridge K-25 Site

Harness, J.L.; Neiswander, D.W.; Person, G.A.; Neubauer, E.D.; Grieco, S.A.; Escue, L.S.; Rhea, J.R.

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; O'Brien & Gere Engineers, Inc., Syracuse, NY; O'Brien & Gere Engineers, Inc., Oak Ridge, TN; HydroQual, Inc., Syracuse, NY

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (8 pp.) (1996)

In 1993, O'Brien & Gere Engineers, Inc. was selected under a Program Research and Development Announcement solicitation of the Morgantown Energy Technology Center of the U.S. Department of Energy (DOE) to develop soda blasting technology for removal of radioactive contamination from surfaces. The project included demonstration of the technology in decontamination and decommissioning (D&D) operations at a nuclear facility. The contract award and management was through Lockheed Martin Energy Systems of Oak Ridge, Tennessee under the direction of DOE's Oak Ridge Operation Office (ORO). Work was performed at ORO's K-25 plant site and O'Brien & Gere Facilities in Oak Ridge. O'Brien & Gere developed a scouring system that removes hazardous and fixed radioactive surface contamination and minimizes residual waste. It uses an abrasive sodium bicarbonate medium that is projected with great force at contaminated surfaces. It mechanically removes surface contamination while leaving the surface intact. Blasting residuals are treated using physical/chemical processes. Bench- and pilot-scale testing of the soda-blasting system was conducted between December 1993 and September 1994 on surfaces contaminated with uranium, technetium, heavy metals, and PCBs. Areas of concrete and metal were blasted. Residuals were dissolved in tap water and treated for radioactive, hazardous, and organochlorine constituents. The treatment comprised pH adjustment, aeration, solids settling, filtration, carbon adsorption, and ion exchange. It produced treated water and residual solid waste. These tests demonstrated that the system is capable of removing greater than 95% of radioactive and PCB surface contamination to

below DOE's unrestricted use release limits. Aqueous radionuclides, heavy metals, and PCBs were below DOE and US EPA treatment objectives for residuals after treatment. Waste residuals volume was decreased by 70%. Preliminary analysis suggests that this treatment system provides significant waste volume reduction and is more economical than available surface decontamination technologies. Full-scale system capital and operating costs are under development. The DOE's emphasis in this demonstration procedure has been on comparing the economics and efficiency of the technique against other available and developing technologies.

432 V18/022337

Solvent Recycle/Contaminant Reduction Testing - Phase I: Task 3 - Topical Report, June 1994-December 1994

Babcock and Wilcox Company, Alliance, OH; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

DOE/MC/30168-5287; 25 pp. (July 1995)

This work is being performed in response to DOE's request for research on methodologies for the decontamination of process equipment. Requirements of the decontamination technology being developed in this program were: (1) removal of as much contamination as possible in a cost effective manner, (2) minimization of the volume of secondary waste generated, and (3) minimization of worker exposure. The specific objective of this task of the test program was to recover or regenerate the cleaning solvent and remove the dissolved uranium from solution.

433 V18/024052

Spotlight on the Decontamination and Decommissioning Focus Area [April 1997]

Initiatives in Environmental Technology Investment 4 (April 1997):7-9 (April 1997)

This article is the second of a two-part series focusing on the decontamination and decommissioning focus area (DDFA). Since fiscal year 1996, DDFA, managed through the Morgantown, West Virginia office of the Federal Energy Technology Center, has supported large-scale demonstration projects (LSDP) as a means of reducing the risk associated with the first-time use of technologies during deactivation or decommissioning operations at U.S. Department of Energy surplus facilities. The intent of the LSDPs is to show, at a scale convincing to the end user, that using a combination of innovative and commercial D&D technologies has substantial cost and other benefits compared to using baseline technologies.

434 V18/024051

Spotlight on the Decontamination and Decommissioning Focus Area [February 1997]

Initiatives in Environmental Technology Investment 4 (February 1997):6-8 (February 1997)

In fiscal year 1996, the decontamination and decommissioning focus area embarked upon a new implementation strategy designed to reduce the risk and liability associated with the first-time use of a technology. The large-scale demonstration projects (LSDP) are the

cornerstone of this new strategy. The intent of the LSDPs is to show, at a scale convincing to the end user, that using a combination of innovative and commercial D&D technologies has substantial cost and other benefits compared to using only commercial technologies. This approach provides a unique opportunity to test innovative technologies beside commercial technologies in an ongoing D&D project.

435 V18/023754

Stakeholder Commitment to Recycle 2000: An Analysis of Efforts by the Department of Energy

Clemens, B.; Lin, Y.L.; Gresalfi, M.J.; Short, J.J.

University of Tennessee, Energy, Environment, and Resources Center, Knoxville, TN; Oak Ridge National Laboratory, Oak Ridge, TN; U.S. Department of Energy, Washington, DC

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 52-58) (November 1995)

The Recycle 2000 Initiative is the DOE's plan to fabricate waste containers from radioactive scrap metal (RSM). This report focuses on DOE's attempts to incorporate stakeholders in the Initiative. Current estimates suggest that the Department of Energy (DOE) has an inventory of 400,000 tons of radioactive scrap metal. Further, it is estimated that an additional 600,000 tons will be generated by future decommissioning, decontamination, and dismantling operations. Other sources also generating radioactive scrap metal include the nuclear power facilities and the petroleum industry. Producers are not the only stakeholders interested in radioactive scrap metal standards. Scrap metal recyclers and metal manufacturers have become concerned about the radiation in the scrap recycling stream. A number of facilities have had to cleanup after inadvertently smelting concealed radioactive sources. Moreover, environmental groups, public interest organizations, and other stakeholders have taken an interest in the ongoing debates.

436 V18/020703

Standardized Tooling Delivery Systems for Decommissioning of U.S. Department of Energy Nuclear Facilities

Hyde, J.M.; Marshall, R.A.; Meyer, R.D.; Subbaraman, G.

U.S. Department of Energy, Washington, DC; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 179-187) (1995)

The United States Department of Energy (DOE) complex encompasses numerous nuclear reactors and processing facilities that are being shut down, with many scheduled for near-term dismantlement. The current approach of using a site-specific remote dismantlement system for dismantling each facility would be

prohibitively expensive. This paper describes two separate, standardized, reusable, tooling delivery systems currently being developed for use at multiple DOE sites. One is designed to dismantle reactors and process systems that have overhead accessibility, and the other is designed to remotely decontaminate concrete walls. These projects have been initiated, and demonstrations of these systems are scheduled in the 1995-97 time frame. Salient features of these systems and their current project status are presented.

437 V18/025824

Surveillance and Maintenance Practices in the Office of Environmental Restoration (EM-40) U.S. Department of Energy

Lilly, M.J., III; Gans, G.M.

U.S. Department of Energy, Office of Environmental Restoration, Germantown, MD; Burns and Roe Enterprises, Inc., Oradell, NJ

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 16-21) (1996)

The Department of Energy has about 1400 surplus contaminated facilities in its infrastructure inventory which are slated for decommissioning. These facilities are now being processed by the Office of Nuclear Material and Facility Stabilization (EM-60) and the Office of Environmental Restoration (EM-40). The steps in the disposition of these facilities when they are no longer required for a DOE mission is a reasonably well-defined process. In disposing of a facility, the following steps occur, generally in the order shown: (1) an orderly and safe shutdown (This may seem to be a strange statement, but the DOE complex is full of examples of production operations that were shutdown "temporarily" with the expectation that they would be restarted. When the final decision was made to declare the facility surplus, conditions typically were not optimum for further processing. Other examples include cessation of experiments or production without adequate program funding for closeout.); (2) other potential DOE missions are explored (facility as is); (3) other Government uses are explored (facility as is); (4) if no further government use is identified, a determination is made whether deactivation and decommissioning is needed; (5) deactivation (if needed) is performed to place the facility in a safe, stable, long-term economic condition, awaiting decommissioning; (6) a period of Surveillance and Maintenance (S&M) until funds are available to perform the decommissioning; (7) decommissioning operations to achieve the established end condition; and (8) a long-term, post-decommissioning S&M. The purpose of this paper is to discuss the Surveillance and Maintenance function - what its nature is, what problems exist and what might be done to perform the S&M function more economically.

438 V18/021355

Surveillance and Maintenance Programs: How Can Headquarters Guidance and Suggestion Help Reduce Costs? [Package 11]

Warren, S.W.

U.S. Department of Energy, Washington, DC

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (9 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. This presentation explored various concerns surrounding surveillance and maintenance of nuclear facilities. The purpose and origin of the program were discussed and problems as well as possible solutions were identified.

439

V18/021008

Survey of Commercially Available Manipulators, End-Effectors, and Delivery Systems for Reactor Decommissioning Activities

Henley, D.R.; Litka, T.J.

Argonne National Laboratory, Decontamination and Decommissioning Program, Argonne, IL

ANL/D&D/TM-95/1; 61 pp. (May 1996)

The purpose of this document is to survey the commercially available equipment that could be assembled to produce such a universal dismantling system. To provide this information, Argonne National Laboratory contacted more than 70 suppliers of manipulators and cranes/gantries. Argonne categorized the suppliers and presents them in this report. In addition, Argonne provides some detailed information about each manipulator, as well as a list of standard end-effectors.

440

V18/020857

Taking Stock: A Look at the Opportunities and Challenges Posed by Inventories from the Cold War Era - Volume 1: A Report of the Materials in Inventory Initiative

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0275 (Vol. 1); 190 pp. (January 1996)

For more than 50 years, the U.S. Department of Energy and its predecessor agencies operated large production facilities and numerous laboratories that acquired and produced enormous amounts of materials, including chemicals, metals, and radioactive materials. The Department used these facilities and materials to research, design, test, and manufacture nuclear weapons as well as for basic science and nuclear engineering research and development. However, with the end of the Cold War and decisions by Presidents Bush and Clinton to reduce the size of the nuclear weapons arsenal, the need for these facilities and materials has been greatly reduced. Consequently, the Department now has a large backlog of materials and equipment that no longer have clearly defined or immediate uses. In February 1995, the Materials in Inventory (MIN) Initiative was launched to fill significant gaps in the Department's knowledge about how its materials are being managed, the systems used to guide disposition decisions, and the barriers to proper materials management and prompt disposition. Volume 1 of this report

summarizes information gathered by the materials teams and analyzes Departmentwide issues with respect to materials management. Volume 2 consists of the 10 individual team reports.

441

V18/020858

Taking Stock: A Look at the Opportunities and Challenges Posed by Inventories from the Cold War Era - Volume 2B: A Report of the Materials in Inventory Initiative - Plutonium and Other NMMSS-Tracked Team Report, Spent Nuclear Fuel Team Report, Chemicals Team Report

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0275 (Vol. 2B); 600 pp. (January 1996)

For more than 50 years, the U.S. Department of Energy and its predecessor agencies operated large production facilities and numerous laboratories that acquired and produced enormous amounts of materials, including chemicals, metals, and radioactive materials. The Department used these facilities and materials to research, design, test, and manufacture nuclear weapons as well as for basic science and nuclear engineering research and development. However, with the end of the Cold War and decisions by Presidents Bush and Clinton to reduce the size of the nuclear weapons arsenal, the need for these facilities and materials has been greatly reduced. Consequently, the Department now has a large backlog of materials and equipment that no longer have clearly defined or immediate uses. In February 1995, the Materials in Inventory (MIN) Initiative was launched to fill significant gaps in the Department's knowledge about how its materials are being managed, the systems used to guide disposition decisions, and the barriers to proper materials management and prompt disposition. Volume 1 of this report summarizes information gathered by the materials teams and analyzes Departmentwide issues with respect to materials management. Volume 2 consists of the 10 individual team reports. The individual team reports describe material-specific issues that require more specific solutions based on unique management characteristics and vulnerabilities. The Plutonium & NMMSS Team Report brings together information compiled for 37 sites with significant holdings of these materials. Approaches that can be implemented now or within the next 5 years to reduce safety risks and management costs are presented. The Spent Nuclear Fuel Report relies on a previously published comprehensive description of hazards associated with spent nuclear fuel (SNF), as well as a Programmatic Environmental Impact Statement (PEIS) that analyzes a number of interim storage alternatives which was completed in 1995. The costs associated with continued storage, treatment, and ultimate disposition of SNF are currently being developed. The Chemicals Team Report covers a unique category that includes a large cross-section of potential MIN materials. The team decided to investigate each site's chemical life-cycle management system and report on whether the systems effectively control MIN chemicals.

442

V18/020859

Taking Stock: A Look at the Opportunities and Challenges Posed by Inventories from the Cold War Era - Volume 2A: A Report of the Materials in Inventory Initiative - Sodium Team Report, Lead Team Report,

Lithium Team Report, Scrap Metal and Equipment Team Report, Weapons Components Team Report, Depleted Uranium Team Report, Natural and Enriched Uranium Team Report

U.S. Department of Energy, Office of Environmental Management, Washington, DC

DOE/EM-0275 (Vol. 2A); 600 pp. (January 1996)

For more than 50 years, the U.S. Department of Energy and its predecessor agencies operated large production facilities and numerous laboratories that acquired and produced enormous amounts of materials, including chemicals, metals, and radioactive materials. The Department used these facilities and materials to research, design, test, and manufacture nuclear weapons as well as for basic science and nuclear engineering research and development. However, with the end of the Cold War and decisions by Presidents Bush and Clinton to reduce the size of the nuclear weapons arsenal, the need for these facilities and materials has been greatly reduced. Consequently, the Department now has a large backlog of materials and equipment that no longer have clearly defined or immediate uses. In February 1995, the Materials in Inventory (MIN) Initiative was launched to fill significant gaps in the Department's knowledge about how its materials are being managed, the systems used to guide disposition decisions, and the barriers to proper materials management and prompt disposition. Volume 1 of this report summarizes information gathered by the materials teams and analyzes Departmentwide issues with respect to materials management. Volume 2 consists of the 10 individual team reports. The individual team reports describe material-specific issues that require more specific solutions based on unique management characteristics and vulnerabilities. This volume contains the following reports: Sodium Team Report, Lead Team Report, Lithium Team Report, Scrap Metal & Equipment Team Report, Weapons Components Team Report, Depleted Uranium Team Report, and, Natural & Enriched Uranium Team Report.

443 V18/022916

Task Integrated Evaluation and Sequencing (TIES): An Engineering and Planning Methodology for Deactivation and Decommissioning of Nuclear Facilities

Divona, C.J.; Marchetti, S.

Fluor Daniel, Inc., Irvine, CA

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:60-61 (1995)

Task integrated evaluation and sequencing (TIES) is a methodology developed by Fluor Daniel for the disciplined planning of complex deactivation and decommissioning (D&D) projects. TIES was developed for the deactivation and transition planning of the ROVER facility at the Idaho National Engineering Laboratory and is consistent with the U.S. Department of Energy's strategy for deactivation of surplus facilities. The TIES methodology is particularly effective during the deactivation period of facility transition where hazards are reduced, systems are isolated, and equipment is removed. The use of TIES results in the overall planning of the deactivation effort and focuses on the achievement of the desired end points. Because it is task oriented and sequenced,

TIES forms a basis for a rolling window of detailed design planning, which provides flexibility in dealing with unforeseen problems that potentially could arise during the project.

444 V18/021805

Telerobotics, Realtime Simulation Can Prevent Robot Crashes at Nuclear Facilities

Ward, C.

Westinghouse Savannah River Company, Aiken, SC

Silicon Graphics World (June 1996):28 (June 1996)

By first verifying robot movements in a virtual environment to preview operation, detect collisions and optimize task performance, engineers at the Department of Energy's (DOE) Savannah River Technology Center in Aiken, SC, have demonstrated that robots can indeed be applied as a reliable and safe replacement for humans handling hazardous materials in nuclear facilities. The Savannah River Technology Center is part of the 300 square-mile Savannah River Site, a DOE facility operated by the Westinghouse Savannah River Company. In the past, the site produced plutonium and tritium for nuclear weapons; but with the end of the Cold War, the focus of the site has shifted from production to cleanup.

445 V18/022115

Testing and Evaluation of Electrokinetic Decontamination of Concrete

DePaoli, D.W.; Harris, M.T.; Ally, M.R.

Oak Ridge National Laboratory, Chemical Technology Division, Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/ORO-2036; 133 pp. (October 1996)

The goals and objectives of the technical task plan (TTP) are (1) to describe the nature and extent of concrete contamination within the Department of Energy (DOE) complex and emerging and commercial technologies applicable to these problems; (2) to match technologies to the concrete problems and recommend up to four demonstrations; (3) to initiate recommended demonstrations; and (4) to continue investigation and evaluation of the application of electrokinetic decontamination processes to concrete. This document presents findings of experimental and theoretical studies of the electrokinetic decontamination (EK) process and their implications for field demonstrations. This effort is an extension of the work performed under TTP 142005, Electroosmotic Concrete Decontamination. The goals of this task were to determine the applicability of EK for treating contaminated concrete and, if warranted, to evaluate EK as a potential technology for demonstration.

446 V18/022387

Testing of a Portable Ultrahigh Pressure Water Decontamination System (UHPWDS)

Lovell, A.; Dahlby, J.

Los Alamos National Laboratory, Los Alamos, NM

LA-13115-MS; 30 pp. (February 1996)

This report describes tests done with a portable ultrahigh pressure water decontamination system (UHPWDS) on highly radioactively

contaminated surfaces. A small unit was purchased, modified, and used in situ, (e.g., to work on a containment box while that containment box was still connected to its normal ventilation system) to change the waste level of the contaminated box from transuranic (TRU) waste to low-level waste (LLW). Low-level waste is less costly by as much as a factor of five or more if compared with TRU waste when handling, storage, and disposal are considered. The portable unit we tested is commercially available and requires minimal utilities for operation. We describe the UHPWDS unit itself, a procedure for its use, the results of the testing we did, and conclusions including positive and negative aspects of the UHPWDS.

447

V18/021290

Trade Association to Stimulate and Support the Movement of Radioactive Scrap Metal to Products

Loiselle, V.

American Ecology Recycle Center, Oak Ridge, TN

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:51 (1995)

In September of last year (1994), the University of Tennessee and American Ecology jointly reasoned the need for assembling a number of companies who would be required to create products from radioactive scrap metal (RSM). This effort stemmed from the availability of scrap metal stockpiles and the undesirability of burying this potential resource. There had already been two attempts at procurement by the U.S. Department of Energy (DOE) of suitable substitutes for commercial products in this direction. An organization that crosses all the lines of responsibility in moving scrap metals to products does not now exist. Initially, this was thought to require scrap metals processors, the melt/cast operators, rolling mills, and fabricators. This list was subsequently expanded to include the holders of the stockpiles as stakeholders in the process as well as the "end users" of products from the contaminated metals. In organizing a comprehensive and new organization, the advancement of such products could be accomplished in a controlled environment from initial to final use.

448

V18/022914

Transportation of Contaminated Stainless Steel for Reutilization into Waste Containers

Lutz, R.N.

Westinghouse Savannah River Company, Aiken, SC

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:62-63 (1995)

The U.S. Department of Energy (DOE) Savannah River Site (SRS) began a program in late 1993 to pursue the recycling of radioactively contaminated stainless steel. The objective of the beneficial reuse demonstration is to recycle up to 200 t of contaminated stainless steel scrap into waste containers for use within the DOE complex. The metal is melted and fabricated by subcontractors at licensed commercial facilities. Product delivery

commenced July 31, 1995. The main challenges to initiation of the recycling include the accumulation, characterization, packaging, and shipment of the contaminated metal items. This paper summarizes how these issues are met.

449

V18/022339

Treatability Study Using Prompt Gamma Neutron Activation Analysis (PGNAA) Technology - Phase I: Topical Report

Congedo, T.V.; Dulloo, A.R.; Ruddy, F.H.; Weigle, D.H.; Williams, R.P.; Seidel, J.G.

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV; Westinghouse Science and Technology Center, Pittsburgh, PA

DOE/MC/30177-5047; 40 pp. (June 1995)

This report reviews the progress accomplished during Phase I of a two-phase project intended to demonstrate the use of Prompt Gamma Neutron Activation Analysis (PGNAA) as a technology for the characterization of hazardous and radioactive contaminants in concrete floors. A comprehensive experimental program was undertaken using the N-SCAN [TM] PGNA system, which was initially developed by Westinghouse for soil characterization, to determine the sensitivity of PGNA for several contaminants in concrete. The experiments were performed in a test facility specially designed and constructed for this project. N-SCAN [TM] has several important advantages over current characterization methods and technologies. Its use does not generate any secondary waste because N-SCAN [TM] is a non-invasive technique that leaves negligible residual radioactivity. It is capable of providing information on the distribution of a contaminant down to a depth of several inches in concrete. The components of N-SCAN [TM] can be readily mounted on a mobile platform, thus facilitating the deployment and operation of the system in the field. Finally, in addition to the characterization of concrete floors and soil, N-SCAN [TM] can be utilized for other characterization applications such as drum assaying and surveying of construction debris from D&D activities.

450

V18/020884

Trends in Decommissioning Costs: A Five-Year Retrospective

Carlson, J.A.

TLG Services, Inc., Bridgewater, CT

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 249-254) (1996)

The costs for decommissioning commercial nuclear power plants have shown dramatic change since the first estimates were performed in the late 1970's. Field experience, maturation of regulatory guidance, the need to store spent fuel on-site, and low level radioactive waste disposal costs have had a profound effect on recently-projected costs for decommissioning. Perhaps the most significant issues currently under discussion are those of site radiological release criteria and the decommissioning rulemaking.

Lessons learned in the decommissioning planning, engineering and implementation of decontamination and dismantling activities at the Shippingport Power Station, Rancho Seco Nuclear Generating Station, Shoreham Power Station, Fort St. Vrain, Yankee Nuclear Power Station, Pathfinder and other nuclear facilities, have shown that utility/owner involvement in estimating the costs for decommissioning is essential. Each of these projects has influenced the methodology used by TLG Services in determining the site-specific costs. The closure of regional disposal sites and the inability of states, and their regional compacts, to develop new disposal sites for radioactive waste have served to increase burial cost projections by a factor of ten within the last decade. Minimum staffing requirements for decommissioning (including the newly issued rulemaking on spent fuel safeguards) will provide baseline input to utilities for decommissioning. The limits on exposure and radioactivity left behind by the decommissioning process could have a significant effect on the cost for removal and disposal of the radioactive material. The need to store spent fuel generated over the operating life of a facility has had a significant effect on the cost of decommissioning. As a minimum, the spent fuel from the final reactor core discharge must be actively cooled for five years to meet current design criteria for dry storage, and ten years for future transfer to the DOE high-level waste repository. Estimated schedules for post-operational dry fuel storage have, in many instances, exceeded those projected for DECON decommissioning. As a result, the annual maintenance costs for this dry fuel storage activity have added significantly to the expense of license termination. Only over the past five years have utility generators begun to address the expense of extended caretaking for spent fuel, during the decommissioning process. The basis for this paper is five years worth of decommissioning cost estimates performed by TLG for its utility clients. Almost twenty billion dollars of estimates are compiled to produce the data reported here; 48 PWR studies and 17 BWR studies contribute to the analyses. Costs are reported in the constant dollars for the base year estimate, i.e., no attempt was made to equate the estimates to current dollars for comparison. Per unit average decommissioning costs for the period 1990 through 1994 have been graphically displayed for the various cost elements have been graphically displayed for the various cost elements (decontamination, removal, packaging, shipping, burial, staffing and other). Additionally, the per unit average low level waste volumes generated during decommissioning and the average burial costs have been isolated from the TLG data. These two items reveal interesting trends with regard to how the utilities have begun to reassess the disposition of low-level radioactive waste (LLRW), taking advantage of waste volume reduction and recycling techniques recently becoming available.

451 V18/021356

U.S. Department of Energy Decontamination and Decommissioning Focus Area [Package 10]

Hart, P.W.

U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

CONF-960437; Proceedings of a National Technical Information Exchange (TIE) Workshop, Santa Fe, NM, April 16-18, 1996; (29 pp.) (April 16, 1996)

These are the viewgraphs from a presentation delivered at the

Deactivation and Decommissioning Focus Area Concurrent Session at the National Technology Information Exchange (TIE) Workshop in Santa Fe, New Mexico. This presentation describes the D&D Focus Area at the Morgantown Energy Technology Center. Areas discussed include the strategy and goals, large scale demonstration technology selection and evaluation criteria, and descriptions of several of the technology projects.

452 V18/025492

United States Department of Energy, Office of Environmental Management, Uranium Enrichment Decontamination and Decommissioning Fund Financial Statements - September 30, 1996 and 1995

KPMG Peat Marwick LLP, Salt Lake City, UT

ER-FC-97-02; 32 pp. (1997)

The Energy Policy Act of 1992 (Act) established the Uranium Enrichment Decontamination and Decommissioning Fund (D&D Fund, or Fund) to pay the costs for decontamination and decommissioning three gaseous diffusion facilities located in Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio (diffusion facilities). The Act also authorized the Fund to pay remedial action costs associated with the Government's operation of the facilities and to reimburse uranium and thorium licensees for the costs of decontamination, decommissioning, reclamation, and other remedial actions which are incident to sales to the Government. The report presents the results of the independent certified public accountants' audit of the D&D Fund financial statements as of September 30, 1996. The auditors have expressed an unqualified opinion on the 1996 statement of financial position and the related statements of operations and changes in net position and cash flows. The auditors' report emphasizes a number of issues that could impact the D&D Fund's financial condition. These matters include legal proceedings that challenge the Fund's assessment process for past and future fees from utilities, the need for additional funding for future remedial action and waste disposal costs, and the ultimate disposition of stores of depleted uranium hexafluoride.

453 V18/021426

Use of Peroxy Compounds in Decontamination and Decommissioning

Ramsey, B.A.; Ramsey, R.W., Jr.; Donovan, T.K.

Consultant, Woodsboro, MD; Radiation Testing Corporation of America, Inc., Woodsboro, MD; Donovan Consulting Services, Inc., Woodsboro, MD

CONF-950877; Mixed Waste, A.A. Moghissi, B.R. Love and R.K. Blauvelt (eds.), Proceedings of the Third Biennial Symposium, Baltimore, MD, August 7-10, 1995, 545 pp.; (pp. 10.2.1-10.2.21) (1995)

The use of peroxy compounds, such as hydrogen peroxide, peroxyborate and peroxyacetic acid, in selected decontamination, outage, and waste treatment operations, offers an interesting alternative to existing agents. The attributes of using superoxidizer peroxy compounds in decontamination and decommissioning (D&D) applications, include: (1) effective agents can be selected to avoid Resource Conservation and Recovery Act characteristic or listed hazardous waste generation; (2) stable degradation products - hydroxides, borates, and water, for example - are residuals which

have no lasting physicochemical effect on steel or other materials contacted; (3) treatment solutions can be used as input to recycle or recovery unit operations for selected metals or radionuclides; (4) treatment solutions remove and flush corrosion products; (5) application decomposes many organics; (6) powerful biocidal action, attacking microorganisms in solution and on surfaces; and (7) some breakdown products of selected peroxy compounds, such as sodium borate, are corrosion inhibitors. Peroxyborate, as sodium peroxyborate, was used in the Three Mile Island Unit 2 Reactor Coolant System, the Spent Fuel Pool, in stainless steel radwaste tanks, and for disinfection of the fuel canisters filled with debris which were subsequently shipped for long-term storage. Data from this use and from subsequent use in decontamination are summarized in this paper. Recently, several peroxy compounds have been tested for biofouling control and microbially influenced corrosion (MIC) detection and treatment during nuclear power plant (BWR) outages. Benchscale experiments examining various peroxy compounds, their efficacy, and consequences to metals, solutions, waste treatments and biofouling (including MIC) controls are discussed in the paper. Currently, patent disclosures have been filed for peroxy applications in D&D as well as use of selected peroxy treatments for biofouling and MIC control. There are several additional steps which need to be undertaken in order to bring peroxy compounds into common use as a decontamination agent. These include: (1) testing efficacy for contaminant removal from concrete surfaces and other porous media; (2) determination of solubilization rates for transuranics, metals, and organics, and (3) full-scale application as a flushing agent prior to system layup or waste emplacement for MIC prevention.

454 V18/025304

Waste Management '97 - Working Towards a Cleaner Environment: Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997 (1997)

Papers in this conference were presented in 51 sessions and three workshops. Topics of interest in the sessions include: recycling, reactor and facility decontamination and decommissioning, public participation, waste stabilization and disposal, waste transportation, innovative remediation technologies, environmental restoration policies and programs, and environmental restoration site projects. Papers within the scope of this data base have been indexed separately.

455 V18/023723

Waste Reduction Information Exchange

Criste, T.

Pantex Plant, Amarillo, TX

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (4 pp.) (1996)

On August 30, 1995, the Pollution Prevention Technical Team hosted a conference to facilitate the exchange of information with

the Panhandle industrial and agricultural communities regarding recycling and reduction of waste. The Waste Reduction Information Exchange, held at the Amarillo Civic Center, was attended by approximately 200 participants. The conference provided a forum for the transfer of technology and exchange of information resources. Internet resources, such as E-Source, EPIC, EnviroSenSe and P2Info, and information ranging from small business incentive programs to partnering endeavors were provided. A variety of agencies, including the Texas Natural Resource Conservation Commission, Battelle Columbus, and Argonne National Laboratory; many speakers; and approximately 30 exhibitors provided information on waste minimization and pollution prevention.

456 V18/022831

Worker Exposures from Recycling Surface Contaminated Radioactive Scrap Metal

Kluk, A.F.; Phillips, J.W.; Culp, J.P.

U.S. Department of Energy, Germantown, MD; Analytical Services, Inc., Columbia, MD

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1936-1943) (1996)

Current DOE policy permits release from DOE control of real property with residual levels of surficial radioactive contamination if the contamination is below approved guidelines. If the material contains contamination that is evenly distributed throughout its volume (referred to as volumetric contamination), then Departmental approval for release must be obtained in advance. Several DOE sites presently recycle surface contaminated metal, although the quantities are small relative to the quantities of metal processed by typical mini-mills, hence the potential radiation exposures to mill workers from processing metal are at present also a very small fraction of their potential value. The exposures calculated in this analysis are based on 100% of the scrap metal being processed at the maximum contamination levels and are therefore assumed to be maximum values and not likely to occur in actual practice. This paper examines the relationship between the surface contamination limits established under DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and radiation exposures to workers involved in the scrap metal recycling process. The analysis is limited to surficial contamination at or below the guideline levels established in DOE Order 5400.5 at the time of release. The dose and cancer risk conversion factors and the pathway scenarios used in performing the assessments in this paper are the same as those developed by the U.S. Environmental Protection Agency (EPA).

NUCLEAR FACILITIES DECOMMISSIONING

457

V18/023693

Accelerated Decommissioning with Limited Funding

Cloutier, W.A., Jr.

TLG Services, Inc., Bridgewater, CT

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (10 pp.) (1996)

These viewgraphs outline the decommissioning experience with the Rancho Seco Nuclear Generating Station. Information relating to the following headings was presented: Plant description; Operating history; Cessation of plant operations; Safe-storage; Preparations; Original scenario; Cost escalation; Re-evaluation of liability; Cost reduction considerations; Waste conditioning prerequisites; Waste processing assumptions; Cost impact; Program modifications; Optimum scenario; Conclusions and recommendations; Current and proposed activities; Future trends; Considerations

458

V18/023932

Impact of Dry Spent Fuel Storage on Decommissioning

Bowser, R.C.; Taylor, M., Jr.; Miller, K.R.

Pacific Nuclear, San Jose, CA; Sacramento Municipal Utility District, Rancho Seco Nuclear Generating Station, Herald, CA

Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (21 pp.) (1993)

Several utilities have made decisions to decommission nuclear plants. Other utilities are currently investigating the economic and technical feasibility of decommissioning versus continued operations. As a result, assessments are being made to determine the impact of dry spent fuel storage on decommissioning. This assessment is being made on a comparison basis of wet versus dry storage (including modifications to current wet storage systems). Not only are the capital and operating costs of the equipment or modifications being evaluated, but staffing levels, interference with other decommissioning activities, and the ability to eventually transfer the fuel to DOE all factor into the assessments. In the case of the Rancho Seco Nuclear Generating Station, the Sacramento Municipal Utility District (SMUD) developed three objectives related to spent fuel disposition to support the safe and economical closure of the plant. These objectives are: (1) minimize occupational and public radiation exposure, (2) minimize decommissioning costs, including the need to maintain the spent fuel pool, and (3) prepare the fuel for Department of Energy (DOE) acceptance. These rather universal goals are being met for Rancho Seco through the use of canister-based spent fuel storage and transportation system, the NUHOMS [R] system. This paper will discuss the economic and technical impacts of dry spent fuel storage on decommissioning, more specifically as it relates to the decommissioning of the Rancho Seco plant.

459

V18/023698

Interim Onsite Spent Fuel Storage

Shetler, J.R.

Sacramento Municipal Utility District, Sacramento, CA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (7 pp.) (1996)

Utilities with both operating and decommissioning plants are currently investigating the economic and technical feasibility of spent nuclear fuel storage and disposition. As a result, assessments are being made to determine the impact of on-site dry spent fuel storage. Not only are the capital and operating costs of the equipment or modifications being evaluated, but staffing levels, project management, the regulatory/licensing process, technical issues, the vendor/fabrication process, offsite considerations, interference with other plant activities, and the ability to eventually transfer the fuel to the Department of Energy (DOE) all factor into the assessments. In the case of the Rancho Seco Nuclear Generating Station, a decommissioning plant, the Sacramento Municipal Utility District (SMUD) developed three objectives related to spent fuel disposition to support the safe and economical closure of the plant. These objectives are to: (1) minimize occupational and public radiation exposure; (2) minimize spent fuel storage costs, including the need to maintain the spent fuel pool, and (3) prepare the fuel for ultimate DOE acceptance with minimal future on-site handling. These universal goals are being met for Rancho Seco through the development and use of a canister-based spent fuel transportable storage system (system).

460

V18/023359

"What Goes Up Must Come Down" Not True for Decommissioning Costs

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:444a (1996)

Decommissioning cost estimates are continuously changing as the industry learns more about how to decommission facilities. The Fort St. Vrain cost estimate was performed by their in-house staff. It was validated by obtaining fixed-price bids for the decommissioning project. The decommissioning project at Fort St. Vrain will be completed on budget. Since actual commercial decommissioning experience according to U.S. Nuclear Regulatory Commission (NRC) regulations is lacking in the industry today, with few exceptions, commercial cost estimates are somewhat suspect. Fort St. Vrain obtained fixed-price bids for a fixed scope. The inevitable unknowns were covered by including a scope change clause and a contingency in the cost estimate. As such, the cost did increase but the estimate contingency was sufficient to cover the unexpected conditions found in the plant.

461

V18/022833

Characterization of Radioactive Aerosols Generated During the Demolition of the Concrete Bioshield of a Reactor Undergoing Decommissioning

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CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1952-1955) (1996)

Particle size distribution studies were performed on aerosols generated during the cutting of the core support floor of the Ft. St. Vrain reactor which is undergoing decommissioning. The activity median aerodynamic diameter (AMAD) for Co-60 in the aerosol was found to be considerably larger than the currently used 1-micron default value and in one case larger than the newly recommended 5-micron reference value for occupational exposure. The reverse was true for Cs-137 where the AMAD was found to be in the sub-micron range possibly caused by high solubility of the radiocesium into the water spray used in the cutting operation.

462 V18/021166

Cost of Delay - Decommissioning Options for Fort St. Vrain

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Transco Products, Chicago, IL

Nuclear Engineering International 41(500):20-21 (March 1996)

The Fort St. Vrain High Temperature Gas-Cooled Reactor shut down in August 1989 due to technical and economic factors. In the USA, reactor licensees can propose decommissioning by one of three methods. However, one of these, entombment, is not considered practical either by the regulator or the utilities. The remaining two options, Decon and Safestore, are technically very similar and share the uncertainties associated with future residual radioactivity regulations, limited waste disposal options and disposal costs projections. In making the decision, while trying to minimize these uncertainties a balance was sought between cost, timescale, and as low as reasonably achievable dose and risk. Decon has the advantage of earlier completion - 1995 as opposed to 2050 - and the superficial economic advantages of Safestore are less convincing on detailed examination. Such considerations have swayed the choice in favour of Decon.

463 V18/020615

Decommissioning Progress at Fort St. Vrain

Likar, V.F.

Westinghouse Electric Corporation, Platteville, CO; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 1-15) (1995)

The Fort St. Vrain Nuclear Generating Station in Colorado in the

United States is well along in decommissioning for release of the site from its Nuclear Regulatory Commission license. This decommissioning is being performed under a fixed price contract between the owner, Public Service Company of Colorado, and a team of Westinghouse and Morrison-Knudsen. This paper will discuss the innovative decommissioning technique of filling the gas cooled reactor with water for shielding and contamination control and the other practical and readily available technologies used. This decommissioning is demonstrating that a full size commercial nuclear reactor can be successfully decommissioned with a reasonable schedule, cost, and radiation dose to the work force.

464 V18/021482

Decommissioning of Fort St. Vrain

Likar, V.F.

Westinghouse Electric Corporation, Platteville, CO

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 81-88) (1996)

The Fort St. Vrain Nuclear Generating Station Decommissioning is rapidly reaching completion. This paper discusses the methods and techniques applied that made the project a technical, scheduling, and safety success and that demonstrates the practicality of commercial nuclear reactor decommissioning.

465 V18/021477

Decommissioning of Fort St. Vrain Nuclear Generating Station

Schmalz, G.D.

Public Service Company of Colorado, Denver, CO

INIS-mf-14809; CONF-931011; INC93: Towards a Better Culture, Proceedings of the 33rd Annual Conference of the Canadian Nuclear Association and the 14th Annual Conference of the Canadian Nuclear Society, Toronto, Canada, October 3-7, 1993, 1500 pp.; (7 pp.) (November 1993)

In the U.S.A., a licensee can propose decontaminating a nuclear power plant using any of three methods: DECON, SAFSTOR, or ENTOMB. For the Fort St. Vrain reactor, DECON was chosen. According to this option, portions of the facility, containing radioactive contaminants, are dismantled and removed, or else decontaminated, soon after the cessation of power. The work to be done is of three kinds: decontamination and dismantlement of the pre-stressed concrete reactor vessel; decontamination or dismantling of actually or potentially contaminated balance of plant; and site cleanup and final site radiation survey. Each of these elements of the work is discussed.

466 V18/023358

Decontamination and Decommissioning of Small-Bore Pipe

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:470-471 (1996)

The ability to aggressively decontaminate to U.S. Nuclear Regulatory Commission (NRC) free-release limits, verify the effectiveness, and prove releasability of contaminated piping systems are tasks that became a major concern for Westinghouse during the Fort St. Vrain (FSV) decommissioning project. The problem is especially acute for small-bore piping systems [2.5 cm to 7.6 cm (1 in. to 3 in.) diameter] with multiple elbows. Westinghouse, and its wholly owned subsidiary, Scientific Ecology Group, being one of the two primary contractors for decommissioning the FSV nuclear generating station [330-MW(electric) high-temperature gas-cooled reactor, operated from 1979 to 1989], encountered this problem and developed equipment and methodologies to successfully decontaminate, survey, and decommission this piping.

467

V18/022815

Decontamination and Its Role in the Fort St. Vrain Decommissioning

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Scientific Ecology Group - Colorado, Inc., Golden, CO
CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1815-1820) (1996)

The full scale decommissioning of a reactor requires the use of a variety of decontamination processes, techniques and equipment. In August of 1992, the decommissioning of the Fort St. Vrain High Temperature Gas-Cooled Reactor (HTGR) was initiated by Public Service Company of Colorado. The Fort St. Vrain Decommissioning Project is being performed by a team comprised of Westinghouse Electric Corporation, Scientific Ecology Group, and MK Ferguson. This project is the largest decommissioning and early dismantlement of a commercially operated reactor in the United States to date. The scope of the project includes decontamination and dismantlement of the Prestressed Concrete Reactor Vessel (PCRV) and decontamination/removal of contaminated plant systems, site cleanup, and a comprehensive final radiation survey, with the ultimate objective being the release of the site for unrestricted use. This paper discusses the various types of decontamination equipment, survey instrumentation and techniques used during the Fort St. Vrain Decommissioning Project. Decontamination techniques range from simple methods such as soapy water, high pressure washing, scabbling, and strippable paint to more complicated methods such as remotely operated grit blast equipment used to decontaminate embedded pipe. The parameters necessary to evaluate the cost effectiveness of various decontamination techniques are discussed. Typically this includes

consideration of the type and level of contamination, the substrate and surface to be decontaminated, the type and volume of waste generated from the decontamination process, whether the decon will be performed on site or off site, equipment and labor costs, project schedule impact, and the unconditional release criteria that must be achieved. These factors and costs are then compared to the costs as associated with the removal, possible volume reduction and final disposal of a particular component or system. The successes and lessons learned during the Fort St. Vrain Decommissioning Project are presented. Many of these techniques and lessons learned can be applied to future decommissioning projects.

468

V18/021251

Final Survey and Site Release Plan for the Fort St. Vrain Nuclear Generating Station

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Public Service Company of Colorado, Platteville, CO; Public Service Company of Colorado, Denver, CO

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 219-221) (1994)

The Fort Saint Vrain Nuclear Engineering Station is one of the first commercial reactors to undertake decommissioning with the objective of obtaining a "release for unrestricted use." The Fort St. Vrain decommissioning is well underway and has a projected completion date of June, 1996. This paper provides a synopsis of the history and current status of the strategy, plans and efforts associated with the unrestricted release of the site.

469

V18/020895

Fort St. Vrain Decommissioning

Fisher, M.J.; Chesnutt, S.W.

Public Service Company of Colorado, Denver, CO; Public Service Company of Colorado, Platteville, CO

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 23-29) (1996)

Nuclear plant decommissioning represents a significant expenditure of time and resources for nuclear utilities. This paper discusses Public Service Company of Colorado's (PSCo) experiences in decommissioning the Fort St. Vrain Nuclear Station, the first long-term operational commercial nuclear plant to be decommissioned under the NRC's Decommissioning Rule. After the premature closure of the plant in August 1989, PSCo reviewed the decommissioning options and selected early plant dismantlement (DECON) over placing the plant in a 60 year storage period (SAFSTOR). PSCo retained a decommissioning contractor using a fixed price contract; physical plant removal activities are currently over 90 percent complete and the final radiological survey is well underway. PSCo is installing a combustion turbine as the first phase

of a project to repower the facility with natural gas for future electric generation.

470 V18/023357

Fort St. Vrain Decommissioning Experience

Fisher, M.J.; Holmes, M.H.; Chesnutt, S.W.

Public Service Company of Colorado, Denver, CO; Colorado Public Service Company, Platteville, CO

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:449a (1996)

Nuclear plant decommissioning represents a significant expenditure of time and resources for nuclear utilities. Public Service Company of Colorado (PSC) is in the process of completing the decommissioning of the Fort St. Vrain (FSV) Nuclear Station, the first large-scale commercial nuclear plant to be decommissioned under the U.S. Nuclear Regulatory Commission's (NRC's) 1988 decommissioning rule. PSC's experience has included dispositioning spent fuel, choosing a decommissioning alternative, and actively decommissioning the plant from dismantlement and decontamination through final survey. When the plant was prematurely shut down in August 1989, PSC's initial task was to find a storage location for FSV's spent fuel. PSC had a contract with the U.S. Department of Energy (DOE) to ship FSV spent fuel to the Idaho National Engineering Laboratory (INEL), and all previously removed spent fuel had been shipped there. However, Idaho legally blocked further FSV spent-fuel shipments to INEL, and PSC decided to license and build an on-site, passively cooled independent spent-fuel storage installation (ISFSI). By June 1992, all FSV spent fuel was transferred from the reactor building to the ISFSI. PSC has been able to use low-level radioactive waste (LLRW) disposal facilities in the Northwest Compact, and disposal costs are within estimates. Industrial and radiological safety have been emphasized throughout the project, and performance in these areas has been outstanding. PSC has obtained NRC approval of a final survey plan that allows for many of the plant's components and systems to remain in place, and final survey activities are nearing completion. PSC is in the process of repowering the facility with natural gas-fired combustion turbines and heat recovery boilers. The first combustion turbine was placed in service April 30, 1996.

471 V18/023937

Licensing Experience for Decommissioning Fort St. Vrain

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Westinghouse Electric Corporation, Platteville, CO

Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (14 pp.) (1993)

The Fort St. Vrain Reactor is located about 35 miles north of Denver, Colorado. The utility decided in 1989 to prematurely shut

down the reactor, and this discussion will cover the experience gained in obtaining a license for decommissioning the reactor and the status of actual decommissioning activities at the site.

472 V18/021486

Dresden Unit 1 Decommissioning Activities

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ComEd, Dresden Nuclear Power Station, Morris, IL

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 127-130) (1996)

Since shutting down in 1978, Dresden Unit 1 has been preparing to be in SAFSTOR dormancy. This paper summarizes the rationale behind choosing the dormancy approach for Dresden Unit 1 and describes specific activities which have been completed and are planned to achieve SAFSTOR dormancy. Activities include interim spent nuclear fuel storage, maintaining active systems, laying up inactive systems, maintaining structural integrity, and limited dismantlement. Also discussed are lessons learned from the project. Finally, the resources required to achieve SAFSTOR dormancy are presented in terms of staffing the organization.

473 V18/023700

Dresden Unit 1: Decommissioning and Configuration Management on an Operating Site

Nauman, T.L.

Commonwealth Edison Company, Chicago, IL

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (15 pp.) (1996)

This series of viewgraphs presents the experiences incurred during the decommissioning of the Dresden Unit 1. Historical perspective is presented along with a description of the 1994 freeze event and lessons learned.

474 V18/025846

Benchmarking Decommissioning Costs at Yankee Nuclear Power Station

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Yankee Atomic Electric Company, Bolton, MA

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 214-220) (1996)

The preparation of decommissioning cost estimates for nuclear power generating stations has received a great deal of interest in the

last few years. Due to the limited number of operating units and relative youth of the nuclear power decommissioning industry, actual cost data relating to the decontamination and dismantlement of nuclear power facilities in the current regulatory environment is limited. The data which does exist has been derived from a variety of other projects and sources, and for the most part, does not provide a one-for-one basis for comparison. The decommissioning of the Yankee Nuclear Power Station (YNPS) represents the first large scale project involving the complete decontamination and dismantlement of a commercial light water, high capacity, nuclear power generation facility in the United States. The actual costs and resources required to decommission YNPS, when compared with decommissioning estimates, will yield valuable benchmarking data. This paper evaluates and compares actual YNPS decommissioning data with planning and estimating data. Since YNPS decommissioning is only partially complete, a comprehensive review of all decommissioning categories cannot yet be presented. The analysis focuses on craft labor resource requirements for the removal of plant system components and a perspective on system removal costs in relation to the overall YNPS decommissioning cost estimate.

475 V18/023383

Decommissioning of the Yankee Reactor Internals

Child, C.L.

Yankee Atomic Electric Company, Bolton, MA; Electric Power Research Institute, Palo Alto, CA; Paul Williams and Associates, Medina, OH

EPRI-TR-106929; CONF-960783; Proceedings of the 1996 Electric Power Research Institute (EPRI) International Low Level Waste Conference, New Orleans, LA, July 22-24, 1996, 715 pp.; (pp. 451-463) (October 1996)

The Yankee Nuclear Power Station (YNPS) first achieved criticality on August 19, 1960. Located in Rowe, Massachusetts, Yankee was the third commercial power plant licensed in the United States. The Nuclear Steam Supply System is a four loop Pressurized Water Reactor (PWR) designed by Westinghouse Electric Corporation. Since it began commercial operation, Yankee continually ranked among the best commercial nuclear plants in the world and has been praised for its pioneering efforts, highly trained and skilled staff, innovative approaches to technical issues, and operational safety culture. During its lifetime, this 185 MWe plant had a capacity factor of 74 percent - over ten points higher than the United States nuclear industry average at that time. On February 26, 1992, faced with escalating costs and a general decline in power demands in the Northeast, the Yankee Atomic Electric Company announced the permanent shut down of Yankee Rowe. Even after shutdown, the Yankee tradition of pioneering and innovation has continued. Prompted by South Carolina's decision to extend access to the Barnwell, South Carolina, waste management facility through June 1994 to out-of-compact states, Yankee initiated an innovative program to remove reactor internals, steam generators, and the pressurizer. Yankee realized that removal of these components could be completed safely using existing programs and procedures. The project would save the ratepayers several millions of dollars compared to deferring removal until after the year 2000. Yankee management approved execution of the Component Removal Program in March, 1993.

476

V18/025834

Decontamination of Large Components: Test Case

Mancini, A.; Applebaum, R.

Yankee Atomic Electric Company, Bolton, MA; Frank W. Hake Associates, Memphis, TN

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 139-143) (1996)

The rising radioactive waste burial costs together with the trend toward standardized above ground burial sites provided the basis for seeking an alternative to direct burial of large components. Large contaminated components such as steam generators can be safely dismantled and decontaminated for free release, metal recycle, and volume reduction. This grand scale disposal technology will prove to be an economical and ecological alternative to direct burial or interim storage. Yankee Atomic Electric Company (YAEC) has teamed with Frank W. Hake Associates (Hake) to decontaminate YAEC's reactor pressure vessel head (RPVH) as a test case. The results of the RPVH YAEC test case has initiated the data base for the decontamination of large components. Disposal of the head, without return of any material to Yankee, was achieved at about 56% of the direct burial cost. The knowledge and experience gained will be used to narrow the application variables for other large components, effectively optimizing the economic benefits and ALARA goals.

477

V18/023703

Disposition of a Reactor Vessel Closure Head

Applebaum, R.

Frank W. Hake Associates, Memphis, TN

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (4 pp.) (1996)

The rising burial costs for radioactive materials together with the trend toward standardized above-ground burial sites provide the basis for seeking an alternative to direct burial of large components. Large contaminated components such as steam generators can be safely dismantled and decontaminated for free release, metals recycle and volume reduction. This grand scale disposal technology will prove to be an economical and ecological alternative to direct burial or interim storage. As a demonstration of the technology the reactor pressure vessel head from Yankee Rowe decommissioning has been processed for disposal.

478

V18/025829

Main Coolant System Decontamination at the Yankee Nuclear Power Station

Metcalfe, E.T.

Yankee Atomic Electric Company, Bolton, MA

CONF-961103; Decommissioning, Decontamination, and

Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 102-107) (1996)

The Yankee Nuclear Power Station (YNPS) located in Rowe, Massachusetts, is a 4-loop PWR that permanently ceased power operation on February 26, 1992. Throughout its operation, YNPS had maintained an exemplary record for performance and safety. Yankee continues to apply the same standards of excellence during the decommissioning of YNPS. Decommissioning has been in progress since 1992 and has included activities such as steam generator removal, reactor internals removal, and system dismantlement. One of the most significant challenges for Yankee in 1966, was performing a chemical decontamination of the Main Coolant System. This paper describes the objectives, challenges, and outcomes involved in planning and implementing the chemical decontamination.

479 V18/021276

Removal and Segmentation of the Yankee Rowe Reactor Vessel Internals

Child, C.L.; McGough, M.S.; Smith, G.

Yankee Atomic Electric Company, Rowe, MA; Power Cutting, Inc., Lake Bluff, IL

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:25 (1995)

A major element of the decommissioning effort of the Yankee Nuclear Power Station was the segmentation and packaging of the reactor internals. PCI Energy Services, specializing in remote cutting, machining, and welding, performed this work under contract to Yankee Atomic Electric Company. The chief means of segmenting the internals was plasma arc cutting, although metal disintegration machining was used for the underwater thermal shield removal. Plasma arc cutting is a proven technology, efficient and reliable for thick materials. Segmentation activities began in September 1993 and were completed in June 1994.

480 V18/022033

Removal of the Steam Generators and Pressurizer at the Yankee Nuclear Power Station

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Yankee Atomic Electric Company, Rowe, MA

CONF-950414 (Vol. 57-II); Life Assessment Technology for Fossil Power Plants, R. Viswanathan and R.W. Porter (eds.), Proceedings of the 57th Annual American Power Conference, Chicago, IL, April 18-20, 1995. Illinois Institute of Technology, Chicago, IL, Vol. 57-II, 914 pp.; (pp. 1281-1286) (1995)

Yankee Nuclear Power Station operated successfully for nearly 32 years. Located in Rowe, Massachusetts near the Sherman Reservoir Dam, it was powered by a 4 loop pressurized water reactor. Yankee Rowe, as it is often referred to, is owned by Yankee Atomic Electric Company. The decision to close Yankee Rowe came at a time when

license renewal planning was in progress. Yankee Atomic did not have a Decommissioning Plan filed with the Nuclear Regulatory Commission (NRC) nor did it have a decommissioning planning staff. Shortly after the permanent shutdown, Yankee began a systematic evaluation of major plant components which could be disposed of in the near term, rather than wait for full scale decommissioning to begin. The decision was made to dispose of the steam generators and pressurizer in 1993. Engineering for the Component Removal Project (CRP) began in March 1993. The four steam generators and pressurizer were removed and shipped intact. The steam generators were hauled by truck to a rail line six miles from the plant, and then by rail to Barnwell, where they were again transported overland to the disposal site. On December 8, 1993, the last of these components left Yankee Rowe. This paper presents a case study of the removal and disposal process and provides some lessons learned.

481

V18/021483

Removal of the Yankee Pressure Vessel: Diary of a Work in Progress

Child, C.L.

Yankee Atomic Electric Company, Bolton, MA

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 95-100) (1996)

On February 26, 1992, The Yankee Atomic Electric Company (YAEC) announced the permanent shut down of the Yankee Nuclear Power Station (YNPS). As part of decommissioning and since early 1995, Yankee has embarked on a program to remove, transport and dispose of the reactor pressure vessel. This paper is a report of the progress to date, and future activities. Actual removal of the reactor pressure vessel will proceed in the reverse order in which it was installed. The upper neutron shield tank will be removed down to the reactor support ring, exposing both the reactor coolant piping and the upper insulation about the reactor pressure vessel and piping. The insulation, which contains asbestos, will be removed as will the reactor coolant piping between the reactor pressure vessel nozzles and the Reactor Support Structure interior wall. The reactor pressure vessel will be lifted from the bottom of the shield tank cavity and placed within a cask which has been oriented below the vapor container equipment hatch. Once in the cask, concrete will be placed both within the reactor pressure vessel and between the reactor pressure vessel and the cask to fix any loose contamination, and to provide additional shielding. Following curing of the concrete, the cask will be lowered to a horizontal position and prepared for transport and disposal. The reactor pressure vessel cask package will be transported overland to the nearest rail line, and will proceed by rail to a disposal site. Reactor pressure vessel lift and transport, originally scheduled for the Spring of 1996, will be delayed until the Nuclear Regulatory Commission reapproves the YNPS Decommissioning Plan.

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V18/022068

Search for the Average Person: Implications for Site Cleanup

Cumming, E.R.; Littlefield, P.S.; Bellini, F.X.

Yankee Atomic Electric Company, Bolton, MA

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 456-460) (1994)

The Yankee Nuclear Power Station is located in Rowe, Massachusetts on a 2000 acre site. Approximately 10 acres of the site are developed for plant use. Commercial power operation at the 185 MWe plant began in 1961. In February 1992, the decision was made to permanently cease power operations. Decommissioning activities were initiated immediately and are continuing today. Initial dose assessments have been completed in order to determine the potential extent of the cleanup effort. This paper discusses the steps taken to date in determining the impact of proposed site release criteria on remediation programs. It also examines the sensitivity of the dose results to the domain of the "average person in the critical population group."

483

V18/022034

Segmentation of the Reactor Internals at the Yankee Nuclear Power Station

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CONF-950414 (Vol. 57-II); Life Assessment Technology for Fossil Power Plants, R. Viswanathan and R.W. Porter (eds.), Proceedings of the 57th Annual American Power Conference, Chicago, IL, April 18-20, 1995. Illinois Institute of Technology, Chicago, IL, Vol. 57-II, 914 pp.; (pp. 1287-1292) (1995)

The Yankee Nuclear Power Station (YNPS) first achieved criticality on August 19, 1960. Located in Rowe, Massachusetts, Yankee was the third commercial power plant licensed in the United States. The Nuclear Steam Supply System is a four loop Pressurized Water Reactor (PWR) designed by Westinghouse Electric Corporation. Since it began commercial operation, Yankee continually ranked among the best commercial nuclear plants in the world and has been praised for its pioneering efforts, highly trained and skilled staff, innovative approaches to technical issues, and operational safety culture. On February 26, 1992, faced with escalating costs and a general decline in power demands in the Northeast, the Yankee Atomic Electric Company announced the permanent shut down of Yankee Rowe. Prompted by South Carolina's decision to extend access to the Barnwell, south Carolina, waste management facility through June 1994 to out-of-compact states, Yankee initiated an innovative program to remove reactor internals, steam generators, and the pressurizer. Yankee realized that removal of these components could be completed safely using existing programs and procedures. The project would save the ratepayers several millions of dollars compared to deferring removal until after the year 2000. Yankee management approved execution of the Component

Removal Program in March, 1993. This paper presents a case study of the removal and disposal process and provides some lessons learned.

484

V18/023692

Wet and Dry Spent Fuel Management Scenarios at the Yankee Nuclear Power Station

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CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (12 pp.) (1996)

Since the permanent cessation of power production at the Yankee Nuclear Power Station in Rowe, Massachusetts, the primary objective of the Yankee Atomic Electric Company has been the safe, economical, and timely decommissioning of the facility and return of the site to unrestricted use. Although removal and disposal of spent nuclear fuel are not considered to be decommissioning under the NRC regulations, nevertheless, its removal from the site must be accomplished prior to license termination for the facility. The current options available to Yankee for storage of the spent fuel prior to removal are storage in the existing Spent Fuel Pool or storage in a dry storage facility that would be constructed on-site. off-site storage at a dry storage facility is essentially an off-shoot of the on-site dry storage option. This paper provides a brief overview of the status of the YNPS decommissioning, a description of the current wet spent fuel storage method, and a review of the factors which will influence Yankee's ultimate decision on the method for spent fuel storage. The four primary factors are low level radioactive waste site availability, the impact of the chosen option on decommissioning the balance of the site, the impact of the timing of fuel acceptance by the Department of Energy (DOE), and relative economics of dry versus wet storage. Yankee is currently postured to store the fuel using either of the two methods. The status of the wet and dry storage options for Yankee is outlined. Yankee is in the process of integrating these factors into a decision analysis model. The model is briefly defined.

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V18/023935

YNPS Decommissioning Activities Prior to Decommissioning Plan Approval

Heider, K.; Sheldon, P.

Yankee Atomic Electric Company, Bolton, MA

Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (10 pp.) (1993)

This paper presents an overview of the decommissioning experience, as of October 1993, at the Yankee Nuclear Power Station (YNPS), located in Rowe, Massachusetts. Particular emphasis is placed on current component removal activities. Decommissioning regulations and recent regulatory developments are examined relative to their impact on current and future decommissioning projects. This paper concludes that many decommissioning activities can be conducted safely and economically through the effective implementation of the same

operational programs and procedures used during plant operations.

486 V18/023361

Yankee Nuclear Power Station: Analysis of Decommissioning Costs

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:444b-445 (1996)

The preparation of decommissioning cost estimates for nuclear power generating stations has received a great deal of interest in the last few years. Owners are required by regulation to ensure that adequate funds are collected for the timely decommissioning of their facilities. The unexpected premature shutdown of several facilities and uncertainties associated with radioactive waste disposal and long-term spent-fuel storage, when viewed in the light of a deregulated electric utility industry, has caused many companies to reevaluate their decommissioning cost estimates. The decommissioning of the Yankee Nuclear Power Station represents the first large-scale project involving the complete decontamination and dismantlement of a commercial light water nuclear power generation facility in the United States. Since this pressurized water reactor operated for 32 years at a respectable 74% lifetime capacity factor, the actual costs and resources required to decommission the plant, when compared with decommissioning estimates, will yield valuable benchmarking data.

487 V18/023696

Early Shutdown Decommissioning Activities and Planning: Perils and Pitfalls

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Consumers Power Company, Charlevoix, MI

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (6 pp.) (1996)

This series of viewgraphs provides an outline of the decommissioning activities that occurred at Big Rock Point Nuclear Plant in Charlevoix County, Michigan. The following areas were covered: Decommissioning plan; MPSC Decommissioning order; Communications plan; Human resources end of license plan; Spent fuel interim storage challenges; and, premature shutdown jitters.

488 V18/021257

New Radiological Criteria for Decommissioning: Importance of Transuranic Nuclides

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CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated

Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 253-257) (1994)

Scaling factor data have been collected over the years at Big Rock Point Nuclear Plant for radioactive waste classification under 10 CFR Part 61.55(a)(8). The proposed revision to 10 CFR Part 20, on radiological criteria for decommissioning, calls for a total effective dose equivalent of 15 mrem/yr, with residual radioactivity As Low As Reasonably Achievable (ALARA). With a view toward future decommissioning, a review of Plant data was performed to determine if it could accurately estimate levels of transuranic nuclides in residual contamination. Scaling factor variability due to variations in plant operations, using the common gamma emitters against which the transuranics are scaled (Co-60, Cs-137, or Ce-144), raises questions of applicability to decommissioning dose analyses. In contrast, transuranic nuclides show low variability when scaled against Am-241, based on Big Rock Point Nuclear Plant data. To determine the feasibility of Am-241 detection levels, capabilities were determined for both field (in situ) and laboratory gamma spectral analyzers. Detection of AM-241 was verified using plant samples.

489 V18/023369

Decontamination of Nuclear Systems at the Grand Gulf Nuclear Station

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CONF-960730 (Vol. 3); Technologies Critical to a Changing World, Volume III: Emerging Energy Technologies, Clean Technologies, Remediation and Emission Control Fuels, and Petrochemicals, Proceedings of the Fifth World Congress of Chemical Engineering, San Diego, CA, July 14-18, 1996. American Institute of Chemical Engineers, New York, NY, Vol. 3, 1118 pp.; (pp. 89-92) (1996)

Early in 1994 Management at the Grand Gulf Nuclear Station realized that a potential decontamination of several reactor systems was needed to maintain the commitments to the "As Low As Reasonably Achievable" (ALARA) program. There was a substantial amount of planned outage work required to repair and replace some internals in loop isolation valves and there were inspections and other outage work that needed to be accomplished as it had been postponed from previous outages because of the radiation exposure levels in and around the system equipment. Management scheduled for the procurement specification to be revised to incorporate additional boundary areas which had not been previously considered. The schedule included the periods for gathering bids, awarding a contract, and reviewing the contractor's procedures and reports and granting approval for the decontamination to proceed during the upcoming outage. In addition to the reviews required by the engineering group for overall control of the process, the plant system engineers had to prepare procedures at the system level to provide for smooth operation during the decontamination of the systems. The system engineers were required to make certain that the decontamination fluids would be contained within the systems being decontaminated and that they would not cross contaminate any other system not being decontaminated. Since these nuclear stations do not have provisions for decontaminating these systems

with using additional equipment, the equipment required is furnished by the contractor as skid mounted packaged units which can be moved into the area, set up near the system being decontaminated, and, after the decontamination is completed, the skid mounted packages are removed as part of the contract.

490 V18/022513

Test Plan for Development and Demonstration of Hot Gas Decontamination for Explosives at Hawthorne Army Ammunition Plant

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Tennessee Valley Authority, Muscle Shoals, AL

SFIM-AEC-TS-CR-94027; 356 pp. (May 1994)

Hawthorne Army Ammunition Plant (HWAAP) covers some 246,000 acres of land situated in Mineral County approximately 135 miles southeast of Reno, Nevada, along U.S. Route 95. The WADF conducts a process of reverse assembly of the munitions followed by steam, autoclave, mechanical, or washout removal of explosive charges. Small metal parts are decontaminated by furnace flashing. Large items could be decontaminated in Building 11 7-1 5. This flashing chamber was originally designed and constructed to provide for flashing large items. The parts are then released as scrap metal. An enclosed flashing chamber was constructed at WADF for the purpose of decontaminating items by flashing them with surplus propellant powder.

491 V18/021274

DD&R Experience and Processes Update - Lessons Learned in Schedule Management of Large D&D Projects

Stouky, R.J.

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:25-26 (1995)

The Long Island Power Authority recently completed decommissioning and decontamination of the Shoreham nuclear power station. Shoreham is the first large-scale commercial nuclear power station to be decommissioned in the United States. The Shoreham project is, therefore, a prototype and can provide insight into how future nuclear plant decommissioning projects should be approached. The "lessons learned" are from experience at Shoreham.

492 V18/023695

Quantification of Shoreham Unit Costs

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CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (7 pp.) (1996)

The Shoreham Decommissioning Project utilized a conventional decommissioning cost estimate based on the guidelines of Atomic Industrial Forum (AIF)/National Environmental Studies Projects'

(NESP) report, Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates (AIF/NESP-036), Pacific Northwest Laboratories' report, Technology, Safety and Cost of Decommissioning a Reference Boiling Water Reactor Power Station (NUREG/CR-0672) and Nuclear Regulatory Commission (NRC) Guide 1.159, Assuring the Availability of Funds for Decommissioning Nuclear Reactors (Task DG-1003). The estimate was submitted as part of the Shoreham Decommissioning Plan (D Plan) in 1990. The NRC approved the Decommissioning Plan, including the estimate, in 1992. The total actual cost for the Shoreham Decommissioning was over seven million dollars less than that projected by the estimate. In other words, the amount predicted by the estimate was sufficient to complete the decommissioning.

493 V18/021485

Shoreham Decommissioning and License Termination: A Success Story

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CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 101-106) (1996)

Shoreham was the first large, NRC-licensed, commercial nuclear power plant to achieve the final goal of license termination. The pioneering nature of the project made the Shoreham experience unique and challenging in many ways. The lack of previous experience with the new decommissioning rule, gaps and ambiguities in the regulations and the absence of well-established procedures and guidelines inevitably led to regulatory uncertainties and delays. In spite of the delays imposed by the licensing process, the decommissioning of the Shoreham plant proceeded with remarkable speed and efficiency. Innovative approaches were employed to tackle difficult regulatory and technical issues. Shoreham decommissioning was completed ahead of schedule and within budget. The insight gained from the Shoreham experience is paving the way for better decommissioning regulations and guidelines from the NRC, particularly as they apply to prematurely shut down plants. The NRC is attempting to examine the problems, determine the causes and come up with solutions in the form of changes to decommissioning regulations. The regulatory changes, clarifications and guidance resulting from this effort are sure to help future decommissioning projects by establishing a more predictable regulatory regime. As the Shoreham decommissioning project came to a successful conclusion, it became evident that the benefits flowing from the project were not confined to the licensing and regulatory arena. It contributed significantly to the knowledge base in such areas as decontamination and dismantling methods, control of personnel radiation exposure, termination survey techniques, spent fuel transportation and public relations. Shoreham also convincingly demonstrated that the cost and schedule of a large, complex decommissioning project are predictable.

494

V18/020893

Shoreham Decommissioning: A Case Study

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CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 9-14) (1996)

In April 1995, the United States Nuclear Regulatory Commission (NRC) issued an Order terminating the Shoreham Nuclear Power Station's license and authorizing the unrestricted release of the Shoreham facility. Shoreham was the first large scale commercial nuclear power plant in the United States to achieve this final goal of license termination. The receipt of the License Termination Order was the culmination of a seven-year long successful effort to decommission the plant. The Shoreham decommissioning, while in some respects atypical, was pivotal in the NRC's development of policy and the proposed new rule for decommissioning. The project did serve as a testing ground for decommissioning practices and technologies. The project was also significantly impacted by the on and off again access to the low level waste repository at Barnwell. This paper will address some of the lessons learned particularly those having significant impact on safety, cost and schedule. These findings have been organized on a functional basis including Project Management, Quality Assurance, Engineering, Construction, Health Physics, Waste Management, and Final Radiation Survey. Actual project milestones and costs will also be addressed.

495

V18/023936

Shoreham Decommissioning: Experiences and Lessons Learned

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Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (16 pp.) (1993)

The Shoreham Nuclear Power Station was the first large nuclear plant scheduled for early decommissioning. Although the plant had experienced the equivalent of only two full-power days of operation, many of the experiences at Shoreham are relevant to other plants facing premature permanent shutdown, awaiting decommissioning. The Electric Power Research Institute (EPRI) chose to document the Shoreham experience in decommissioning and the lessons that were learned, particularly in regard to those facets that the effort would have in common with plants that have a more normal operating experience resulting in much higher radioactivity levels. The EPRI program gained the information through review of Shoreham documentation and personal interviews with thirteen key Shoreham staff members. In June of 1989, the utility placed Shoreham plant in permanent shutdown and began plans for immediate decommissioning of the facility. The goal was to ensure the safe removal of all contaminated and activated

materials, terminating the 10CFR part 50 license and releasing the facility for unrestricted use. Shoreham is achieving this goal by dismantling, segmenting, and shipping these materials off site for decontamination, volume reduction and burial. No buildings are destroyed, and non-contaminated equipment remains in place unless salvaged. Shoreham, a single unit site, chose immediate dismantlement rather than SAFESTOR for economic reasons. Rather than use contractors, Shoreham chose to manage the decommissioning project and radwaste packaging and shipping themselves. Shoreham modeled their Possession-Only-License application after that of Rancho Seco. They based the Decommissioning Plan on the format of AIF/NESP 036 but with considerable modifications to coordinate the detailed work packages, schedules, and cost estimates so as to arrive at more realistic estimates. In spite of delays in receiving the decommissioning order, Shoreham will complete decommissioning nearly on the initial schedule and under the initial cost estimate. The discussion will detail costs, schedule, and the lessons learned.

496

V18/021025

Shoreham: Highlights of a Successful Decommissioning Project

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (11 pp.) (1996)

In May 1995, the Shoreham Nuclear Power Station became the first large, NRC-licensed, commercial nuclear power plant to complete decommissioning and have its license terminated. The pioneering nature of the project made the Shoreham experience unique, interesting and challenging. Planning for the decommissioning of the Shoreham plant began in 1989. Radiological characterization of the Shoreham facility and site was initiated in early 1990. Radiological surveys were performed on plant structures, systems, the reactor pressure vessel (RPV), RPV internals, the biological shield wall and the facility grounds. The decommissioning alternative selected for Shoreham was DECON, i.e., prompt removal of radioactive materials to attain conditions for release of the facility for unrestricted use. Other alternatives, such as SAFSTOR and ENTOMB were evaluated but eliminated because of the desire to make the facility available for re-powering or other industrial uses as soon as possible. Much of the Shoreham decommissioning work was accomplished through dismantlement and removal of equipment. Field tested and proven processes were used to dismantle plant structures and systems. High pressure water lancing (hydrolyzing) and a variety of mechanical decontamination techniques were used during the course of the project. An extensive final radiological survey (termination survey) was performed to demonstrate that the residual radioactivity levels had been reduced in accordance with Shoreham release criteria specified in the NRC-approved Decommissioning Plan and the Termination Survey Plan. The cost and schedule aspects of various decommissioning activities were closely monitored and controlled. As a result, the project was successfully completed on schedule and under budget (about \$186 million). In April 1995, the NRC issued a License

Termination Order terminating the Shoreham Nuclear Power Station's license and authorizing the unrestricted release of the Shoreham facility. This brought to a successful conclusion the seven-year long Shoreham decommissioning effort.

497 V18/025845

Total Cost of Decommissioning Shoreham

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 211-213) (1996)

Utilities, rate commissions and the Nuclear Regulatory Commission (NRC) are scrutinizing decommissioning cost estimates and making comparisons to actual decommissioning project costs, such as Shoreham. Such comparisons can be misleading if only the direct costs of decontamination and dismantlement are included in the comparison. The total cost to remove Shoreham from service was about \$1.1 billion. This cost included removal of radioactively contaminated material, disposal of slightly activated fuel, taxes, and transition costs. This paper summarizes these costs and the implications of the Shoreham decommissioning experience on other decommissioning cost estimates.

498 V18/023384

Electric Power Research Institute/American Society of Mechanical Engineers Conference 1996, Full System Decon Waste Processing

Maffei, D.; Gately, D.M.; Kirshe, M.H.

Consolidated Edison Company, Buchanan, NY; Chem-Nuclear Systems, Inc., Columbia, SC; Electric Power Research Institute, Palo Alto, CA; Paul Williams and Associates, Medina, OH

EPRI-TR-106929; CONF-960783; Proceedings of the 1996 Electric Power Research Institute (EPRI) International Low Level Waste Conference, New Orleans, LA, July 22-24, 1996, 715 pp.; (pp. 475-478) (October 1996)

During the period of March 1 to March 9, 1995, the first full reactor coolant system (RCS) chemical decontamination of an operating U.S. commercial nuclear plant was performed at Con Edison's Indian Point 2 Nuclear Generating Station in Buchanan, New York. The objective of the full RCS decontamination project was to reduce personnel radiation exposure for performing plant inspection and maintenance activities. It is estimated that the full RCS decontamination results will provide exposure savings for the next five operating cycles and that recontamination of plant systems will be slower than the rate of contamination observed prior to the decontamination. By maintaining workers' exposure "As Low As Reasonably Achievable," chemical decontamination will enhance maintenance productivity, lower the plant's operating and maintenance costs, improve public perception of nuclear energy as a viable source of electricity, and assist in the considerations for

plant life extension.

499 V18/021237

Full Reactor Coolant System (RCS) Chemical Decontamination Status Report on the Indian Point 2 1995 National Demonstration

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CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 91-98) (1994)

Performance of maintenance activities is key to the safe and efficient operation of the nation's civilian nuclear power plants. However, maintenance activities, often performed in areas of relatively high radiation fields, will increase as the nation's plants age. With recent regulations requiring reductions in allowable radiation exposure to plant workers and the possibility of further reductions and regulations in the future, it is imperative that new techniques be developed and applied to reduce personnel exposure. Full primary system chemical decontamination technology offers the potential to be the single most effective method of maintaining workers' exposure "as low as reasonably achievable" (ALARA) while concurrently reducing plant operation and maintenance (O&M) costs. The status and plans for a National Demonstration of Full Reactor Coolant System (RCS) Chemical Decontamination is discussed in this paper. The demonstration is to take place at Indian Point 2 nuclear generating station, in February 1995. A five step Alkaline Permanganate/Can-Derem (AP/Can-Derem) dilute chemical process will be used to decontaminate the Reactor Coolant, Residual Heat Removal and Chemical and Volume Control Systems. A decontamination factor (DF) of 5 is anticipated. This is expected to lower cumulative worker radiation exposure by as much as 3,500 man-rem over the next ten operating years. This project is particularly significant for the U.S. nuclear industry in that it will be the first time an operating plant with plans for continued operation is chemically decontaminated.

500 V18/021278

Use of the CO₂ NDC Cleaner at a Nuclear Facility

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CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:29-30 (1995)

As part of the reorganization of the radioactive materials storage facility, Rochester Gas and Electric rented the services of a portable CO₂ nondestructive cleaning system. It was placed between the radwaste storage building and the radioactive materials storage facility to allow contaminated materials to be easily reached from each area. The purpose of bringing this type of unit on-site was to:

(1) allow free release of as many tools and small solid scraps as possible; (2) determine the actual number of tools and equipment available for the crafts to utilize; (3) better organize the materials once their number was determined; (4) allow for a better distribution in the future; (5) make better use of the available on-site space; and (6) minimize the waste volume created as a result of this effort. The last issue was the key point in the process because any effort to begin a reorganization would have been rejected if the end result was the creation of more waste volume than originally in place. The results were very satisfactory; many of the items cleaned were then free-released, and there were no releases of contamination outside the decontamination containment area.

501 V18/020894

Cintichem Decommissioning Experience Dose Assessment and Derivation of Alternative Criteria for Contaminated Bedrock

McGovern, J.J.; Adler, J.J.

Cintichem, Inc., Tuxedo, NY; TLG Services, Inc., Bridgewater, CT

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 15-22) (1996)

The Cintichem facility's former research and radionuclide production reactor and hot laboratory are being decommissioned. The decommissioning process started in mid-1990 and is nearing completion. Contaminated soil under and adjacent to the reactor and hot laboratory buildings has been removed. Removal of this contaminated soil revealed contaminated bedrock with an estimated affected volume of 26,700 cubic feet. Decommissioning criteria for surface contamination (NRC Regulatory Guide 1-86 - Table I) would indicate that remediation was required. In view of the high cost of remediation and the low risk associated with leaving it in place, it was believed that the remediation was not reasonable. A dose assessment methodology has been developed and was approved by the cognizant regulators. The dose assessment methodology will be used to demonstrate compliance with the site decommissioning acceptance criteria of no more than 10 mRem/yr from all potential exposure pathways to the maximum exposed individual, with an ALARA goal of 3 mRem/yr. Bedrock sampling has been under way since mid-1995 and is nearly complete. Preliminary results indicate that the hypothetically maximum exposed individual would not receive more than 1.2 mRem/yr.

502 V18/023699

Cintichem Decommissioning Experience: The Final Chapter

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TLG Services, Inc., Bridgewater, CT

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (7 pp.) (1996)

This series of viewgraphs provides an overview of the decommissioning experience at Cintichem in Tuxedo, NY. The

following areas are covered: Site description and history; Decommissioning overview; Pre-D&D radiological characteristics; Unrestricted site release criteria; Final survey scope; and, Lessons learned/problems solved.

503 V18/023701

Maintaining Structural Integrity During Decontamination and Decommissioning

McGovern, J.J.

Cintichem, Inc., Tuxedo, NY

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (5 pp.) (1996)

The initial characterization study that is done for formulating the decommissioning plan and the remediation work scope doesn't always provide all of the information that is necessary to define the work scope in sufficient detail. Therefore, accurate and complete decontamination work plans and procedures cannot always be developed prior to the commencement of the remediation work. Also, the currently specified levels of decommissioning acceptance criteria are at such low levels that the full work-scope cannot always be recognized because of pre-remediation radiation levels. Initial characterization data may indicate that only the surface of a structural member or area may have to be remediated in order to release it for recycle or for demolition but, in actuality, contaminants may have penetrated surfaces and seams. Unless an extremely thorough characterization is performed prior to commencement of remediation, the extent of some contamination conditions cannot be recognized until extensive remediation work has been completed. Complications involving structural integrity during remediation work can arise where: (1) contaminants have penetrated deeply into structural surfaces or seams by vehicles such as water or corrosive fluids; (2) contaminated fluids have breached primary containment and percolated through soil under structures or structural members; (3) contamination has been deposited in inaccessible spaces behind or under structural members, such as beams, joists or columns of the structure, or behind stringers for stairs and landings; and (4) design drawings that were used in engineering work plans and procedures differed from the as-built condition. During the Cintichem decommissioning project complications were encountered on several tasks where structural integrity of the buildings became significant considerations either prior to starting or during the course of completing the task.

504 V18/020905

Training of Decommissioning Workers for the Cintichem Decommissioning Project

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TLG Services, Inc., Bridgewater, CT

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 112-118) (1996)

Special training modalities and requirements for the Cintichem Decommissioning Project were developed and implemented to

provide a foundation for performing the project with reduced dose/contamination exposure levels to workers and increased general safety. Cintichem developed and implemented a training program for general and specialized decommissioning activities and efficient, comprehensive training requirements necessary to train a decommissioning work force of non-nuclear workers. Cintichem utilized special site-specific training methodologies such as mandatory daily briefings of all personnel involved, and specialized equipment training to ensure that task/activities would be accomplished efficiently and safely with minimum radiological exposure for decommissioning workers.

505

V18/020902

Solubility Classification Analysis of Airborne Uranium Product at a Uranium Conversion Facility

Eidson, R.R.

Outreach Technologies, Inc., Broken Arrow, OK

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 95-99) (1996)

The need for lung solubility classification of uranium and other radionuclides has increased over the past few years due to the changes in 10 CFR Part 20 which requires the determination of dose assessments to include the solubility classification of material in the exposure area. In addition, facilities in the decommissioning process planning to use onsite disposal cells may be required by the United States Nuclear Regulatory Commission (USNRC) to have solubility classifications performed on the soil, sludges, or any other material placed in the storage cell. This paper presents in-house experience with routine determination of the solubility characteristics of particulate material collected on air filters and process powders at Sequoyah Fuels Corporation (SFC) and the determination of the lung solubility of uranium in soil for onsite disposal cell purposes at a site that handled depleted uranium. Discussion is provided with regard to the analytical methods and associated difficulties and resolutions.

506

V18/023930

Decision Framework for Nuclear Power Plant Decommissioning: Technical Brief

Electric Power Research Institute, Palo Alto, CA

Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Friday, November 12, 1993), Monterey, CA, November 10-12, 1993, 125 pp.; (4 pp.) (September 1993)

Decommissioning of a nuclear power plant can be defined loosely as the measures taken to restore the plant site to a state enabling unrestricted access within 60 years of plant shutdown. For a utility facing decommissioning this means selecting a course of action that balances public expectations against decommissioning costs, radiation exposure, and other risks. At the plant component level, decommissioning planners face problems identifying and evaluating feasible alternatives for each plant component and prioritizing decommissioning activities among the various components. The considerable amount of uncertainty affecting this decision process

and the lack of experience in the U.S. with decommissioning large commercial nuclear plants were motivations behind a series of Electric Power Research Institute (EPRI)-sponsored case studies to learn more about economic analysis and risk evaluation in decommissioning planning. The case studies will build a foundation for developing a generic support tool to aid member utilities in their decommissioning planning process. The tool will not replace the need for detailed engineering planning and cost estimation, but rather supplement these efforts by integrating them in a comprehensive, balanced decision framework. The first case study application was at the Trojan Nuclear Power Plant, and the approach used in that study is summarized here.

507

V18/023706

Large Component Cradle Design and Grouting Technologies

Zuchowski, L.A., Jr.

Burns and Roe Enterprises, Inc., Oradell, NJ

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (15 pp.) (1996)

The Trojan Nuclear Plant (TNP), located in the vicinity of Rainier, Oregon, ceased commercial operation on January 4, 1993. Portland General Electric (PGE), a joint owner of the plant, has begun decommissioning activities. The first phase of activities, the Large Component Removal (LCR) Project, entailed removal of the plant's four steam generators and pressurizer from the Containment Building, preparing them as their own shipping containers, transporting via barge and overland transportation to the U.S. Low-Level Radioactive Waste Facility on the Hanford Reservation to a waste disposal facility near Richland, Washington.

508

V18/020906

Low Density Cellular Concrete (LDCC) Injection

Morgan, R.D.

Burns and Roe Construction, Inc., Oradell, NJ

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 132-138) (1996)

The purpose of this paper is to provide an overview of the Low Density Cellular Concrete Injection Process for the large component removal project at Portland General Electric's (PGE) Trojan Nuclear Power Plant in Rainier, Oregon. The Trojan Nuclear Plant is a four (4) loop pressurized water reactor power plant with an output of 1130 MWE. It consists of a Westinghouse Turbine Generator. The uniqueness of this project was not limited to the size and radioactivity of the components but encompassed a myriad of logistical and procedural factors. The LDCC injection was performed in the Reactor Containment Building (RCB) which presented problems with introduction of LDCC materials, disposal of wastes, venting, sampling, security, and ALARA. Then schedule, which was highly interdependent between several contractors was very aggressive in its original form due to time constraints for the economical burial of the vessels at offsite facilities prior to a change

in the burial costs. It was severely impacted by the imposition of court ordered stays in the work associated with a lawsuit against the NRC regarding decommissioning of nuclear facilities prior to decommissioning plan approval. The project represents a major milestone in the operation of nuclear power facilities in the USA and provides other utilities with nuclear operating facilities the benefit of PGE's and its major subcontractors experience in the first major step of the long decommissioning process.

509 V18/020904

Steam Generator and Pressurizer Radwaste Package Design Features

Lacy, N.H.; Zuchowski, L.A., Jr.; Heath, D.R.

Burns and Roe Enterprises, Inc., Oradell, NJ; Portland General Electric Company, Rainier, OR

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 119-124) (1996)

As part of the first activities performed in the decommissioning of the Trojan Nuclear Power Plant, four steam generators and a pressurizer were removed from the containment and prepared as radwaste shipping packages for their radioactive contents. While these types of components have been previously used as their own shipping containers, a different design approach made this package preparation somewhat unique. The purpose of this paper is to provide a review of the design implementation for the large component removal project at Portland General Electric's Trojan Nuclear Power Plant.

510 V18/020892

Trojan Large Component Removal Project [April 1996]

Lackey, M.B.; Kelly, M.L.

Portland General Electric Company, Rainier, OR

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 3-8) (1996)

On November 1, 1995, Portland General Electric (PGE) Company completed the Large Component Removal (LCR) Project, which represented the first phase of decommissioning the Trojan Nuclear Plant. This project entailed removing the four steam generators and pressurizer from the Containment Building, preparing them as their own shipping containers, and transporting them via barge and overland transporter to the U.S. Ecology low-level radioactive waste facility on the Hanford Reservation near Richland, Washington. The project had been in the planning stage since the plant was permanently closed on January 4, 1993. Even greater regulatory oversight than normal at a nuclear facility was involved because (1) the project was performed prior to the Decommissioning Plan being approved by the Nuclear Regulatory Commission (NRC), (2) the existing regulations did not apply directly to the shipments, and (3) water and land transport were involved. Finally, court actions in response to cases brought by

Trojan as well as Yankee Rowe opponents had to be dealt with during implementation of the project.

511 V18/021484

Trojan Large Component Removal Project [March 1996]

Lackey, M.B.; Kelly, M.L.

Portland General Electric Company, Portland, OR

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 89-94) (1996)

On November 1, 1995, Portland General Electric (PGE) Company completed the Large Component Removal (LCR) Project, which represented the first phase of decommissioning the Trojan Nuclear Plant. This project entailed removing the four steam generators and pressurizer from the containment Building, preparing them as their own shipping containers, and transporting them via barge and overland transporter to the US Ecology low-level radioactive waste facility on the Hanford Reservation near Richland, Washington. The project had been in the planning stage since the plant was permanently closed on January 4, 1993. Even greater regulatory oversight than normal at a nuclear facility was involved because (1) the project was performed prior to the Decommissioning Plan being approved by the Nuclear Regulatory Commission (NRC), (2) the existing regulations did not apply directly to the shipments, and (3) water and land transport were involved. Finally, court actions in response to cases brought by Trojan as well as Yankee Rowe opponents had to be dealt with during implementation of the project.

512 V18/024020

Trojan Large-Component Removal Project

Lackey, M.B.; Kelly, M.L.

Portland General Electric Company, Portland, OR

Radwaste Magazine 4(1):11-17 (January 1997)

The large-component removal (LCR) project was completed safely, on schedule, under budget, and at less than half the estimated radiation dose. This success is attributed to the extensive planning and close cooperation of the many organizations and individuals involved. Most importantly, the experience gained during the LCR project can now be applied to continuing the safe and cost-effective decommissioning of the Trojan nuclear plant.

513 V18/023711

Trojan Reactor Vessel and Internals: The Plans for a One Piece Removal

Lackey, M.B.

Portland General Electric Company, Portland, OR

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG

Services, Inc., Bridgewater, CT, 478 pp.; (22 pp.) (1996)

This series of viewgraphs and schematic drawings highlights the issues surrounding the removal and transport of the Trojan reactor vessel. The project description includes: Similarities to a large component removal project; Preparing the vessel inside containment; Utilizing temporary equipment to remove the reactor; Load-tiedown the reactor vessel package to the transporter and the loaded transporter to a barge; Transport to the US Ecology disposal site.

514

V18/025842

Deconstruction of a High Enriched Uranium Nuclear Fuel Manufacturing Building Under Criticality Control

Kingsley, R.S.; Thomas, R.T.

B&W Nuclear Environmental Services, Inc., Lynchburg, VA CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 186-191) (1996)

During the 1950s, 1960s, and early 1970s, the Babcock & Wilcox Co. (B&W) designed, constructed, or purchased a number of nuclear materials processing facilities to manufacture nuclear fuel for the commercial nuclear power industry and for the U.S. Navy. These included low enriched uranium (less than 20 percent U-235), high enriched uranium (greater than 20 percent U-235), and mixed oxide (PuO₂-UO₂) nuclear fuel manufacturing facilities. In addition, B&W designed and built a major nuclear research center in Lynchburg, Virginia to support these nuclear fuel manufacturing activities to conduct nuclear power research. With the downturn in the commercial nuclear industry in the late 1970s, B&W began an extensive deactivation, decontamination, and decommissioning program for many of the manufacturing and R&D facilities and sites. This D&D program is ongoing. The D&D of the Apollo Fuel Fabrication Complex, located in Apollo, PA was one such project. D&D project completion for the complex required six years and a cost of \$72 million. A number of unique challenges were faced during the project. However, new technologies were not required, rather, technical problems were solved by field engineers applying basic engineering skills using current technology. One of the unique problems solved by the project involved the deactivation and deconstruction of the highly enriched uranium (HEU) fuel manufacturing portion of the complex. The practical engineering approach that was taken for the deconstruction of that portion of the processing building, which housed the high enriched fuel manufacturing facility and the criticality control measures, is detailed throughout this paper.

515

V18/021249

Decontamination and Decommissioning of the Apollo Fuel Fabrication Facilities

Kingsley, R.S.; Toms, B.Y.

B&W Nuclear Environmental Services, Inc., Lynchburg, VA CONF-941148 (Vol. 1); DDER-94: Decommissioning,

Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 209-212) (1994)

Babcock & Wilcox's (B&W) 73,000 sq ft former nuclear fuel conversion plant in Apollo, Pennsylvania is undergoing site characterization, decontamination, and dismantlement. B&W Nuclear Environmental Services, Inc. This facility was used from the late 1950's until the early 1980's for the conversion of uranium hexafluoride to various fuel forms, including uranium dioxide powder and pellets. Both high- and low-enriched uranium as well as thorium were processed in the facility. Upon discontinuing fuel manufacturing operations, the chemical processing equipment was decontaminated, removed, packaged, and shipped to a licensed low-level radioactive waste (LLRW) burial site. As a result of plant operations, uranium contamination existed within the building and in the soils on the plant site. Following safe shutdown and equipment removal, a comprehensive radiological characterization was conducted at the site. All subsequent decontamination and decommissioning (D&D) activities were conducted under the authority of NRC license SNM-145. The Apollo D&D Project was completed May, 1994 with no lost-time accidents, no radiological or safety vent occurrences, and no revocation of local, state, or federal licenses. All project objectives were met while maintaining the health and safety of employees and community residents, and preserving the integrity of the environment.

516

V18/021283

Controlling Worker Dose at TMI-2 After 1987

Paynter, A.F.; Lodde, G.M.; Poppenwimer, L.A.

GPU Nuclear Corporation, Middletown, PA; Lodde Enterprises, Mount Joy, PA

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:34-36 (1995)

The American Nuclear Society (ANS) winter meeting of 1988 contained an embedded topical paper on the cleanup of Three Mile Island unit 2 (TMI-2). At the time of the meeting, the cleanup program was still in progress. Defueling operations were completed in February 1990. In December 1993, the U.S. Nuclear Regulatory Commission gave General Public Utilities approval to put TMI-2 in postdefueling monitored storage (PDMS). Cleanup activities are now complete and TMI-2 is in safe, stable, monitored storage. This paper closes out and briefly summarizes some of the ideas concerning worker radiation exposure that were presented during the 1988 ANS winter meeting.

517

V18/024068

Decontamination Experience During the Cleanup of TMI-2: Interim Report

Pearlstein, E.; Schwartz, F.L.; Urland, C.S.

PENTTEK, Inc., Coraopolis, PA

EPRI-NP-1757; 78 pp. (May 1992)

Decontamination of the TMI-2 plant provided information that can help other utilities plan cleanup of contaminated areas. Specifically, knowledge gained from the use of various decontamination tools and techniques at TMI-2 can enhance plant operations while reducing worker exposure. The objective of this report is to document those lessons learned at TMI-2 in selecting and using various decontamination tools, products, and techniques to accomplish plant cleanup.

518 V18/023363

Early Dismantlement of Three Mile Island Unit 2

Byrne, J.J.; Heisey, K.A.

GPU Nuclear Corporation, Middletown, PA

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranelone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 63-66) (1996)

Three Mile Island Unit 2 (TMI-2) nuclear station ceased commercial operation following the March 1979 accident. Following completion of an extensive cleanup effort that included removal and shipment of the damaged core, the U.S. Nuclear Regulatory Commission issued a possession-only license (POL) amendment on September 14, 1993. Postdefueling monitored storage (PDMS) technical specifications were issued on December 28, 1993. Early dismantlement efforts at TMI-2 allow productive use of excess trained personnel while retaining their availability for occasional increased needs at TMI-1. This reduces the need for outside contractors. These issues apply not only to the TMI site but could be applied to any site with a permanently shutdown facility co-located with an operating facility. This allows the operator to reduce operating and maintenance costs at the operating plant while at the same time reducing the legacy of the shutdown plant.

519 V18/022081

Radioactive Contaminate Characterization and Measurements of Residual Radioactivity in the TMI-2 Auxiliary and Fuel Handling Buildings and Reactor Building

Lodde, G.M.; Paynter, A.F.; Brosey, B.H.

GPU Nuclear Corporation, Middletown, PA

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 309-313) (1994)

The reactor accident at Three Mile Island Unit-2 on March 28, 1979 resulted in widespread radioactive contamination throughout the plant. This article outlines the methods and analytical model used to characterize and quantify the residual radioactivity in the plant prior to entering Post-Defueling Monitored Storage on December 28, 1993, 178 months after the Unit-2 accident.

520 V18/021250

TMI-2 Cleanup Program - Post 1988

Byrne, J.J.

Three Mile Island Nuclear Generating Station, Middletown, PA

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 215-218) (1994)

The ANS Winter Meeting of 1988 contained an embedded topical on the Cleanup of Three Mile Island Unit 2. At the time of the Meeting, the Cleanup Program was still in progress. It was not until December 1993 that NRC approval to enter Post-Defueling Monitored Storage (PDMS) was granted. In August 1988, just prior to the 1988 ANS Winter Meeting, GPU Nuclear submitted its Safety Analysis Report for PDMS. This document established six prerequisites for PDMS: (1) Prevention of nuclear criticality; (2) Nuclear fuel shipped off-site; (3) Potential for a significant release of radioactive material eliminated; (4) Water removed from the Reactor Coolant System and Fuel Transfer Canal; (5) Radioactive waste shipped off-site or packaged awaiting shipment; and (6) Radiation levels reduced to allow necessary plant monitoring. This paper briefly describes the completion of these prerequisites and provides a status on the current conditions of TMI-2.

521 V18/022518

Saxton Nuclear Experimental Corporation (SNEC) Facility Decontamination/Decommissioning

Kuehn, G.A.

GPU Nuclear Corporation, Saxton Nuclear Experimental Corporation Facility, Middletown, PA

CONF-960426; Proceedings of the 58th Annual Meeting of the American Power Conference, A.E. McBride (ed.), Chicago, IL, April 9-11, 1996. American Power Conference, Chicago, IL, Vol. 58-II, 886 pp.; (pp. 821-822) (1996)

This paper describes the decontamination/decommissioning of the Saxton Nuclear Experimental Corporation Facility. The topics of the paper include the facility history, site layout, station structures, site characterization findings, and decommissioning sequence. Phase one of the sequence has begun with the final phase of the decommissioning scheduled to be completed in 1999.

522 V18/020896

Decommissioning of the Saxton Nuclear Experimental Corporation Facility

Byrne, J.J.; Holmes, R.D.

GPU Nuclear Corporation, Middletown, PA

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314

pp.; (pp. 30-34) (1996)

Saxton Nuclear Experimental Corporation (SNEC) and GPU Nuclear plan to decommission the Saxton Nuclear Experimental Corporation facility by the year 2000. Much of the site has previously been remediated. The remaining structures and miscellaneous components include the containment vessel (CV), which contains the Saxton Reactor Vessel and its various support systems, a concrete shield wall located around the NW and NE quadrant of the CV, several tunnel sections that are immediately adjacent to the outer circumference of the CV and the remaining portions of the septic system, weirs and associated underground piping. Following decontamination and demolition of these structures and miscellaneous components the site will be released for unrestricted use.

523

V18/023710

Saxton One-Piece Reactor Vessel Removal

Kuehn, G.A.

GPU Nuclear Corporation, Saxton Nuclear Experimental Corporation Facility, Middletown, PA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (12 pp.) (1996)

After having completed characterization of the Saxton Nuclear Experimental Corporation (SNEC) Facility, GPU Nuclear is convinced that one-piece Reactor Pressure Vessel (RPV) removal is feasible and advantageous from a cost/schedule standpoint. We are in the preliminary stages of preparing a bid specification for RPV removal and disposal. The SNEC Facility was constructed in 1960 through 1962 and operated as a research and training reactor from 1962 until 1972. It is a 23.5 megawatt thermal, pressurized water reactor which was fueled with both UO₂ and mixed oxide (UO₂-PuO₂) cores. In 1972, all fuel was removed from the facility and shipped to the Atomic Energy Commission in Savannah River, South Carolina. The RPV consists of a laminated plate cylindrical shell, a spherically-dished bottom head and a removable reactor closure head which bolts to a matching ring flange. The vessel weighs approximately 120,000 pounds including internals. TLG Services, Inc. was contracted to perform activation analyses of the vessel and internals. Field data including in-vessel and ex-vessel thermoluminescence dosimeter (TLD) strings and ex-vessel structural material sampling and analysis compared favorably to the computer-generated activation analyses. The RPV and internals contain approximately 1450 curies of radioactivity which contributes greater than 90% of the total SNEC Facility radioactive material inventory. The predominant isotopes are Ni-63 (55.8%), Co-60 (40.9%), Fe-55 (2.6%), H-3 (0.12%), and C-14 (0.08%). The only core sub-components which would require categorization as greater-than-Class-C (GTCC) in accordance with 10 CFR Part 61, are the lower core guide blocks. Since the guide blocks are permanently bolted to the lower core plate, we interpret the regulations to allow blending the plate and blocks for shipment which will qualify the vessel and internals for shallow land disposal. Preliminary calculations indicated that the RPV may have been able to meet low specific activity (LSA)-II or LSA-III criteria. Subsequent discussions with the NRC indicate they would be reluctant to accept the LSA classification and that it would be advantageous to seek certification for a Type B package without

the "Exemption for low specific activity". Although plans are not final, it is our intent to remove the RPV, with temporary closures attached and with its insulation and support cans intact, through an opening created in the containment dome. The RPV will be housed on-site in a temporary facility equipped to prepare the package for shipment. It is anticipated that the package design may require impact limiters, shielding, tie downs and a shear-key assembly. The vessel will likely be grouted with low density cellular cement and all penetrations secured with welded closure caps.

524

V18/020900

Site Characterization Efforts at the Saxton Nuclear Experimental Corporation

Brosey, B.H.; Holmes, R.D.

GPU Nuclear Corporation, Middletown, PA

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 78-86) (1996)

The Saxton Nuclear Experimental Corporation (SNEC) Facility is a deactivated pressurized water reactor (PWR). The SNEC facility is owned by the Saxton Nuclear Experimental Corporation and maintained by General Public Utilities Nuclear Corporation (GPU Nuclear). The reactor facility was built from 1960 to 1962 primarily as a research and training reactor. The reactor fuel was removed from the Containment Vessel (CV) in 1972 and shipped to the Atomic Energy Commission (AEC) facility at Savannah River, South Carolina. Following fuel removal, equipment, tanks, and piping located outside the CV were removed. The buildings and structures that supported reactor operations were partially decontaminated from 1972 through 1974. Site Characterization was completed in 1995.

525

V18/021161

Development and Application of Risk-Based Criteria for Unrestricted Release of Radioactivity from Licensed Nuclear Facilities

Gardner, F.

American Ecology Recycle Center, Oak Ridge, TN; Electric Power Research Institute, Palo Alto, CA; Paul Williams and Associates, Medina, OH

EPRI-TR-105569; CONF-950718; Proceedings of the 1995 Electric Power Research Institute (EPRI) International Low-Level Waste Conference, Orlando, FL, July 10-12, 1995, 600 pp.; (pp. 15.1-15.11) (November 1995)

Since 1982 the Recycle Center performed decontamination and survey for release (SFR) services for nuclear utilities and industrial and government clients, successfully processing over 25 million cubic feet of radioactive material and releasing over 8 million cubic feet for unrestricted use, recycling or solid waste disposal. The State of Tennessee Radioactive Materials License for the Recycle Center requires that materials must meet surface radiation limits equivalent to U.S. NRC Regulatory Guide 1.86 and that surveys are performed in accordance with facility-specific procedures. Recently, the EPA and NRC have proposed dose rate goals and limits for

decommissioning of nuclear facilities. Using a typical isotopic ratio of radionuclides found in utility generated materials, the resulting dose for materials which meet SFR limits has been calculated for dry active waste (DAW), ion-exchange resin and soil, released to disposal as solid waste. The implementation of risk (dose) based SFR criteria appears to offer waste generators and processors an opportunity to minimize the volume of radioactive wastes committed to disposal while providing a defensible technical basis for establishing minimal risk to the public. Most importantly, adoption of risk based criteria, combined with a complete characterization of the materials will allow development for SFR processing of volumetrically (vice surficially) contaminated material such as soil. This paper describes the results of dose calculations using Reg. Guide 1.86 levels and typical LLRW materials as the source term.

526 V18/024165

Development of Technology and Engineering Methods for Decontamination of Equipment, Transport Vehicles and for Dust Suppression at the Chernobyl Unit 4

Grigorev, V.V.; Kurnosov, V.A.; Pavlov, A.B.; Ryumin, G.V.

Vsesoyuznyj Nauchno-Issledovatel'skij I Proektnyj Institute Ehnergotekhniki (VNIPIEhT), Moscow, Russian Federation; Ministerstvo Ukrainy po Delam Zashchity Naseleniya ot Posledstvij Avarii na Chernobyl'skoj AEhS, Kiev, Ukraine
INIS-UA-026/A; CONF-960002; Chernobyl 96: Results of 10 Years Work on ChNPP Accident Mitigation, Proceedings of the Fifth International Scientific-Technical Conference, N.P. Arkhipov (ed.), Zelenyj Mys, Ukraine, 1996, 526 pp.; (pp. 189-190) (1996)

Short communication. No abstract available. (This document is in Russian).

527 V18/021247

Decommissioning of Building "A" at the Lynchburg Technology Center

Hoovler, G.S.; Bennett, R.L.; Toms, B.Y.

B&W Nuclear Environmental Services, Inc., Lynchburg, VA
CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 201-203) (1994)

The Babcock & Wilcox Company, a wholly owned subsidiary of McDermott International, Inc., owns and operates the Lynchburg Technology Center (LTC) near Lynchburg, Virginia. The LTC was built as a highly integrated facility to develop, test, and examine nuclear reactor cores and to develop overall nuclear fuel cycles. Building A housed four critical experiment facilities and a 1 MW pool-type reactor. A corporate decision was made in 1983 to discontinue activities with radioactive materials in Building A. By this time, three of the critical experiment facilities and the pool reactor had already been dismantled and their licenses terminated. Requirements in the CX-10 and SNM-778 licenses called for decontamination of the facility when activities ceased. A

dismantling plan for the CX-10 area of Building A was submitted to the Reactors Branch of the NRC for approval in August, 1984. The CX-10 Dismantling Plan was approved in August, 1984. A decommissioning plan for Building A was submitted to the Nuclear Materials Branch of NRC for information purposes. The objective of the decommissioning project was to decontaminate the facility in a safe and responsible manner to enable release for unrestricted use and from licensed control. Release limits for surface contamination are contained in US NRC Regulatory Guide 1.86. Additional numerical limits for external exposure and soil contamination were provided by the NRC. These limits were used as minimum goals during decontamination with ALARA (As Low As Reasonably Achievable) levels being used as the primary goals.

528 V18/021246

Decontamination and Decommissioning of Building "C" at the Lynchburg Technology Center

Bennett, R.L.; Toms, B.Y.

B&W Nuclear Environmental Services, Inc., Lynchburg, VA
CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 197-200) (1994)

The Babcock & Wilcox Company, a wholly owned subsidiary of McDermott International, Inc., owns and operates the Lynchburg Technology Center (LTC) near Lynchburg, Virginia. The LTC was built as a highly integrated facility to develop, test, and examine nuclear reactor cores and to develop overall nuclear fuel cycles. Under NRC License SNM-778, research and development on thorium, uranium, and plutonium nuclear fuels were performed in Building C at the LTC. A corporate decision was made in 1982 to discontinue activities with radioactive materials in Building C. B&W, in ceasing licensed activities in Building C, complied with an SNM-778 license requirement to decontaminate Building C in a manner which protected the environment and the general public from exposure to levels of radioactivity in excess of those permissible. A decommissioning plan was submitted to the NRC for information purposes. The objective of the decommissioning project was to decontaminate the facility in a safe and responsible manner to enable release of the facility for non-nuclear purposes. Release limits for surface contamination are contained in US NRC Regulatory Guide 1.86. These limits were used as minimum goals during decontamination with ALARA (As Low As Reasonably Achievable) levels being used as the primary goals.

529 V18/025310

ARMR Trade Association Role in the Metal Recycle Industry

Loiselle, V.; Clemens, B.

American Technologies, Inc., Oak Ridge, TN; Lockwood Greene Technologies, Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,

March 2-6, 1997; (4 pp.) (1997)

ARMR, the trade association of radioactive metal recyclers, continues to define its role in the metal recycle industry. Common problems are cited for this newly formed industry. The association addresses its 1996 activity, a measure of its current membership, and support for rulemaking for a volumetric release standard for non-radioactive materials. The future holds that significant quantities of metals will be affected.

530 V18/023521

AT-1 Building Decommissioning Project: Progress Report

Garcia, A.; Petit, X.; Jeanjacques, M.

Commissariat a l'Energie Atomique, Centre d'Etudes de la Vallee du Rhone, Marcoule, France

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (12 pp.) (May 1996)

In order to validate the concrete cleansing process in Cell 903, additional examinations were undertaken. These investigations covered the physical and radiological state of the cell, the analysis of the migration of the contamination through the concrete walls and the movement of a tool-carrier within Cell 903, taking into account the small size of the cell (2m x 3m). The examinations made it possible to confirm the fact that the contamination did not migrate very deeply into the vertical walls, and that therefore, surface treatments could be considered, rather than a cutout of the bearing structures. Following these tests, a consultation was carried out and a company was appointed to scrape the walls of cell 903 to remove a thickness of two centimeters, using a milling/ploughing process with a BROKK type carrier.

531 V18/023524

AVR Experimental Nuclear Power Station: Progress Report

Pohl, P.

Arbeitsgemeinschaft Versuchs-Reaktor GmbH, Juelich, Germany

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (4 pp.) (1996)

The progress of the AVR decommissioning project since TAG 19 can be summarized as follows. In April, defueling was commenced at the AVR. Problems were encountered initially with the Juelich hot cell facility not being able to accept the discharged fuel materials. This was resolved recently and the current projected completion date for defueling is 1997. Dismantling work is underway in the turbine hall. The current plan for the facility decommissioning is to dismantle the facilities up to the exterior of the reactor vessel. This would not preclude either full dismantling or safe storage of the facility. This decision is yet to be made for the AVR.

532 V18/022528

AVR Reactor Dismantling Outline Planning - The Insitu Concept

Schilling, I.; Wnuck, W.; Nesirky, P.; Davies, K.; Wimmers, M.; Schmitz, H.W.; Wimmer, T.

ARGE NOELL Konsortium Lentjes, Wuerzburg, Germany; Arbeitsgemeinschaft Versuchs-Reaktor GmbH, Juelich, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 558-561) (May 1996)

Short communication. No abstract available. (This document is in German).

533 V18/022761

Activities on Realization of a Melting Plant at the Chernobyl Site

Steinwarz, W.

Siempelkamp Giesserei GmbH & Company, Krefeld, Germany

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 83-86) (1996)

In the frame of the restoration activities for the Chernobyl area a melting plant for radioactively contaminated metallic materials is being planned to be erected on the NPP site. EU-sponsored studies on the technical concept as well as to define the specific licensing conditions have provided the basis for the official licensing application in 1995.

534 V18/024231

Activity Determination of H-3, C-14, Cl-36, Ni-63 and Fe-55 in Solid Wastes from Decommissioned Reactor Using Liquid Scintillation Counting (LSC)

Huaiyuan, Y.; Zhihui, W.; Wei, L.; Xuelian, W.; Hong, Z.

Ministry of Nuclear Industry, Institute of Radiation Protection, Taiyuan, China

Atomic Energy Science and Technology (Yuanzineng Kexue Jishu) 30(6):509-515 (November 1996)

The authors describe the methods of analysis and measurement for H-3, C-14, Cl-36 activities in reactor core graphite samples, and H-3, Ni-63, Fe-55 activities in stainless steel and carbon steel rust, aluminum alloy and cell sediment samples in order to estimate the inventory of some residual radionuclides in decommissioned reactor waste. The methods of preparation and measurement of samples for these radionuclides are discussed briefly. (This document is in Chinese).

535 V18/020948

Alternative Use of Surface Contamination Limits in Building Demolition

Gaul, W.C.; Reiley, K.

OHM Remediation Services Corporation, Columbia, SC; Defense Logistics Agency, Baltimore, MD

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (7 pp.) (1996)

The current surface contamination limits used for release of facilities for unrestricted use are applied to decommissioning projects to verify that the levels of removable contamination or residual total (fixed and removable) contamination that could pose health risks to the general public are acceptably low. The acceptable amounts of residual radioactivity remaining should be taken in context of how the structure or surface is to be used in the future. Risks associated with various levels of residual surface contamination are correlated to accepted risk based standards. One of these risks is potential exposure to radioactive material in the industrial rubble resulting from structure or surface demolition and disposal. However, if the demolished material is used as dispersion media, this exposure risk is reduced and the projects costs are lowered by eliminating the need for costly surface decontamination. This paper will discuss the use of this methodology to release a structure.

536 V18/022442

American National Standard for Decommissioning of Research Reactors

American Nuclear Society, La Grange Park, IL
ANSI/ANS-15.10-1994; 25 pp. (1994)

This standard provides requirements and criteria for the decommissioning of research reactors and includes decommissioning alternatives, planning, radiation criteria, surveillance and maintenance, environmental impacts, quality assurance, and reports and documentation. This standard was developed under procedures of the Standards Committee of the American Nuclear Society; these procedures are accredited by the American National Standards Institute, Inc., as meeting the criteria for American National Standards. The consensus committee that approved the standard was balanced to ensure that competent, concerned, and varied interests have had an opportunity to participate.

537 V18/024217

Application of Abrasive Water Jet Cutting Techniques for Nuclear Facility Dismantling

Brandt, C.; Louis, H.; Meier, G.; Tebbing, G.

Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektraegerschaft Entsorgung, Karlsruhe, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 219-231) (November 1995)

Abrasive water jet technology offers optional cutting techniques for applications in industrial production as well as in dismantling work, in addition to conventional methods. The abrasive water injector jet technique has been developed to maturity and high technical

standards. A more recent development is the abrasive water suspension jet technique, which can contribute to distinct reduction of the volume streams used. (This document is in German).

538 V18/023378

Application of Decontamination and Melting of Low-Level Waste

Clements, D.W.; Hall, M.

British Nuclear Fuels plc, Manchester, United Kingdom

CONF-961103; Proceedings of an American Nuclear Society (ANS) and European Nuclear Society (ENS) Winter Meeting, Washington, DC, November 10-14, 1996. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 75:460c-461 (1996)

This paper describes the range of plant, equipment, and techniques developed by British Nuclear Fuels plc at their Capenhurst site to minimize land burial, environmental impact, and recycling of metals. This large nuclear processing facility in the United Kingdom yielded more than 160,000 tons of suspect surface contaminated material. By the time the project is finally completed at the end of 1996, approximately 99.5% of the contaminated material will have been safely and cost-effectively treated so that it can be recycled for use in a non-nuclear environment. The remaining material as well as minimal quantities of secondary wastes arising from decontamination activities will have been size reduced and/or encapsulated to maximize the cost-effective use of the United Kingdom's low-level-waste burial facility.

539 V18/023534

Application of Remote Techniques for the Decommissioning of the First Primary Separation Plant at Sellafield, Cumbria

Challinor, S.F.

British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (6 pp.) (1996)

Construction of the first primary separation plant at Sellafield commenced in 1947 and comprised two mirror image process lines designated North and South to reprocess irradiated metal fuel from the Windscale piles. The facility operated between 1952 and 1964 during which time two modifications were carried out to improve throughput. In 1964 the plant was superseded by the current reprocessing facility, B205, rendering the B204 reprocessing facilities redundant. Following shutdown the plant underwent clean out and wash down and the South line was converted to reprocess oxide fuel operating from 1969 until 1973. The facility was not constructed with eventual decommissioning in mind and is characterised by very large process cells with minimal physical access to process vessels and pipework. The physical size of the individual process cells coupled with the drive to reduce the dose exposure to operators and reduce decommissioning costs has resulted in the increased use of remote techniques for removal and size reduction of radioactive plant and equipment. This paper describes the application of remote techniques utilized in the first primary separation plant, one of a number of major facilities

undergoing decommissioning at Sellafield, Cumbria.

540 V18/025850

Applications of Decontamination and Melting of Low Level Waste

Clements, D.W.; Hall, M.; Dam, A.S.

British Nuclear Fuels plc, Manchester, United Kingdom; BNFL, Inc., Fairfax, VA

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996.

American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 258-262) (1996)

Decontamination of materials from decommissioning projects has reduced the costs and quantities of low level wastes for disposal. Melting for recycling, volume reduction, and manufacture of useful, slightly radioactive products has also greatly reduced the cost of waste disposal. Significant savings in both cost and disposal volumes have been achieved by BNFL.

541 V18/022485

Approach for Technology Demonstration of Decontamination and Dismantling of Research Reactors and Recycling of Resulted Radwastes and Sites

Oh, W.Z.; Yoon, J.S.; Park, Y.S.; Choi, W.K.; Won, H.J.

Nuclear Environment Management Center, Korea Atomic Energy Research Institute, Taejon, Korea

Proceedings of the Fifth ASRR-V Asian Symposium on Research Reactors, Taejon, Korea, May 29-31, 1996; (pp. 660-671) (1996)

With the aging of nuclear facilities in Korea, the nation's nuclear sector is indebted with safe decommissioning. Since two research reactors (TRIGA MARK II and III) which were forfeited their availability due to the operation of the Korean designed research reactor, HANARO, are scheduled to be decommissioned shortly, KAERI is planning a demonstration program for on-site verification of various technologies for decommissioning. In this program, a broad range of relevant technologies such as decontamination, dismantling, remote operation, radwaste treatment, contamination analysis for the facility and its environment, and site restoration are to be developed and tested. This paper presents the scope and integrated time schedule of the demonstration program for each technological category.

542 V18/024218

Approach to Remobilization of Solidified Materials in Liquid Radioactive Wastes by Means of Teleoperators

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Telerob Gesellschaft fuer Fernhantierungstechnik mbH, Ostfildern, Germany; Hansa Projekt Anlagentechnik GmbH, Hamburg, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektktraegerschaft Entsorgung, Karlsruhe, Germany;

Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 319-326) (November 1995)

During operation and decommissioning of nuclear reactors, radioactive liquids frequently arise which initially have to be collected in interim storage casks in buffer systems before they are further conditioned. During liquid waste storage, crust-like solid deposits may form depending upon the materials as a result of cementing sediments, time-delayed crystallization processes, etc. These deposits form the solid layers on the facility components which are in contact with the medium and can not, or only insufficiently, be remobilized by means of conventional chemical or physical decontamination processes. The paper describes an approach to a solution for removing or remobilizing these deposits using a high-performance pulse technique which has been successfully applied on an industrial scale for decoring of castings and sand removal. This approach has proven its strengths in fragmenting composite materials previously considered unseparable. (This document is in German).

543 V18/023372

Area for Hydroabrasive Radioactive Decontamination of Metal

Antropov, V.M.; Kukhtin, V.V.; Zykova, V.S.

Nauchno-Proizvodstvennoe Ob'edinenie Pripyat, Chernobyl, Ukraine; Naukovo-Tekhnichnij Tsentz z dezaktivatsiyi ta kompleksnogo povodzhennya z radyoaktivnimi vyidkhodami, Zhovtyi Vodi, Ukraine; Ministerstvo Ukrainy po Delam Zashchity Naseleniya ot Posledstvij Avarii na Chernobyl'skoj AEhS, Kiev, Ukraine

INIS-UA-028; Problems of Chernobyl Exclusion Zone, Naukova Dumka, Kyiv, Ukraine, 200 pp.; (pp. 43-46) (1994)

The process and facilities' outline of an area for hydroabrasive radioactive decontamination of radionuclide-contaminated metal equipment and products are described. (This document is in Russian).

544 V18/025840

Areal Density Application to U-Contaminated CaF₂ Storage

Paulson, L.E.

General Electric Company, Nuclear Energy Production, Wilmington, NC

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 171-175) (1996)

Calcium fluoride (CaF₂) is a byproduct arising from the treatment of ammonium fluoride liquid generated by the ammonium diuranate (ADU) conversion process. This fluoride waste by-product contains

low amounts of uranium. From the time of the ADU factory startup in 1968 until the addition of the waste treatment facility in 1972, CaF₂ precipitates were placed into two shallow-ground storage locations. The northwest storage area is made up of seven trenches located on high ground on the northwest quadrant of the site. The central storage area consists of six older process lagoons located at the site lagoon area. Since 1972, CaF₂ precipitate containing uranium has been accumulated in the lagoon storage area located at the waste treatment facility. In 1996, a D&D operation was conducted to support physical removal and relocation of the CaF₂ waste stored in the northwest storage area. This action facilitated the management of the resource and eliminates potential release of CaF₂ constituents from current storage locations. In conjunction with this effort, a criticality safety analysis (CSA) was performed to demonstrate safety of anew above ground storage warehouse built specifically to house the reclaimed calcium fluoride wastes containing low concentrations of uranium.

545 V18/022471

Arguments for Admission of the AVR Decommissioning Project to the OECD/NEA Programme on Experience Exchange (Juelich, 16.08.1994)

Cooperative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installations Decommissioning Projects, Proceedings of the 13th Meeting of the Liaison Committee, Paris, France, November 2-3, 1994. International Atomic Energy Agency, Vienna, Austria, 1994; (12 pp.) (1994)

This memo gives an overview of the decommissioning of the AVR and the current licensing procedure for SAFSTOR of the plant. Furthermore, it presents first conceptual considerations for ultimate disposal of the plant.

546 V18/024208

Aspects Determining the Selection of Dismounting Techniques for Disassembly of Reactor Vessels and Their Internals

Haferkamp, D.

Noell GmbH, Wuerzburg, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 169-178) (November 1995)

Selection of dismantling processes for the disassembly of activated building components from nuclear power stations is not only dependent upon the characteristics and application conditions of dismantling processes. Frequently, the decisive factor are characteristics specific to building components or the facility. Therefore, each example will have to be a tailor-made solution. Considering the requirements to be met by the dismantling processes for power reactors in Germany the following preferences show up:

external dismantling as a wet process for reactor internals and wet/dry dismantling for reactor pressure vessels. The reason is that these reactor types have sufficiently large water ponds which can be used for disassembly. The reactor pressure vessels of these reactors are to a great extent dismantled 'in-situ' with a dry technique, whereby the inner cutting seam can be produced to a certain extent by a wet technique. (This document is in German).

547 V18/021160

Aspects on Decommissioning of the Greifswald Nuclear Power Plant

Volkman, B.; Loeschhorn, U.

Ingenieurbuero Bernd Volkman, Greifswald, Germany; Energiewerke Nord GmbH, Greifswald, Germany

Jahrestagung Kerntechnik '93, Proceedings of a Conference, Cologne, Germany, May 25-27, 1993; Nuclear Engineering and Design 159(2-3):117-121 (November 1995)

The most important part of the nuclear facilities in the former German Democratic Republic is situated at Greifswald near the Baltic Sea. Shortly after reunification of the German states, a decision was made to decommission all Russian pressurised water reactors. The dismantling of them will be the biggest decommissioning project of series reactors world-wide. The low level of radioactive contamination, especially in the primary circuit, makes recycling of much material after decontamination possible.

548 V18/022520

Assessing the Status of a Nuclear Fuel Fabrication Facility to Support Decommissioning Plans

Chapman, G.C.; Moore, R.A.; Dechert, S.F.; Huston, T.E.; Hopson, M.A.

Nuclear Fuel Services, Inc., Erwin, TN

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):3-4b (June 1996)

Characterization and modeling of approximately 22 acres of a nuclear fuel fabrication facility's plant site has recently been completed. Characterization involved several phases: a gamma radiation survey, a geophysical survey, and a sampling and analysis campaign. Information obtained from previous area investigations and from the sampling and analysis campaign was used to divide the site into survey units, areas which possess similar radiological and physical characteristics. Each survey unit was then modeled using the RESRAD computer code to obtain an estimate of the potential dose from residual radioactive material. Finally, a limited evaluation of the effort required to release the site was performed based on site specific modeling and the criteria specified in the NRC's proposed rule "Radiological Criteria for Decommissioning." Data generated from this assessment will be used to support detailed decommissioning plans for this portion of the plant site.

549 V18/025394

Asset Recovery as a Way to Fund D&D Projects

Tuohy, J.M.; Hurt, N.H.; Quinn, D.; Capote, J.

IDM Environmental Corporation, Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (3 pp.) (1997)

There exists a world-wide market for the re-utilization of surplus plants, equipment and materials. The effective integration of asset recovery strategies in conjunction with facility D&D projects provides a number of very significant benefits: (1) the proceeds generated by the sale of surplus assets can be directly applied toward funding the D&D project, (2) the salvage of surplus equipment and materials significantly reduces the volume wastes requiring disposal, (3) the relocation of surplus plants can provide unique opportunities for site re-development and re-industrialization. This paper describes several recent examples of IDM's innovative approach to the decommissioning of industrial facilities, involving the integration of asset recovery and plant relocation strategies as essential elements of a comprehensive D&D strategy.

550

V18/021497

BNFL Nuclear Decommissioning Liabilities Management Program

Colquhoun, A.P.

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (19 pp.) (1995)

The objective of this paper is to describe BNFL's policy and strategy for decommissioning and also to summarize the overall scope of nuclear liabilities in the wider field of waste retrieval and storage, as well as the dismantling and demolition aspects of decommissioning. BNFL's recently established organizational arrangements for discharging all types of these liabilities are explained, together with a review of practical progress in dealing with them. Organizational changes in recent years have amalgamated decommissioning work with operations covering waste storage and retrieval operations. A strategy of minimizing residual activity in shutdown plants is pursued, followed by dismantling and demolition on appropriate time scales to minimize risk and cost. Since April 1995, a new BNFL subsidiary, Nuclear Liabilities Management Company Limited (NLM) has taken responsibility for discharge of BNFL's Waste Retrieval and Decommissioning liabilities on all BNFL sites. NLM has the objectives of optimal and lowest cost management of liabilities and much clearer segregation of physical operations from project specification and planning. The Ministry of Defense (MoD) policy, strategy, work programs and progress for the Atomic Weapons Establishment (AWE) are also outlined. MoD/AEA has established an equivalent strategy for dealing with its liabilities.

551

V18/022830

BOA: Asbestos Pipe-Insulation Abatement Robot System

Schempf, H.

Carnegie Mellon University, Robotics Institute, Pittsburgh, PA

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1929-1935)

(1996)

The BOA system is a mobile pipe-external robotic crawler used to remotely strip and bag asbestos-containing lagging and insulation materials (ACLIM) from various diameter pipes in (primarily) industrial installations. Steam and process lines within the DOE weapons complex warrant the use of a remote device due to the high labor costs and high level of radioactive contamination, making manual removal extremely costly and highly inefficient. Currently targeted facilities for demonstration and remediation are Fernald in Ohio and Oak Ridge in Tennessee.

552

V18/020877

BR3 PWR Pilot Decommissioning Project: First PWR Decommissioning in Europe

Massaut, V.J.; Klein, M.; Lefebvre, A.

SCK/CEN, Mol, Belgium; Belgatom, Brussels, Belgium

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 165-172) (1996)

The BR3 reactor was the first PWR reactor to be installed in Western Europe. Put into operation in 1962, it was shut down on June 30th, 1987. It was a low rated plant with an electrical net power output of 10.5 MW for a thermal power of 40.9 MWth. In 1989, BR3 was selected by the European Commission as one of the four pilot dismantling projects, in the scope of the European Union five year research programme on decommissioning of nuclear installations. The project, covering five years (1989-1993) has been divided into two main phases: (1) the first one (1989-1991) involving: (a) the chemical decontamination of the primary loop; (b) the selection and testing of techniques and tools for the remote dismantling of the reactor internals; and the remote dismantling of a first reactor internal, the thermal shield; (2) the second one (covering 1992-1993, extended to 1994) including the remote dismantling of all remaining reactor internals. In 1994, an extension of the contract was signed with the European Union, concerning the dismantling of the first set of reactor internals, unloaded since 30 years from the reactor, after two running campaigns. The main goal of this contract was to allow the comparison of the direct dismantling with a deferred operation, after 30 years of cooling down period. This work is being carried out by the plant owner, the SCK-CEN (Belgian Nuclear Research Center) associated with international partners as Siemens KWU, Framatome, Rolls-Royce & Associates Ltd., and Belgatom. Moreover, in the framework of the decommissioning plan of the plant, thorough decontamination processes for metallic components have been developed and tested. Dismantling and demolition of contaminated and activated concrete is also studied for preparing the complete dismantling of the reactor building.

553

V18/020875

Back to the "Green Field": The Experience and the Results Gained from the Decommissioning of the Niederaichbach Nuclear Power Plant (KKN)

Valencia, L.; Precht, E.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt,

Projektbereich Stillelegung, Karlsruhe, Germany

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 192-199) (1996)

By unveiling a memorial stone and planting a German oak tree on the premises of the former Niederaichbach nuclear power plant, a unique project was completed on 17 August 1995: A power reactor had given way to a "green field". KKN was the first power reactor ever decommissioned and removed completely. It represented a project for demonstration purposes. The findings obtained will be very useful for future decommissioning of shut down nuclear power plants. Significant experience was gained in the following areas: Licensing procedure under the Atomic Law; Logistics and Waste Management; Remote-controlled Dismantling; Activated Concrete Removal; Minimizing Radiation Dose; and, Release from Atomic Law Obligations

554 V18/020714

Basic Ways for Reducing Professional [Personnel] Radiation During Decommissioning of Nuclear Facilities

Zhao, S.

Beijing Institute of Nuclear Engineering, Beijing, China
Hewuli Dongtai (Trends in Nuclear Physics) 13(1):52-55 (March 1996)

Radionuclides and their activity in commercial nuclear reactors during decommissioning are briefly introduced. The basic ways and measures of reducing sources of radiation in reactor design, construction, operation and decommissioning are described. Measures are aimed at helping reduce sources of radiation in facilities being decommissioned and reducing personnel exposure during the decommissioning. (This document is in Chinese).

555 V18/024364

Beneficial Reuse of Empty DUF6 Cylinders

Nieves, L.A.; Arnish, J.; Nabelsiii, B.

Argonne National Laboratory, Argonne, IL
CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (12 pp.) (1996)

This presentation examined the issues relating to disposition of depleted uranium hexafluoride (DUF6) cylinders. Four options were evaluated: Recycle into LLW disposal containers; Reuse as LLW disposal containers; Free release for remelting; and, Crush, package, and bury. Feasibility and risk analyses were performed on each option. Annual health risks and environmental impacts were identified. Finally, cost comparisons were made and conclusions presented.

556 V18/024227

Better Uses for Financial Reserves: Reserves for Decommissioning, Dismantling and Waste Management

Could be Used for Changing Energy Structures

Irrek, W.

Energie Spektrum 11(9):42-46 (1996)

The reserves laid back by German operators of nuclear power plants for decommissioning, dismantling and waste management amounted to more than DM 44 billion in 1994, and the sum is still increasing. With this money, the public utilities intend to strengthen their competitive position in other industrial sectors. The author proposes to transfer this money into public funds instead in order to ensure that it is used in an economically more efficient manner. (This document is in German).

557 V18/025353

Biodecontamination of Concrete Surfaces: Occupational & Environmental Benefits

Johnson, L.; Rogers, R.D.; Hamilton, M.A.; Nelson, L.; Benson, J.; Green, M.

Lockheed Martin Idaho Technologies Company, Idaho Falls, ID; British Nuclear Fuels plc, Preston, United Kingdom

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Managers and engineers around the globe are presently challenged by high estimated costs for the decontamination and decommissioning of nuclear facilities which are no longer needed or are abandoned. It has been estimated that more than 73 sq Km of contaminated concrete currently exists in the US DOE complex, and that number is increased many fold when similar facilities are accounted for in other countries. Needs for the decontamination of concrete have been identified as: more cost effective decontamination methods, reduction of secondary wastes, minimized worker radiation exposures and, contaminant containment. Recently environmental microbes have been harnessed to remove the surface of concrete as a technique for decontamination and decommissioning (D&D). This Biodecontamination technology has been tested by Idaho National Engineering Laboratory (INEL) and British Nuclear Fuels plc (BNFL) scientists and engineers in both United States and United Kingdom nuclear facilities. Biodecontamination field tests at a shutdown nuclear reactor facility (EBR-I) have shown radioactively contaminated surface removed at rates of 4-8 mm/yr, thus validating the feasibility of this technology. Engineering economic analyses indicate two attractive benefits embedded in this approach to concrete D&D: (1) due to the passive nature of the technique, a cost savings of more than an order of magnitude is projected compared to the current labor intensive physical decontamination techniques; and (2) the exposure to humans and the natural environment is greatly reduced due to the unattended, highly contained biodecontamination process.

558 V18/021266

Characteristics of Storage Sites of Radioactive Products of Decontamination Arranged at the Territory of the Republic of Belarus

Serebryanyi, G.Z.; Rolevich, I.V.; Gvozdev, A.A.; Baklaj,

A.A.; Golikova, N.B.; Starobinets, S.E.; Polivko, L.A.

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CONF-950917 (Vol. 2); IECM '95, Proceedings of the Fifth International Conference on Radioactive Waste Management and Environmental Remediation, Vol. 2: Management of Low-Level Waste and Remediation of Contaminated Sites and Facilities, S. Slate, R. Baker and G. Benda (eds.), Berlin, Germany, September 3-7, 1995. American Society of Mechanical Engineers, New York, NY, 913 pp.; (pp. 1629-1630) (1995)

Decontamination products from the aftermath of the Chernobyl Nuclear Power Plant accident have been stored in the Gomel Region of the Republic of Belarus. In accordance with State objectives to more exactly define the radioactive waste storage sites, their inventories and registration have been conducted. Sixty-nine storage sites have been investigated regarding the: (1) Areas; (2) Bulk amount of waste disposed; (3) Cs-137, Sr-90, 239, and Pu-240 specific activities; and (4) Level of radioactivity in the groundwater. It has been found that Cs-137 inventory is 1.9×10^{12} Bq; Sr-90 is 1.9×10^{11} Bq; and Pu-239 and Pu-240 are 3.4×10^9 Bq. The majority of the storage sites are potentially dangerous for the environment owing to possible ingress of radionuclides into the surface and groundwaters. A system of radiation control and supervision, including a network of 47 hydrogeological holes has been created to study the processes of migration of radionuclides from the storage sites into the groundwater. During this time, maximum specific activities of Cs-137 and Sr-90 in the groundwater have accounted for 270 Bq/cubic meter and 40 Bq/cubic meter, respectively.

559

V18/022134

Chemical Decontamination: Modelling the Electrolytic Regeneration of Cerium 4 Plus - 1995 Scientific Report of the Belgian Nuclear Research Centre

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Centre d'Etude de l'Energie Nucleaire, Mol, Belgium

INIS-mf-14878; 138 pp. (p. 40) (1996)

Electrochemical techniques are used for the decontamination of radioactive contaminated metallic pieces. The objectives of the scientific work, performed at the Belgian Nuclear Research Centre SCK-CEN, in this area are 1) to optimize the selective electrochemical regeneration of the ceric ion in sulphuric acid solutions, 2) to optimize the extraction of sulphuric acid from used effluents by means of double electrodialysis, and 3) to provide reliable data and to develop models aimed at determining the final plant characteristics. The progress in this research area is given.

560

V18/021475

Chernobyl NPP Decommissioning: Current Status and Alternatives

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CONF-960306 (Vol. 4); ICONE-4 (Vol. 4), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Plant Operations and Maintenance, Nuclear Fuel Cycle,

Institutional and Energy Policy, Non-Proliferation and Safeguards, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 4, 745 pp.; (pp. 357-361) (1996)

After the Chernobyl accident of April 26, 1986, many contradictory decisions were made concerning the Chernobyl nuclear power plant (NPP) future. The principal source of contradictions was a deadline for a final shutdown of the Chernobyl NPP units. Alterations in a political and socioeconomic environment resulted in the latest decision of the Ukrainian Authorities about the year 2000 as a deadline for beginning the Chernobyl NPP decommissioning. The date seems a sound compromise among the parties concerned. However, in order to meet the date a lot of work should be done. First of all, a decommissioning strategy has to be established. The problem is complicated due to both site-specific aspects and an absence of proven solutions for the RBMK-type reactor decommissioning. In the paper the problem of decommissioning option selection is considered taking into account the influence of the following factors: relevant legislative and regulatory requirements; resources required to carry out decommissioning (man-power, equipment, technologies, waste management infrastructure, etc.); radiological and physical status of the plant, including structural integrity and predictable age and weather effects; impact of planned activities at the destroyed unit 4 and within the 30-km exclusion zone of the Chernobyl NPP; planned use of the site; and socio-economic considerations.

561

V18/021940

Clearance Levels for Radionuclides in Solid Materials: Application of Exemption Principles - Interim Report for Comment

International Atomic Energy Agency, Vienna, Austria

IAEA-TECDOC-855; 75 pp. (January 1996)

Radioactive waste is produced during the generation of nuclear power and the use of radioactive materials in industry, research and medicine. The importance of the safe management of radioactive waste for the protection of human health and the environment has long been recognized. This report proposes levels of radionuclides in solid materials below which regulatory control may be relinquished on the grounds that associated radiation hazards are trivial. The radiological basis for the guidance is the international consensus on principles for the exemption of radiation source, and practices from regulatory control reached in 1988 and published in IAEA Safety Series No. 89. The levels are intended as international reference values. They may find use in agreements between Member States on the transboundary movement of materials for which the final destination and final use cannot be known in advance.

562

V18/020619

Clearance of Materials and Buildings from Decommissioning Operations in Europe

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 355-362) (1995)

The increasing cost and complexity of final disposal of radioactive waste is a major incentive for decommissioning operators to seek release of very low activity radioactive material from regulatory control. The European Union (EU) supports the use of safe clearance procedures and has proposed nuclide-specific clearance levels to provide a common basis for European regulators. The EU's R&D program has also contributed significantly to the introduction of effective decontamination, measurement, and recycling techniques.

563

V18/020719

Closure of Trawsfynydd Power Station - Effects on Staff and the Local Community and Identifying a Strategy for Decommissioning

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 295-303) (1995)

The decision to close Trawsfynydd power station had implications for staff and the local community. It was necessary to take immediate steps to prepare for decommissioning the station and to devise an appropriate staff structure. At the same time, there was also a need for Nuclear Electric to adopt a clear and well defined decommissioning strategy. As the station is located within a National Park, as local employment opportunities are very limited, and as the nuclear industry was approaching a Government Review, Nuclear Electric took steps to consult the staff and the local public on the options for decommissioning the station. This consultation influenced the decommissioning strategy chosen for Trawsfynydd.

564

V18/022128

Code System COROUT: Radioactive Inventory Calculations

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INDC(NDS)-355; International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning, N.P. Kocherov (ed.) International Atomic Energy Agency (IAEA), Vienna, Austria, 98 pp.; (pp. 89-98) (April 1996)

The code system COROUT is devoted to the evaluation of nuclear reactor out-of-core radioactive inventory for the sake of the nuclear power plant decommissioning problem. The code includes

calculations of the neutron flux distributions and activation kinetics in a consistent way. Only thermal neutrons are taken into consideration in the present code version. The Code is divided into three steps. The first step prepares the necessary data file containing data on reactor geometry, core flux, reactor operational history, and data on elements in the out-of-core zones. The main part of calculations are performed during the second step. Next the thermal neutron flux distribution in the out-of-core area is calculated for two-dimensional cylindrical geometry and the system of gain-loss equations and activation kinetics is solved for the elements in the different out-of-core shells. The Vladimirov's method of iterations on the spatial grid is used for the neutron flux calculations. The kinetic equations are solved by the operational method. The change of neutron field due to activation during reactor campaign is taken into account. The third part of COROUT code system allows preparation of plots of flux and activity distribution for different shells. All steps could be initiated independently using the results stored at the previous steps. The code is destined for personal computers and has been written on the basis of 32-bit FORTRAN language for IBM PC.

565

V18/024176

Collimated Insitu Gamma Spectrometry: A Method for Identifying Suspected Surfaces, Rehabilitation Monitoring and Exemption of Surface Areas from Regulatory Control

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 385-395) (November 1995)

In the decommissioning of reactors, areas with a low probability of contamination have been evaluated by direct measurement sampling on a grid system covering an extremely small part of the area to be investigated. It has, therefore, not been possible to determine the residual radioactivity of the facility areas concerned or their radiological relevance with the required reliability. The collimated in-situ gamma spectrometer is a measuring device which is suitable of supplementing or replacing the procedures applied for release strategies in terms of construction, calibration and efficiency, as it avoids systematic errors of conventional measuring processes. (This document is in German).

566

V18/020944

Collimated Insitu Gamma Spectrometry: A New Method for Fast Clearance Measurements of Large Areas or Building Structures of Nuclear Facilities Under Decommissioning [February 1996]

Guglhoer, P.; Hummel, L.

Department Radiation Protection, Munich, Germany
 CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (17 pp.) (1996)

The requirements on a collimated in situ gamma spectrometer for the use in nuclear facilities under decommissioning is described. A prototype was developed and constructed. The equipment was used in seven facilities in Germany and France to check mass- or surface-specific activities on outdoor grounds and inside the buildings in restricted areas. The results gained by in-situ gamma spectrometry are compared with "traditional" methods like sampling or measuring with contamination monitors. The advantages of this new technique are worked out. It could be shown that such a device is able to meet in the most cases the essential detection limits regarding national radiation protection ordinances or release criteria.

567 V18/022517

Collimated Insitu Gamma Spectrometry: A New Method for Fast Clearance Measurements of Large Areas or Building Structures of Nuclear Facilities Under Decommissioning [July 1996]

Hummel, L.; Guglhoer, P.

TUV Bavaria, Munich, Germany

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):28a (June 1996)

Based on a 40% p-type HPGe-detector with a shielding of approximately 50 g per centimeter squared, a prototype collimated in-situ gamma spectrometer was developed, constructed, and calibrated. The collimator was optimized for weight (portability) and sharp transition between "field of view" and the area which should be faded out. Because of the complicated calibration procedure, two completely independent methods were used to reach high reliability. The device is completely battery operated and able to measure the activity on vertical and horizontal areas by averaging over at least 0.4 sq m and up to more than 10 sq m. The equipment was used in nuclear power plants, fuel fabrication facilities, and fuel reprocessing plants in Germany and France to check mass- or surface-specific activities on outdoor grounds and inside the buildings in restricted areas. Cross-checks with surface contaminated concrete, which was previously measured, show an agreement better than 30%. Compared with traditional methods, in-situ measurements are more representative than drawing and analyzing samples. Unlike contamination monitors, in-situ gamma spectrometry is nuclide specific and integrates over nuclides migrated into the surface.

568 V18/023539

Commercial Power Reactor Decommissioning in the U.S.

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TLG Services, Inc., Bridgewater, CT

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group,

Stockholm, Sweden, May 6-10, 1996, 512 pp.; (13 pp.) (1996)

This presentation focused on the shutdown of commercial nuclear plants and the lessons learned from decommissioning at each facility. The following plants were reviewed: Shoreham, Yankee Rowe, Rancho Seco, Trojan Nuclear Plant, Fort St. Vrain, and San Onofre Unit 1. Additionally, the SEC/FASB Exposure Draft on decommissioning as an unfunded liability was discussed.

569 V18/023374

Commissariat a l'Energie Atomique's Industrial Organization of Dismantling Projects

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 CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:451-452 (1996)

The objectives of the dismantling and decommissioning of Commissariat a l'Energie Atomique's (CEA's) installations and associated research and development (R&D) facilities are described. The strategic objective of the CEA is to establish in its nuclear research center an irreproachable situation with respect to the shutdown of nuclear installations in the area of protection and safety norms under the best possible cost and schedule conditions. The challenge is to demonstrate the reversible nature of nuclear installations; to help, in this way, to reassure the public that the nuclear generation of electricity is a valid option and to develop the skills that will enable French companies when the time comes to take their place in the market for dismantling nuclear power plant stations and diverse other such installations.

570 V18/024177

Comparison of Radiometry and Mass Spectroscopy for Radioactivity Analysis with Regard to Their Suitability for Exemption of Building Materials from Nuclear Facility Dismantling

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 403-415) (November 1995)

Since 1994, the Institute of Radiochemistry of Munich Technical University (RCM/TUM) has been carrying out the project of 'Dismantling of Nuclear Facilities: Comparison of Measuring and

Analytical Processes for Examining Residual Material and Waste Arising in the Dismantling of Nuclear Facilities', a project supported by the German Ministry of Education, Science, Research and Technology (BMBF). This project's goal is to carry out comparative studies to establish measuring and analytical methods qualified in terms of detection sensitivity, accuracy, and time requirements for evaluating radionuclides which are difficult to detect but which are relevant in terms of verification, or which could at least serve as a reference for validation processes. Focus is on nuclides which are typical of the Karlsruhe Fuel Reprocessing Facility (WAK): fission products which are pure beta radiation emitters (Sr-90, Tc-99 and Pu-241) and actinides which emit alpha particles (selected isotopes of thorium, uranium, neptunium, plutonium and americium). (This document is in German).

571 V18/020616

Compilation of the Decommissioning Archive Record for Hunterston "A" Power Station

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 275-284) (1995)

The Nuclear Site License and other statutory legislation require retention of extensive records appertaining to the design, construction, operation and decommissioning of nuclear licensed sites. Guidelines for decommissioning recommend the formation of a Decommissioning Archive of such records. The compilation of a Decommissioning Archive Record (DAR) addresses existing records generated throughout the life of a facility and a selection is made for retention. The selection of the DAR has been developed from established criteria and meets requirements of statutory, regulatory and site license compliance for the decommissioning phase and addresses basic safety considerations. A case has been made for the adoption of optical disk as the long term storage medium for the DAR with the recommendation for the controlled destruction of the hard copy.

572 V18/025497

Completion of the Japan Power Demonstration Reactor Decommissioning Program: Experience and Waste Management

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Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan; Atomic Energy Society of Japan, Tokyo, Japan; Japan Atomic Industrial Forum, Inc., Tokyo, Japan

CONF-9610248 (Vol. 2); Proceedings of the Tenth Pacific Basin Nuclear Conference, Kobe, Japan, October 20-25, 1996, 614 pp.; (pp. 1223-1230) (October 1996)

The Japan Power Demonstration Reactor (JPDR) decommissioning program was completed successfully by March 1996. This was the first trial dismantling of a nuclear power plant in Japan. Know-how and data on dismantling activities and techniques were obtained in the program. Remote dismantling by project-developed cutting techniques, waste management, and implementation of site release procedures are especially useful experiences for future decommissioning of commercial nuclear power plants in Japan.

573 V18/024222

Contaminants and Heavy Metals from Decommissioning Nuclear Reactors

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 143-155) (November 1995)

The reactor facilities which are presently being dismantled (power reactors) show that we may expect only a small amount of building waste materials containing contaminants. Essentially, it is a question of building rubble with a portion of foreign materials, which is classified into low categories of the refuse law in accordance with present legislation, and which therefore may be disposed of as building rubble. The building waste materials will be recharacterized in follow on studies if necessary, because of the laws and ordinances currently under discussion. The studies at the Rossendorf 10 MW research reactor show that also in facilities of the new German states, the amount of building rubble containing contaminants is very low. Problems arise in the exact classification of the foreign materials used, such as coats of paint and insulation. (This document is in German).

574 V18/024199

Control of Dismantling Waste and Field Test of Burning Waste

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Genshiryoku Kogyo (Nuclear Engineering) 42(12):26-30 (December 1996)

The operation period of an atomic reactor is thought to be about 30 to 40 years. The development of treatment and storage for the dismantled waste from nuclear facilities and a field test are described. The Manual of Management of JPDR Dismantled Waste, which contained the classification, flow, and the treatment of dismantled waste, served as a guide to control waste. The classification of waste, flow, evaluation of radioactivity level, buried containers for

dismantled waste, volume, storage and reuse, and the burning test are explained. The burning test facility should be controlled from the viewpoint of radiation exposure management for 29 years. (This document is in Japanese).

575

V18/020614

Cost Effective Safety Cases (for Sellafield)

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 149-158) (1995)

This paper reviews the experience of developing safety cases for major decommissioning projects at British Nuclear Fuels plc (BNFL), Sellafield. Experience to date and the key features of example safety cases are described. Lessons learned are discussed including experience in overcoming problems. An approach to safety documentation has been developed which results in robust and yet flexible safety cases. This gives a cost-effective system both in terms of the safety cases themselves and in consequent benefits during decommissioning operations.

576

V18/024221

Criteria Determining the Selection of Slags for the Melt Decontamination of Radioactively Contaminated Stainless Steel by Electroslag Remelting

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SAND97-0601C; CONF-970232; Proceedings of an International Symposium on Liquid Metal Processing and Casting, Santa Fe, NM, February 1997; (16 pp.) (1997)

Electroslag remelting (ESR) is an excellent process choice for the melt decontamination of radioactively contaminated metals. ESR furnaces are easily enclosed and do not make use of refractories which could complicate thermochemical interactions between molten metal and slag. A variety of cleaning mechanisms are active during melting; radionuclides may be partitioned to the slag by means of thermochemical reaction, electrochemical reaction, or mechanical entrapment. At the completion of melting, the slag is removed from the furnace in solid form. The electroslag process as a whole is greatly affected by the chemical and physical properties of the slag used. When used as a melt decontamination scheme, the ESR process may be optimized by selection of the slag. In this research, stainless steel bars were coated with non-radioactive surrogate elements in order to simulate surface contamination. These bars were electroslag remelted using slags of various

chemistries. The slags investigated were ternary mixtures of calcium fluoride, calcium oxide, and alumina. The final chemistries of the stainless steel ingots were compared with those predicted by the use of a Free Energy Minimization Modeling technique. Modeling also provided insight into the chemical mechanisms by which certain elements are captured by a slag. Slag selection was also shown to have an impact on the electrical efficiency of the process as well as the surface quality of the ingots produced.

577

V18/023931

Criteria for Releases and Disposal of Low Level and Intermediate Level Waste in Sweden

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Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (14 pp.) (1993)

In Sweden there exists a complete system for management, including final disposal, of all radioactive wastes which are not classified as long-lived or high-level waste. This paper will present the disposal options and the requirements set on the waste categories as well as Sweden's four different engineered shallow land disposals. The advantages of having a shallow land disposal together with exemption of waste and a final storage facility for low-level and intermediate-level waste are discussed. Finally the paper will give a summary of why Sweden has succeeded in establishing a full system for low-level and intermediate-level waste. The discussion is from a regulatory point of view.

578

V18/023352

Criticality Issues in Decommissioning Activities at Sellafield

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 176-181) (1996)

Since 1983 British Nuclear Fuels (BNFL) at Sellafield has been actively involved in the decommissioning of its old plant, with 7 projects being fully completed, 6 projects in the practical phase, and 12 currently in the planning design and strategy studies phase. These projects vary from the dismantling of a single large alpha-contaminated glove box to the decommissioning of an entire 11-story building housing redundant reprocessing facilities. Decommissioning techniques have developed over a number of years on the site and now draw from a wealth of experience to meet the substantial challenges in the present day. The methodology employed throughout the production of Criticality Safety Assessments has had to evolve to keep pace with these techniques. Decommissioning projects have posed some unique problems for Criticality Safety Assessment, with regard to both the nature and

methodology of the proposed operations. This paper describes the facilities involved and highlights the criticality issues that have been addressed in preparing operational Criticality Safety Cases to support these decommissioning operations, making reference to example case studies where appropriate.

579 V18/023685

Current Issues in the Regulation of Decommissioning and Radioactive Waste

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U.S. Nuclear Regulatory Commission, Washington, DC
CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (15 pp.) (1996)

Decommissioning involves removing radioactive contamination to such levels that a facility can be released for unrestricted or perhaps restricted use. Over the last several decades, an increasing number of power plants, fuel cycle facilities, and other operations involving radioactive materials have ceased licensed activities, either because they have reached the end of their useful life, or because other pressures have forced their shutdown. Because of this, decommissioning has become a significant part of the nuclear industry in recent years and has received increased attention by NRC. Given this trend, it is important that NRC focus on decommissioning to ensure that it is performed safely and consistently with the commitments made when these facilities began operations years ago. It is also important to demonstrate that the entire cycle of radioactive materials use, from initiation to termination, is safe and protects the public and the environment.

580 V18/025828

Current Status of Decontamination and Decommissioning Programs in Japan

Ichikawa, M.; Tanaka, M.; Yanagihara, S.

Japan Atomic Energy Research Institute, Ibaraki, Japan
CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (p. 60) (1996)

As of September, 1996, there are 49 commercial nuclear power plants operating in Japan, providing electricity which equals approximately 30% of total energy supply in the country. In addition, four nuclear power plants are under construction. However, nuclear facilities constructed in the early stage of development of nuclear energy are getting old in recent years. The decommissioning of prototype nuclear facilities, the Japan Power Demonstration Reactor (JPDR) and the JAERI Research Reactor 3 (JRR-3) was successfully completed in the Japan Atomic Energy Research Institute. The Tokai Power Station, which is Japan's oldest commercial nuclear power plant will be shutdown by March 1998. This will be the first case of decommissioning of a commercial nuclear power plant in Japan. In consideration of the future decommissioning of commercial nuclear power plants, the basic

policy for decommissioning of nuclear power plants was established by Atomic Energy Commission in the Long-Term Nuclear Power Development and Utilization Plan published in 1982. It states that dismantling of retired nuclear power plants should be performed as early as possible after shutdown and the site should be effectively reused for the next generation of the nuclear power plant. It also prescribed that wide-ranging technologies for future decommissioning of commercial nuclear power plants should be developed and demonstrated through the JPDR and the JRTF (JAERI Reprocessing Test Facility) decommissioning programs. A special group in a sub-committee on nuclear power organized by government studied various aspects of decommissioning of commercial nuclear power plants. The study on standardized decommissioning procedures was one of the key results of the group, indicating the benefits of decommissioning following five to ten years of mothballing. The decommissioning guidelines for nuclear power plants was established based on the study of the standardized decommissioning procedures and cost estimations with regard to 1,100 MWe class water reactors. Under these circumstances, efforts have also been made for research and development for decontamination and decommissioning technologies as well as for safety research in both government organizations and private sectors. The Ministry of Trade and Industry promotes technology development for decontamination and decommissioning in consideration of commercial nuclear power plants. The Science and Technology Agency has also conducted several decommissioning programs for prototype nuclear facilities and promotes advanced technology development for decontamination and decommissioning. The experience of decommissioning of prototype nuclear facilities will be transferred to that of commercial nuclear power plants. The JPDR decommissioning program proved that dismantling of the nuclear power plant was practical, and the lessons learned were summarized in the project. These will be useful for future decommissioning of commercial nuclear power plants. The studies on decommissioning scenarios and technologies with regard to commercial nuclear power plants have been conducted by applying the experience of the JPDR decommissioning program. The data and lessons learned in dismantling of prototype nuclear facilities have been accumulated for decommissioning of commercial nuclear power plants in the future. Those must be useful for study on decommissioning scenarios and practical plans for establishing effective plant life cycle management. This paper describes the current status on decontamination and decommissioning programs together with strategies of decommissioning of nuclear facilities in Japan. (Complete text)

581 V18/022850

Current Status of the Decommissioning of Gas Cooled Reactors in Spain and Italy

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Research Association for Nuclear Facility Decommissioning, Tokyo, Japan

Journal of the RANDEC 15:2-11 (December 1996)

Spent fuels from the reactor of Vandellós-1 Power Station in Spain and Latina Power Station in Italy have been completed. At present, they are waiting for licenses for the commencement of decommissioning work. These licenses are scheduled for issuance in

October 1996 and June 1997, respectively. After the licenses are issued, the safe storage preparation works at these plants will be performed over a 5 year period. Vandellós-1 and Latina will be dismantled after 25 years and 40 years safe storage period, respectively. Although with the time period of safe storage differs among countries, their fundamental policy on the decommissioning of the reactors is the same as that of Japan, that is, reactors should be finally dismantled. (This document is in Japanese).

582

V18/022542

Cutting Technique for Dismantling of Nuclear Facilities

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CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 575-578) (May 1996)

Short communication. No abstract available.

583

V18/024215

Cutting Thick Sheets with Nd:YAG Lasers Considering Use of Optical Fibers and Emission Reduction

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 265-276) (November 1995)

Combining Nd:YAG lasers with optical fibers makes it possible to handle the beam in a flexible and economical fashion, which is a solution for application in nuclear reactor decommissioning because it is possible to guide the beam easily over large distances. It is also possible to process materials without any cutting force and with narrow cutting joints at difficult-to-get-at places and at a large distance from the beam generation. Studies have shown that it is possible to cut CrNi materials with sheet thicknesses of 20 mm at cutting speeds of 200 mm/min using Nd:YAG lasers in the range of up to 1,500 W. We can safely say with regard to present and expected developments in Nd:YAG lasers with high average laser performance that the range of cutting speeds and sheet thickness will be extended while simultaneously improving quality. (This document is in German).

584

V18/025350

D&D Techniques Applied During Decommissioning of

Waste Stored at NPP Rheinsberg

Schmidt, D.; Christ, B.G.

DETEC GmbH, Alzenau, Germany

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (5 pp.) (1997)

Nuclear Power Plant (NPP) Rheinsberg (KKR) was the first nuclear power plant of the former German Democratic Republic and started operation in 1966 after nine years of construction. Based on the former safety philosophy, it was expected that the final storage of low and medium active waste would take place on the KKR site. A special purpose storage facility for solid and liquid radioactive wastes (ALfR, "Lager fuer radioaktive Abfaelle") was used. The overall decommissioning concept of KKR includes: (1) total dismantling of facilities and demolition of buildings; (2) release from the atomic act; and (3) recultivation to "green-field" by the year 2009. Due to the potential risk to the environment of the wastes stored, the ALfR-part of the KKR is to be decommissioned first. Wastes shall be removed as soon as possible. The facilities and buildings of the ALfR are scheduled to be treated subsequently. The removal of solidified radioactive evaporator concentrates from the Beton-Monolith part of the ALfR is now complete. The decontamination of the building is to a point where only some contamination remains in the deeper layers of concrete floor. Wastes have been sent for final storage at the Morsleben repository. The removal of ALfR-solid is currently completed and the wastes generated are placed in Morsleben. Liquid radioactive wastes of ALfR-liquid are separated into solid and liquid parts. The solid wastes will also be sent to Morsleben. The liquids will be stored in other KKR tanks for further treatment with NPP standard equipment. The techniques applied and experience gained are described below.

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V18/023373

D&D Techniques Applied During Decommissioning of Waste Stores at Rheinsberg Nuclear Power Plant

Christ, B.G.; Schmidt, D.

DETEC GmbH, Alzenau, Germany; NUKEM Nuclear Technologies, Columbia, SC

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 254-257) (1996)

The NPP Rheinsberg nuclear power plant (NPP) (KKR), the first nuclear power plant of the former German Democratic Republic, was commissioned in 1966 and shut down for safety reasons in 1990. Today, the plant is in a postoperative condition. The former safety philosophy for Rheinsberg's waste was the long-term storage of all low-and medium-active waste at the KKR site. After the reunification of Germany, a new decision was made. The KKR storage facilities, built and operated for both solid and liquid radioactive waste, now have to be removed, and waste will be stored in the final repository of Morsleben before 2000. The overall

decommissioning concept of KKR includes total dismantling of facilities and demolition of buildings, release from the atomic act, and recultivation to "green-field" by the year 2000. Due to the potential risk to the environment the waste storage facility is to be decommissioned first. The removal of radioactive solids is complete. Liquids have been stored in other KKR tanks for further treatment with NPP standard equipment. The decontamination of the building is to a point where only some contamination remains in the deeper layers of concrete floor. The techniques applied and experience gained are described in this paper.

586 V18/023691

DECCER Methodology Changes: Why the Estimates Change

Seymore, F.W.

TLG Services, Inc., Bridgewater, CT

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (8 pp.) (1996)

DECCER (DECOMmissioning Costs, Exposures and Radwastes) is a model aimed to estimate all expenditures by utilities or owners in support of decommissioning prior to shutdown and all costs following shutdown. Recent changes in the model are related to the following: staffing transition costs; characterization and termination surveys; unit variables to convert from inventory quantity to waste packages/ truck shipments/ burial volume per unit were revised to reflect field experience; alternate burial location for large volume concrete/soil/ dry active waste; removal of clean material from contaminated areas; unit cost factors to allow for both insulated and non-insulated conditions; and, HP support now directly part of unit cost labor crew.

587 V18/020721

Data Analysis and Lessons Learned in Decommissioning the Japan Power Demonstration Reactor

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Japan Atomic Energy Research Institute, Ibaraki, Japan; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 127-140) (1995)

The Japan Power Demonstration Reactor decommissioning program is in its final stage. Survey of radioactivity in the facilities is ongoing toward declassification of radiation control areas. Various data have been collected in the dismantling activities, and useful lessons were obtained from the first trial of dismantling the Japanese nuclear power plant. The result of data analysis has been applied to the development of the code system for management of reactor decommissioning for future decommissioning of commercial nuclear power plants.

588 V18/021154

Database Structure for Radiological Optimization Analyses of Decommissioning Operations

Zeevaert, T.; Van de Walle, B.

Centre d'Etude de l'Energie Nucleaire, Mol, Belgium

BLG-686; 36 pp. (September 1995)

The structure of a database for decommissioning experiences is described. Radiological optimization is a major radiation protection principle in practices and interventions, involving radiological protection factors, economic costs, social factors. An important lack of knowledge with respect to these factors exists in the domain of the decommissioning of nuclear power plants, due to the low number of decommissioning operations already performed. Moreover, decommissioning takes place only once for a installation. Tasks, techniques, and procedures are in most cases rather specific, limiting the use of past experiences in the radiological optimization analyses of new decommissioning operations. Therefore, it is important that relevant data or information be acquired from decommissioning experiences. These data have to be stored in a database in a way they can be used efficiently in ALARA analyses of future decommissioning activities.

589 V18/022524

Database on Cutting Techniques and Associated Filter Systems for Dismantling - EC DB TOOL

Hueske, M.; Bach, F.W.; Haferkamp, H.; Rahlfs-Marhold, A.

Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 587-590) (May 1996)

Short communication. No abstract available.

590 V18/022834

Decision Analysis Science Modeling for Application and Fielding Selection Applied to Metal Decontamination Technologies

Lagos, L.E.; Burton, R.; Ebadian, M.A.

Florida International University, Hemispheric Center for Environmental Technology, Miami, FL

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1956-1961) (1996)

This study focused on identifying currently accepted metal nuclear decontamination and industrial metal surface removal technologies. Emerging technologies were also reviewed to determine their applicability to site needs. The most promising technologies will be demonstrated at the Hemispheric Center for Environmental Technology (HCET) on the campus of Florida International

University (FIU) to validate the data collected and address specific site concerns. Enhancements and further testing requirements for the commercial as well as the industrial technologies were also considered. Multiobjective or multicriteria decision-making techniques (MODM) have been employed to identify the appropriateness of these standard and innovative techniques to surface removal. A decision model to validate the application of the given technologies on a site-by-site basis has been developed. In order to determine the nature of and achieve the correct weight of the decision variables, an analysis of site surveys has been performed. This analysis required a concurrent review of the available waste characterization surveys and related data. A full set of outcome variables has been assigned, and the appropriate technique for algorithm development has been selected. In order for these dynamic, multiobjective problems to be solved on a continuing basis, an interactive or quasi-interactive method of solution has been developed. This method will serve as the basis for an interactive computer program to solve for appropriateness in the decision-making process for the application of these remediation techniques.

591

V18/022844

Decision Analysis Science Modeling for Application and Fielding Selection Applied to Concrete Decontamination Technologies

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Florida International University, Hemispheric Center for Environmental Technology, Miami, FL

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 2011-2015) (1996)

The study is comprised of two phases. Phase I is partially complete. Field testing, which will complete Phase I, is scheduled to be conducted in July 1996. Phase I focuses on identifying standard and emerging concrete surface removal nuclear decontamination technologies. Nonnuclear industrial technologies will also be reviewed according to baseline technologies to determine their applicability to remediation objectives. The most promising technologies will be assessed at the Hemispheric Center for Environmental Technology (HCET) on the campus of Florida International University (FIU). The assessment will provide comparable data related to operations and maintenance, health and safety, and secondary waste management issues. Enhancements and further testing requirements for the commercial as well as the industrial technologies will be considered. The compilation of comparable data in the areas of operations and maintenance, health and safety, and secondary waste management along with site-specific information related to labor rates, disposal costs, equipment and material costs, and schedule constraints will allow multiobjective or multicriteria decision-making techniques (MODM) to be employed, which constitutes Phase II. These MODM techniques will allow determination of the appropriateness of the different techniques used to perform concrete surface removal. Defensible decisions are paramount in serving the multiple goals of the United States Department of Energy's operating mandate. This review and analysis mechanism will provide for an extension of the

decision-making criteria beyond a simple cost-benefit analysis. A discussion of the development of the MODM model is not included in this paper, however.

592

V18/023572

Decommission of Nuclear Ship Mutsu

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Ishikawajima-Harima Giho (Ishikawajima-Harima Engineering Review) 36(6):461-465 (November 1996)

The nuclear-powered ship MUTSU was decommissioned by removing the reactor room in June 1995, which was hoisted and transported by a floating crane to a shore storage room at Sekinehama, Aomori Prefecture. This work was carried out in three stages: extraction of the spent fuel assemblies and neutron sources, dismantling of the machinery in the reactor auxiliary room, and separation and transportation of the reactor together with the secondary shielding structure and surrounding hull. IHI mainly conducted the third stage work. The separation work of the reactor room structure using a semisubmersible barge is outlined. Stress analysis and design of the reactor room for lifting work is also described. (This document is in Japanese).

593

V18/024878

Decommissioning A-Plants with VR

Mechanical Engineering 118(2):26 (February 1996)

If asked to identify the most common use of virtual reality (VR) in a production engineering environment, engineers would probably point to walk-through applications. However, engineers recognize that VR's potential extends far beyond such applications, and they are taking advantage of VR tools to re-engineer the engineering process itself. At TRW, Inc., in Redondo Beach, California, for example, engineers are using VR to create virtual replicas of plants in which atomic bombs were produced. The 3-D models essentially replace the 2-D drawings used by workers at the U.S. Department of Energy who are dismantling the structures. By re-engineering the process of measuring existing structures manually and updating (or re-creating) 2-D drawings, TRW engineers have produced far more accurate engineering data in less time and at a lower cost. Further, the resulting virtual models help workers prepare the demolitions far more effectively than paper drawings ever could.

594

V18/020658

Decommissioning Activities at Latina NPP

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 71-77) (1995)

The Latina plant, equipped with a gas-cooled graphite moderated reactor, was definitely taken out of service by a government decision in 1987. Since then it has been de-fueled and granted a new license that allows for operations aimed at putting the plant in a passive safe enclosure state. The main anticipated decommissioning activities are: the dismantlement of some contaminated systems and components; the refurbishing, modification and reinforcement of systems, components and premises; and sorting, treating, conditioning and storing on site radiological waste.

595 V18/023533

**Decommissioning B204 Primary Separation Plant:
Progress Report - October 1995-April 1996**

Challinor, S.F.

British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (1 p.) (1996)

The scope of the decommissioning of the B204 Primary Separation Plant is the removal of process plant; pipework, vessels, steelwork and the decontamination of the residual building structure to meet low level waste criteria on subsequent demolition. Highlights for this reporting period are as follows. The Site Regulators have issued an agreement to commence active commissioning of the MAN cell equipment. Final preparations for Active commissioning of MAN cell equipment is in progress. Automated size reduction programming has been demonstrated. Phase 5, Stainless Steel Hulls Silo emptying project equipment has been installed. The Site Regulators have given agreement to begin inactive commissioning for the silo emptying equipment. Inactive commissioning of silo emptying equipment is in progress. This report also includes updates on the 9 work phases, progress in technical areas, management aspects, and costs.

596 V18/022123

**Decommissioning Calculations for IAEA Benchmark
(JPDR) - Phase 2**

Wall, S.J.; France, N.J.; Dean, M.H.

AEA Technology, Technical Services Division, United Kingdom; International Atomic Energy Agency, International Nuclear Data Committee, Vienna, Austria

INDC(NDS)-355; International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning, N.P. Kocherov (ed.) International Atomic Energy Agency (IAEA), Vienna, Austria, 98 pp.; (pp. 9-45) (April 1996)

A benchmark inter-comparison exercise on radioactive inventory calculations for fission reactor decommissioning was set up on the recommendation of the IAEA Advisory Group Meeting on Nuclear Data Requirements for Fission Reactor Decommissioning. The aim of the project is to derive likely calculational uncertainties in such calculations, and also to validate different methods against both measurements and each other. A previous paper described benchmark calculations performed in the United Kingdom, using the codes ANISN, MCBEND, and DORT. The data for this benchmark was derived from the actual project to decommission the Japanese

Power Demonstration Reactor (JPDR). ANISN, MCBEND, and DORT results compared well with each other, and agreement in the shroud and reactor vessel was good compared to experiment. However, calculated activities were found to be up to a factor of 5 to 10 times higher in the bio-shield, although this was in line with calculations carried out elsewhere. This paper investigates the origins of this discrepancy, within the limitations of the data available. The main sources of uncertainty are identified, and recommendations are made for future work.

597 V18/023386

**Decommissioning Calls for Meticulous Advance
Planning**

Strauss, S.D.

Power 140(9):47-54 (November-December 1996)

Expiring licenses and premature shutdowns force plant owners to analyze NRC decommissioning alternatives and technology requirements, and to project market conditions expected to prevail in the future. Barring a sudden change in energy economics, the start of the next century will mark the physical decline of the US nuclear industry. The spate of nuclear units commissioned in the 1960s and 1970s will begin reaching the end of their design life. Plant owners facing expiration of their operating licenses must choose between shutting down these plants and renewing their licenses. Because of uncertainties regarding the continued availability of burial space for contaminated components, and what many question as the competitive position of nuclear power compared to other generating options, many plant closures followed by decommissioning in some form can be expected.

598 V18/024181

**Decommissioning Concept for the Braunschweig
Research and Measuring Reactor (FMRB) of
Physikalisch-Technische Bundesanstalt (PTB)**

Hajek, W.

Physikalisch-Technische Bundesanstalt, Braunschweig, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 85-96) (November 1995)

A concept has been developed for the shut-down and partial dismantling of the Physikalisch-Technische Bundesanstalt (PTB) research reactor. It describes the way of proceeding, from the planning phases to the final measurements for the release of the plant, including the time and cost schedules, and the present situation as regards the disposal of highly enriched spent fuel elements. (This document is in German).

599 V18/023683

Decommissioning Conference: Proceedings of the 1996 TLG Conference, Captiva Island, FL, October 13-16, 1996

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp. (1996)

The 1996 Decommissioning conference is a biennial event sponsored by TLG as a not-for-profit conference to promote the exchange of information and experience among industry and government professionals, engineers, and financial planners in the field. Invited and submitted papers were presented in the following areas: (1) Policies and Regulations; (2) Estimating Decommissioning Costs; (3) Managing Decommissioning Costs; (4) Decommissioning Planning Experience; (5) Commercial Decommissioning Field Experience; (6) Nuclear and Fossil Financial Decommissioning Planning; and (7) Disposition of Contaminated/Activated Materials.

600

V18/022410

Decommissioning Cost Analysis System (DECAS): User's Manual

ABZ, Inc., Chantilly, VA

Report; 25 pp. (December 1993)

Until now, estimating the cost of decommissioning a nuclear facility has been somewhat of a mystic art, with few practitioners. ABZ, Incorporated's Decommissioning Cost Analysis System, or DECAS, removes the mystery and allows utilities to get control of their decommissioning estimates. DECAS uses proven cost estimating techniques coupled with expert system technology developed by ABZ to provide an easy-to-use system to determine decommissioning costs. DECAS was designed to provide complete documentation for the basis of a cost estimate, both to simplify future revisions, as well as facilitate understanding of the estimate. DECAS serves two functions typically required for decommissioning planning. First, it allows the costs and durations of decommissioning to be accurately predicted. Second, it provides for the maintenance and manipulation of multiple decommissioning scenarios to allow the user to evaluate different decommissioning options, scopes of work, timing, et cetera.

601

V18/023377

Decommissioning Cost Estimation of Nuclear Research Facilities: Application to French Commissariat a l'Energie Atomique (CEA)

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Societe Generale pour les Techniques Nouvelles (SGN), Saint-Quentin-en-Yvelines, France; Commissariat a l'Energie Atomique, Fontenay-aux-Roses, France

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 37-42) (1996)

Since 1990, the Commissariat a l'Energie Atomique (CEA) has performed systematic cost estimates for the decommissioning of its

facilities, whether currently in service or at the end of their service life, to serve as a basis for planning its investment strategy. With regard to long-term estimates for operations carried out within a statutory and technical environment that is likely to evolve, the study is more particularly aimed at reaching a consistent level of accuracy for each important item. The method sets the dismantling strategy for the 3,000 cells, rooms or enclosures of facilities after evaluation and classification. The evaluation is not limited to financial aspects only but also specifies the amount of work, manpower, waste and integrated doses to be implemented. This methodology was used to evaluate the dismantling of 55 CEA facilities and pointed out that while wastes are a major problem of decommissioning, manpower and radiation protection issues also raise management concerns. In actual fact, the work preparation and follow up, the management of manpower, doses and wastes in a hostile environment require the mobilization of owner's and prime contractor's teams to bring these dismantling works to a successful closure.

602

V18/022531

Decommissioning Costs of the BR3 Reactor

Noynaert, L.; Massaut, V.J.; Cornelissen, R.; Klein, M.

SCK/CEN, Mol, Belgium; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 543-546) (May 1996)

Short communication. No abstract available.

603

V18/022540

Decommissioning Economics and Risk Advisor: An Introduction to DERAD - Final Report, Version 2.0

Cohen, G.; Ginn, R.; Gjerde, A.R.; Qian, M.

Electric Power Research Institute, Palo Alto, CA; Decision Focus, Inc., Mountain View, CA

EPRI-TR-106788; 20 pp. (September 1996)

This report provides a brief description of version 2.0 of the Electric Power Research Institute (EPRI) Decommissioning Economic and Risk Advisor (DERAD) software. The report provides examples of the use of DERAD in systematically analyzing tactical and strategic decommissioning options, including case studies.

604

V18/020656

Decommissioning Graphite Cores Containing Significant Amounts of Stored Energy

Marsden, B.J.; Davies, M.A.

AEA Technology, Risley, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995.

Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 265-274) (1995)

When graphite is irradiated at temperatures below 150 degrees C, significant amounts of stored energy can accumulate. This energy can be released in a self-sustaining reaction by heating the graphite to above the temperature at which it was irradiated. Furthermore, when graphite is heated in air to above 400 degrees C it can thermally oxidize in an exothermic reaction. It is therefore essential that the stored energy content and oxidation rates are taken into account when deciding on methods for the safe dismantling and disposal of graphite cores. This paper describes the accumulation of stored energy within graphite cores and the associated problems.

605 V18/022535

Decommissioning Guideline: A Device for Harmonization of the Licensing Procedure Under Nuclear Law

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Bundesministerium fuer Umwelt, Naturschutz und Reaktorsicherheit, Bonn, Germany; Bayerisches Staatsministerium fuer Landesentwicklung und Umweltfragen, Munich, Germany; Deutsches Atomforum e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96: Technical Session on Decommissioning of Nuclear Installations, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl. Bonn, Germany, 66 pp.; (pp. 19-35) (June 1996)

The guideline has been stepwise developed by the Decommissioning task group, soliciting the advice and comments of the Reaktorsicherheitskommission (RSK) and the Strahlenschutzkommission (SSK), as well as of business associations and technical supervisory boards. The version recently published also has been presented for review to various expert committees, for reactor safety, radiation protection, fuel cycle, and legal aspects. The guideline is arranged into five chapters: introduction, general framework conditions of decommissioning activities, planning and application documents and procedures, licensing procedure, and supervisory procedure. There also are five annexes: definition of terms and concepts, classification of official publications of the BMI/BMU and of the Kerntechnischer Ausschuss (KTA) codes and rules with regard to their applicability to the planned decommissioning work, commentaries relating to the protection-specific or partial application of the relevant official publications of the BMI/BMU and of the KTA codes in all decommissioning activities, technical explanations and information concerning details of application documents, and listing of the required licensing documentation. (This document is in German).

606 V18/024887

Decommissioning Nuclear Installations: Business as Usual or Playing with the Devil?

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Organization for Economic Co-Operation and Development (OECD), Nuclear Energy Agency (NEA), External Relations and Public Affairs, Paris, France

Nuclear Energy 35(5):339-344 (October 1996)

Decommissioning, the concept of which is explained in the paper, is progressively becoming a major industry whose basic concerns do not differ fundamentally from those of other classical heavy industries. The author outlines safety legislation and international regulatory guidelines, and discusses technological progress that is rapidly being made and which will reinforce safety, reduce waste volume and yield savings in operation. Institutional and regulatory frameworks, as well as long-term financing mechanisms, will ensure that future generations bear no undue burden. The links between decommissioning and waste management, implying early planning of suitable disposal sites, are emphasized. The paper touches briefly on international co-operation in the decommissioning field. Social and public acceptance factors influencing decommissioning are reviewed, and emphasis is placed on early public involvement. The author concludes that decommissioning should not constitute an impeding factor in any nuclear power program development.

607 V18/022484

Decommissioning Plan for KRR-1 and 2

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Proceedings of the Fifth ASRR-V Asian Symposium on Research Reactors, Taejon, Korea, May 29-31, 1996; (pp. 647-650) (1996)

KRR-1 and KRR-2 were operated for 33 and 23 years, respectively. These two research reactors shut down on December 30, 1996, for the reasons of uneconomical operation and political changes. While KRR-1 would be Stage-2 in order to be reconstructed as a memorial building, KRR-2 would be Stage-3. In this paper, decommissioning plans for KRR-1 and KRR-2 are described as follows: (1) background; (2) operational history; and (3) schedule of the plan.

608 V18/025351

Decommissioning Plan of a Nuclear Research Center: Lessons Learned by SCK-CEN

Noynaert, L.; Van Alsenoy, V.; Cornelissen, R.

SCK/CEN, Mol, Belgium

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

During the last decade it became obvious that the management of nuclear installations does not stop at the end of its operational lifetime, but only when decommissioning is completed. To optimize the decommissioning, measures have to be taken as early as the design phase of those installations. The detailed description of these measures must be collected in a decommissioning plan which has to be submitted for approval to the authorities. In the case of a nuclear research center, the management of a decommissioning program is complex due to the diversity of the nuclear installations and the radioactive material generated by the research programs. In the case of SCK-CEN, the Belgian Nuclear Research Center, the nuclear installations include the air/graphite reactor BR1, the material testing reactor BR2, the first European PWR BR3, nuclear laboratory buildings, and a farm with pastures. The radioactive

materials present on the site vary from ordinary materials like steel, aluminum, and concrete to less common ones like beryllium, sodium, and a very large variety of fissile materials and spent fuel. To develop its decommissioning plan, SCK-CEN set up a nuclear information system which is principally a database. This database records the physical and radiological inventory of the site infrastructure and its installations. It also contains waste and dismantling information necessary for the cost evaluation of decommissioning strategies. This system resulted in a tool which can be used by various facilities such as power reactor plants, reprocessing plants. The decommissioning techniques and associated costs used in the decommissioning plan were based on experience accumulated by SCK-CEN since 1988. Since then, SCK-CEN has carried out the complete decommissioning of three nuclear laboratories and is the dismantling operator of the BR3 plant. The use of the nuclear information system and the execution of the different cost evaluations finally resulted in SCK-CEN's decommissioning plan. This plan is in conformity with the IAEA recommendations and was approved by the Belgian authorities.

609

V18/021026

Decommissioning Planning Activities for Two Russian Navy Land Based Nuclear Submarines at Paldiski, Estonia

Putnik, H.; Grochowski, T., Jr.; Pettersson, S.

AS ALARA Limited, Tallinn, Estonia; B&W Nuclear Environmental Services, Inc., Lynchburg, VA; Swedish Nuclear Fuel and Waste Management Company, Stockholm, Sweden

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (16 pp.) (1996)

Paldiski, Estonia had been the site of an important nuclear submarine training facility for the USSR Navy. The facility included two scaled submarine mock-ups, one delta and one echo class, each containing an operational nuclear reactor. Construction of the facility began in the early 1960's with the first training submarine (Unit #1) going critical in 1968 with a 70 MWt reactor. A second training submarine (Unit #2) was added in the early 1980's and went critical in 1983 with a 90 MWt reactor. Unit #1 was refueled and retrofitted with upgraded steam generators in 1980. The two reactors were operated into 1989. Both training submarines were housed within a single building in a common high bay area. Auxiliary site facilities included a liquid waste processing facility; storage buildings for solid and liquid radioactive waste; a central facility ventilation center; cooling towers; a cooling water pump facility; a central heating plant; a radioactive laundry facility; and a radiochemical laboratory. In 1994, as part of the negotiated Russian troop withdrawal from Estonia, Russia agreed to defuel and safe store the reactors prior to 30 September 1995, when control of the site was transferred to Estonia. The spent fuel from the reactors was transferred under Russian control to Russia in October 1994. Russian preparation for safe storage of the two reactors included dismantling non-active components, systems related to reactor operation, and some of the associated auxiliary facilities. Russia also constructed two concrete sarcophagi around the remaining hull sections containing the reactor vessels. This work was completed prior to

mid-September 1995. An international expert group was established in early 1994 at the request of the Estonian government. This group is known as the Paldiski International Expert Reference Group (PIERG). The purpose of PIERG is to promote the safe and timely decommissioning of the Paldiski nuclear facility by advising Estonia on technical, legal, organizational, financial, waste management, and radiation safety matters related to the decommissioning activities. Utilizing the resources of PIERG, a Conceptual Decommissioning Plan has been developed for the site. This plan has been reviewed by the IAEA and Estonia and accepted for implementing as funding permits. The Conceptual Decommissioning Plan is now the basis for ongoing work and planning of future site activities.

610

V18/023540

Decommissioning Planning Activities for Two Russian Navy Land Based Nuclear Submarines at Paldiski, Estonia

Putnik, H.; Grochowski, T., Jr.; Pettersson, S.

AS ALARA Limited, Tallinn, Estonia; B&W Nuclear Environmental Services, Inc., Lynchburg, VA; Swedish Nuclear Fuel and Waste Management Company, Stockholm, Sweden

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (12 pp.) (1996)

Paldiski, Estonia had been the site of an important nuclear submarine training facility for the USSR Navy. The facility included two scaled submarine mock-ups, one delta and one echo class, each containing an operational nuclear reactor. Construction of the facility began in the early 1960's with the first training submarine (Unit # 1) going critical in 1968 with a 70 MWt reactor. A second training submarine (Unit # 2) was added in early 1980s and went critical in 1983 with a 90 MWt reactor. Unit # 1 was refueled and retrofitted with upgraded steam generators in 1980. The two reactors were operated in 1989. Both training submarines were housed within a single building in a common high bay area. Auxiliary site facilities included a liquid waste processing facility; storage buildings for solid and liquid radioactive waste; a central facility ventilation centre; cooling towers; a cooling water pump facility; a central heating plant; a radioactive laundry facility; and a radiochemical laboratory. In 1994, as part of the negotiated Russian troop withdrawal from Estonia, Russia agreed to defuel and safe store fuel from reactors prior to September 30, 1995, when control of the site was transferred to Estonia. An international expert group was established in early 1994 at the request of the Estonian government known as the Paldiski International Expert Reference Group (PIERG). the purpose of PIERG is to promote the safe and timely decommissioning of the Paldiski nuclear facility by advising Estonia on technical, legal organisational, financial, waste management, and radiation safety matters related to decommissioning activities. Utilizing the resources of PIERG, a Conceptual Decommissioning Plan has been developed for the site which is now the basis for ongoing work and planning of future site activities.

611

V18/020624

Decommissioning Program for JAERI's Reprocessing

Test Facility

Mimori, T.; Nemoto, K.; Uchikoshi, T.; Miyajima, K.; Ito, A.

Japan Atomic Energy Research Institute, Ibaraki, Japan; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 229-235) (1995)

The Japan Atomic Energy Research Institute's (JAERI) Reprocessing Test Facility (JRTF) was the first facility constructed in 1966 for fundamental fuel reprocessing tests in Japan. The JRTF decommissioning program consists of treatment of liquid waste generated from reprocessing tests, research and development on dismantling techniques, and actual dismantling. The treatment of liquid waste is continuing. It is necessary to treat a total of about 70 cubic meters of liquid waste, which is categorized into five groups: AI-decladding liquid waste, alpha-contaminated waste, spent solvent, unpurified uranium solution, and high-level liquid waste. Ongoing research and development on dismantling techniques is considering characteristics of the nuclear fuel facilities. Stage 3 of the decommissioning activities is scheduled to start after dismantling techniques have been developed.

612 V18/023375

Decommissioning Program-Sharing Experience

Sheil, A.E.; Hall, M.

British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:471 (1996)

When the current reprocessing programs are complete, British Nuclear Fuels plc's (BNFL's) Sellafield site will have approximately 120 radioactive plants, all of which will require decommissioning. A formal program was initiated in the early 1980s and has expanded to reach the current level of 18 plants undergoing decommissioning and a plan of work stretching over several decades. In addition to these chemical plants, BNFL's decommissioning program extends to other sites in the United Kingdom, including fuel and enrichment facilities. The BNFL has been managing a huge program, including the technical solutions adopted to meet safety and cost targets, the interaction with regulatory bodies, and the management of the site work. Particular attention has been paid to the methods used to minimize dose exposure to operators and the minimization and management of waste. Novel approaches have been used for the integration of plant and remote equipment control systems to reduce demands on operators and improve productivity. Other aspects of the extensive development program have been carried

out in support of decommissioning.

613 V18/024207

Decommissioning Projects of the Karlsruhe Research Center

Kuczera, B.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Bereich Stilllegung Nuklearer Anlagen, Karlsruhe, Germany
ATW, Internationale Zeitschrift fuer Kernenergie 42(2):105-109 (February 1997)

The Division of the Karlsruhe Research Center (FZK) charged with decommissioning nuclear installations is in the process of decommissioning the FR-2 research reactor, the Karlstein Superheated Steam Reactor (HDR), the Niederaichbach Nuclear Power Station, the Compact Sodium-cooled Reactor (KNK), the Multi-purpose Research Reactor (MZFR), and the Karlsruhe Reprocessing Plant (WAK). For decommissioning the FR-2, the variant chosen includes safe confinement of the reactor unit and demolition of most of the ancillary buildings. In June 1996, the third partial permit was granted for decommissioning the HDR; recultivation work to green field conditions is to be finished by 1998. On the Niederaichbach site, green field conditions were established in August 1995. The KNK will be put into safe confinement as a first step. The MZFR is to be removed completely by 2004. Decommissioning the WAK also includes the disposal of some 80 cu m of liquid high-level waste. The Karlsruhe Vitrification Plant will be built in order for this step to be carried out on the premises. The WAK site will be restored to green field conditions by 2010. (This document is in German).

614 V18/020650

Decommissioning Regulations and Program in Belgium

Braeckeveldt, M.; Schrauben, M.

National Agency for Radioactive Waste and Enriched Fissile Materials (NIRAS/ONDRAF), Brussels, Belgium; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 141-148) (1995)

A regulatory process for decommissioning in Belgium has been implemented since 1991. The National Agency for Radioactive Waste and Enriched Fissile Materials (NIRAS/ONDRAF) has been entrusted with some assignments regarding decommissioning for all national nuclear installations. Furthermore, the Agency has been responsible since 1980 for the safe management of all radioactive waste produced in Belgium, including decommissioning waste. The Agency's assignments in the field of decommissioning cover data collection and evaluations of nuclear plants with the aim to plan future waste management strategies and to provide the necessary funding for decommissioning during the plant operational life-time. Furthermore, the Agency may be in charge of the execution of the

decommissioning programs in case of request or failure of the operator/owner of a plant or for the so-called "Nuclear Liabilities," in which case the Agency is entrusted by the Belgian State with the execution of the programs. To fulfill its legal assignments, NIRAS/ONDRAF has made recommendations to nuclear plant owners for drawing up decommissioning plans and has set up an integrated data processing system to evaluate decommissioning programs.

615

V18/023687

Decommissioning Rule and Its Implementation

Bajwa, S.S.

U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, DC

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (11 pp.) (1996)

Decommissioning means to remove (as a facility) safely from service and reduce residual radioactivity to a level that permits release of the property for unrestricted use and termination of the license. It does not include care and disposal of spent fuel or non-radiological demolition. This paper examines the regulatory process under the old rule and compares requirements with the new rule

616

V18/021489

Decommissioning Situation and Research and Development for the Decommissioning of the Commercial Nuclear Power Station in Japan

Yamamoto, T.

Japan Atomic Power Company, Plant Operation Department, Tokyo, Japan

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 107-109) (1996)

There are 48 commercial nuclear power stations (CNPS) in operation in Japan as of January 1, 1995 that supply about 28% [2.2 X 10¹⁰(E+8) MWh] of Japan's total annual electricity generation for FY 1995. Accordingly, since nuclear power contributes so large a portion of total electricity generation, there is a growing concern amongst the public about the safety of decommissioning nuclear power stations. It is gravely important to ensure safety throughout the decommissioning. This paper discusses the decommissioning situation in Japan, the Japanese national policy for decommissioning of CNPSs, R&D for decommissioning of CNPSs in Japan, and the present conditions of low-level radioactive waste disposal in Japan.

617

V18/021293

Decommissioning Strategy for Prematurely Shut Down

Plants

Abbott, E.C.; Perez, J.L.

ABZ, Inc., Chantilly, VA; Southern California Edison, Irvine, CA

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:18-19 (1995)

Proper planning of the transition from operations to decommissioning prior to the final plant shutdown can result in substantial savings. One plant estimates savings of approximately \$70 million. Most of the savings comes from personnel reductions as operating programs and procedures are reduced or eliminated. This paper summarizes the optimum process to be used to achieve regulatory relief once a decision to shut down is reached. After each step in the process is described, the estimated savings is given as a percentage of the annual operating and maintenance costs.

618

V18/020659

Decommissioning Strategy for Trawsfynydd Power Station

Jones, H.M.; Ellis, A.T.

Nuclear Electric plc, Barnwood, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 285-294) (1995)

Following the decision to close Trawsfynydd power station, Nuclear Electric adapted its generic decommissioning plans to suit the particular local circumstances. This resulted in an early reduced height SAFSTOR strategy which is described in the paper.

619

V18/021506

Decommissioning Windscale Piles

Nuclear Engineering International 41(503):20-21 (June 1996)

Advanced remote technology is enabling the decommissioning of the two Windscale plutonium producing piles to be carried out. The piles were sealed in 1957 after one was destroyed by fire. An outline is given of work already completed. This includes a detailed visual, radiological and sonar survey of the water ducts through which the irradiated fuel was transferred to the storage pond; sludge removal from the water ducts; and the clearance of fuel and debris from the air inlet ducts. Standard remotely operated vehicles were modified to carry out the work.

620

V18/020646

Decommissioning a High Activity Handling Cell to Stage 3

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AEA Technology, Harwell, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British

Nuclear Energy Society, London, United Kingdom;
Institution of Electrical Engineers, London, United Kingdom
CONF-951133; Nuclear Decommissioning: The Strategic, Practical,
and Environmental Considerations, Proceedings of an International
Conference, London, United Kingdom, November 29-30, 1995.
Mechanical Engineering Publications, London, United Kingdom,
392 pp.; (pp. 109-118) (1995)

AEA Technology has just completed the decommissioning and
demolition of a redundant High Activity Handling Cell. The cell was
used for 25 years for dismantling rigs and irradiated experimental
equipment and for cutting up rigs for disposal. In the early 1980s,
cobalt pencils were cut up, heavily contaminating the cell interior.
Contact radiation levels were up to 700 mSv per hour [beta and
gamma]. Immediately after shutdown in 1984 the facility was
placed on a five year program of minimal care and maintenance.
The decommissioning project was broken down into five main
phases. This paper discusses the major elements within each phase
and summarizes the key factors identified as part of the extensive
planning carried out. The technologies involved, remote and manual
working, and operational experience are discussed. The lessons
learned are also identified.

621 V18/023570

**Decommissioning and Building Demolition: Harmful
Substances and Heavy Metals During Decommissioning
of Nuclear Facilities - Final Report**

Simon, G.G.; Roellig, H.; Niese, S.; Kahn, A.

NUKEM GmbH, Alzenau, Germany; Verein fuer
Kernverfahrenstechnik und Analytik Rossendorf e.V.,
Dresden, Germany

Report; 88 pp. (November 1995)

At present there is not sufficient information on harmful substances
and heavy metals which arise during the decommissioning and
remediation of nuclear facilities. The aim of the present work is the
compilation and characterization of the harmful substances which
are the waste produced during the decommissioning of nuclear
facilities or the waste released in the treatment of such waste. The
first step is the selection criteria for the harmful substances and the
nuclear facilities to be investigated. The compilation of the required
data was carried out using the relevant literature as well as
information from the operators of the nuclear facilities. For this
purpose the computer code TOXI was developed and tested. The
evaluation of the data was carried out in a purely quantitative way,
whereby not only the harmful substances from decommissioning
were registered but also the newly defined precursor harmful
substances. It was discovered that only a small number of special
waste types is to be expected (especially neon tubes as well as
material contaminated with harmful impurities such as ion exchange
resins, filters and oils). These materials can be specifically removed
in a very early stage in the demolition of the facility and transferred
for treatment as special waste. Due to the barrier systems of nuclear
facilities a significant increase in the burden to man and the
environment from harmful substances and heavy metals released
during decommissioning is not to be expected. (This document is in
German).

622 V18/020949

**Decommissioning and Closure of a Manufacturing
Process that Generated Low Level Mixed Wastes**

Wilson, D.J.; Banikowski, J.E.

O'Brien & Gere Engineers, Inc., Syracuse, NY

CONF-960212; Waste Management '96: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
February 25-29, 1996; (7 pp.) (1996)

This paper describes the strategy that was developed to perform
facility decommissioning and license termination for a polymer
manufacturing facility where uranyl acetylacetonate (UAA) and
uranyl dinitrate (UNH) were used as catalyst components for several
blends of polymeric compounds. Elimination of this product line by
the manufacturer resulted in the need to prepare a facility
decommissioning and license termination plan acceptable to the
New York State Department of Labor (NYSDOL) as the licensing
agency, implementation of the plan consistent with New York State
Department of Environmental Conservation (NYSDEC)
regulations, and preparation of a facility closure and license
termination report. Upon elimination of the product line, excess
UAA and UNH product intermediates and low level radioactive
waste such as QA/QC samples required disposal as part of NYSDOL
licensing requirements. Because the intermediates would be
considered a low level radioactive waste, and the UNH possibly a
mixed waste due to an oxidizing characteristic and, it was decided to
reprocess the intermediates to a final product prior to disposal. The
situation was further complicated by the fact that no disposal
facility would readily accept the intermediates, the hazardous waste
characteristics of the final product were unknown prior to
reprocessing, regulatory approval by both the NYSDOL and
NYSDEC to initiate reprocessing was required, and the Barnwell, SC
disposal facility (the most likely receiving facility) was to close in
the near future. This paper describes the steps in developing the
overall decommissioning strategy to successfully terminate the
manufacturer's license. The most challenging aspect of the
decommissioning procedure was to find and implement an
acceptable regulatory strategy which would not require a Resource
Conservation and Recovery Act (RCRA) treatment permit and still
meet the time frame associated with closure of the Barnwell disposal
facility that has since reopened.

623 V18/023569

**Decommissioning and Demolition of Nuclear Facilities:
Economic, Legal and Political Aspects - VDI-GET
Meeting, September 26-27, 1996, in Schwerin**

Essmann, J.

ATW, Internationale Zeitschrift fuer Kernenergie 41(11):735-736
(November 1996)

Short communication. No abstract available. (This document is in
German).

624 V18/024188

**Decommissioning and Dismantling of Nuclear Facilities
in Belgium: Legislation, Organization, and Experience**

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National Agency for Radioactive Waste and Enriched Fissile

Materials (NIRAS/ONDRAF), Brussels, Belgium; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 53-66) (November 1995)

The legal tasks on ONDRAF-NIRAS in the field of reactor decommissioning consist in gathering and evaluating all the necessary information on nuclear facilities in Belgium from the point of view of the materials and radioactive wastes which will result from later reactor decommissioning, as well as ascertaining the amount of funds necessary and determining the corresponding provisions which would make possible later dismantling and disposal of the facilities. In certain cases, ONDRAF-NIRAS will also be entrusted with the task of executing the program for dismantling. The Belgian government has also entrusted ONDRAF-NIRAS with the administration and execution of various so-called 'Liability Funds'. The most important dismantling programs currently operating are: the European pilot fuel reprocessing plant EUROCHEMIC in Dessel, what was previously the department of 'Nuclear Waste' of the Nuclear Research Centre CEN/SCK in Mol, and the first European PWR of the type Westinghouse BR-3 reactor in Mol. (This document is in German).

625

V18/020647

Decommissioning and Dismantling of Nuclear Installations Within the Responsibility of the Federal Ministry of Education, Science, Research, and Technology (BMBF): Current Situation, Costs and Perspectives

Komorowski, K.; Meuresch, S.

Federal Ministry of Education, Science, Research, and Technology, Bonn, Germany; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 41-47) (1995)

After the first nuclear energy program was announced in 1956, the German Federal Government spent about DM 29 billion on the promotion of nuclear engineering up to and including the year 1994, primarily on cooperation in experimental and demonstration facilities as well as on research and development projects. The majority of these installations were constructed and commissioned in the period from 1960 to 1980. They comprise prototype and demonstration plants, research and test reactors and smaller facilities at national research centers as well as a research mine. The facilities are all located in the territory of the old federal states. Some of them are now out of operation, dismantled or ready for

dismantling. For public future acceptance of nuclear energy in Germany it is of considerable significance to demonstrate, in practice, environmentally compatible and low-cost decommissioning and dismantling techniques. This report surveys the state of the art in decommissioning and dismantling, and of the financing of obsolete nuclear facilities under the responsibility of the Federal Ministry of Education, Science, Research and Technology.

626

V18/024223

Decommissioning and Dismantling of the NUKEM-A and HOBEG Fuel Fabrication Plants

Rose, K.W.; Boerner, P.

DETEC GmbH, Alzenau, Germany; NUKEM GmbH, Alzenau, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 137-142) (November 1995)

In accordance with an order of the supervisory authorities dated April 5, 1988 the nuclear fuels from NUKEM-A and HOBEG were cleared from the facilities except for residual amounts (contamination of buildings, grounds, facility components and operating wastes). Pursuant to the provision of section 7, paragraph 3 AtG (Atomic Energy Act) both production facilities, NUKEM-A and HOBEG, are scheduled for separated decommissioning and dismantling, or for rededication pursuant to section 64 StrlSchV (Radiation Protection Ordinance). (This document is in German).

627

V18/021170

Decommissioning and Dismantling of the Reprocessing Plant Karlsruhe

Eiben, K.; Fritz, P.

Wiederaufarbeitungsanlage Karlsruhe Betriebsgesellschaft mbH, Eggenstein-Leopoldshafen, Germany

Nachrichten-Forschungszentrum Karlsruhe 27(4):285-294 (1995)

Reprocessing activities were discontinued in late 1990. The facility was drained and rinsed, and 80 m³ of high-level waste concentrates (HLWC) have since been stored in special tanks, awaiting vitrification. Decommissioning work is scheduled to proceed in six phases. The reprocessing areas of the facility will be prepared for release from radiological control and dismantled in the first phase. The remaining facilities can be deregulated, and storage tanks dismantled, only after termination of phase 1. The goal of the following phase is clearance from radiological control of all controlled areas, and the last phase is to cover dismantling of all buildings and restoration of a green field site. The overall costs of these activities are estimated to amount to DM 1.657 million. The article explains the contents of the first permits for decommissioning as well as the documents prepared for planning of

work and licence application. (This document is in German).

628 V18/022544

Decommissioning and Dismantling of the WAK Building for Reprocessing

Eiben, K.; Birringer, K.J.; Fritz, P.

Wiederaufarbeitungsanlage Karlsruhe Betriebsgesellschaft mbH, Eggenstein-Leopoldshafen, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 547-549) (May 1996)

Short communication. No abstract available. (This document is in German).

629 V18/021508

Decommissioning and Dismantling: How to Manage Risks to Protect Workers and the Environment

Rollinger, F.

Commissariat a l'Energie Atomique, Paris, France

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (19 pp.) (1995)

This paper gives the point of view from the French CFDT syndicate about the management of radiation risks for workers and environment during nuclear installation dismantling. The paper focuses on the lack of regulations about radiation protection during some dismantling and recycling operations and after the closeout of some feed materials plants, on the lack of training for the contractor personnel, and on the lack of liability from contractors and operators during dismantling works. A dismantling operation managed with success requires a strategy of quality and implies an optimization of worker and environment radioprotection and of waste management. This discussion is illustrated with several examples of faults, accidents and errors that occurred during dismantling operations in French facilities.

630 V18/022913

Decommissioning and Disposal of Heavy Equipment

Witt, C.R.; Johnson, R.A.

Chem-Nuclear Systems, Inc., Aiken, SC

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:63 (1995)

In the past 3 years, two projects have been completed that involved transporting large, internally contaminated reactor components to the disposal site in Barnwell, South Carolina. A variety of transport modes were used, including barge, rail, and heavy-haul trailers. This paper summarizes the two projects and enumerates the lessons learned from them.

631 V18/024226

Decommissioning and Material Recycling: Radiation

Risk Management Issues

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Netherlands Energy Research Foundation (ECN), Petten, Netherlands

ECN-I-96-040; 41 pp. (September 1996)

Once nuclear fuel cycle facilities have permanently stopped operations they have to be decommissioned. The decommissioning of a nuclear facility involves the surveillance and dismantling of the facility systems and buildings, the management of the materials resulting from the dismantling activities, and the release of the site for further use. The management of radiation risks associated with these activities plays an important role in the decommissioning process. Existing legislation covers many aspects of the decommissioning process. However, in most countries with nuclear power programs legislation with respect to decommissioning is incomplete. In particular this is true in the Netherlands, where government policy with respect to decommissioning is still in development. Therefore a study was performed to obtain an overview of the radiation risk management issues associated with decommissioning and the status of the relevant legislation. This report describes the results of that study. It is concluded that future work at the Netherlands Energy Research Foundation on decommissioning and radiation risk management issues should concentrate on surveillance and dismantling activities and on criteria for site release.

632 V18/022527

Decommissioning and Safe Containment of the THTR-300: Dismantling of the Fuel Burnup Measuring Reactor

Reisch, A.; Baechler, M.; Lettau, H.; Stratmann, W.

Hochtemperatur-Kernkraftwerk GmbH, Hamm-Uentrop, Germany; Noell GmbH, Wuerzburg, Germany; STEAG Kernenergie GmbH, Essen, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 562-565) (May 1996)

Short communication. No abstract available. (This document is in German).

633 V18/021505

Decommissioning in Britain

Nelson, R.L.

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (26 pp.) (1995)

This paper considers the decommissioning programs of the electricity generators Nuclear Electric and Scottish Nuclear, and the research and development organisation, the United Kingdom Atomic Energy Authority. There are significant differences between these organisations but their approach to the safe, cost effective management of redundant facilities has several common elements. The paper describes the nuclear facilities and liabilities, considers

the decommissioning strategies, lists estimated costs and provisions and ends with a description of the management arrangements and the outcome of the recent Nuclear Review.

634 V18/023520

Decommissioning of EL-4 Nuclear Power Plant: Progress Report

Logre, P.; Reynard, P.

Site des Monts d'Arree, Brennilis, France

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (23 pp.) (1996)

In this initial report regarding the dismantling of EL4, we summarise the main aspects of the project as it was presented to the members of the Technical Advisory Group in October 1995 at the Monts d'Arree Plant at Brennilis. From August 1985 until the end of 1994, the personnel of the Monts d'Arree Plant carried out the final shutdown and decommissioning operations, including removal of all the spent fuel, the detritation and removal of heavy water, the draining and drying of the coolant systems and the packaging of waste. At the same time, technical studies, safety studies and radiological measurement campaigns were carried out in view of partial dismantling of the installations. The CEA and EDF have adopted the decommissioning stage 2, following IAEA, including: Total dismantling for the Spent Fuel Building, the Effluent Processing Station, the solid radwaste repository and the stack, following removal and processing of the dismantling wastes; Partial dismantling for the Reactor Building, where some part of the systems is to be dismantled, and, the reactor itself. It is planned to place the dismantling wastes into interim storage in the reactor building and to then leave the new interim storage installation EL4D dormant for thirty to fifty years.

635 V18/025379

Decommissioning of HOBEG Fuel Element Fabrication Plant Germany

Runge, H.; Sohnius, B.; Borner, P.; Schmidt, D.

DETEC GmbH, Alzenau, Germany; NUKEM GmbH, Alzenau, Germany; NUKEM Nuclear Technologies, Columbia, SC

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (5 pp.) (1997)

As the first of four German fuel element fabrication sites requiring decommissioning, the HOBEG facility in Hanau has completed the decommissioning process. This project took six years due to complicated German licensing procedures. After removal of all nuclear material, the process equipment was dismantled and the buildings were cleared from all installations. This initial work was followed by remediation of outside areas and decontamination of the process buildings. Problems were encountered since the natural background of the site exceeded the regulatory clean-up guidelines. After extensive radiological control measures and regulatory negotiations, the facility was released from the atomic law and is now used for civilian purposes.

636

V18/021365

Decommissioning of Nuclear Facilities

U.S. Army, Headquarters, Washington, DC

ARMY TM 5-801-10; 61 pp. (April 3, 1992)

This manual provides general design criteria and guidance to facilitate the decommissioning of nuclear facilities. A discussion of regulatory considerations is provided which will enable the user to understand nuclear facility decommissioning requirements. Guidance provided is applicable to U.S. Army power reactors, radiographic facilities, medical diagnostic and treatment facilities, medical laboratories, and research and development facilities. General information concerning radiological hazards and source considerations are provided, in appendices.

637

V18/020649

Decommissioning of Nuclear Facilities in Japan

Saeki, K.; Ezure, H.

Atomic Energy Commission, Tokyo, Japan; Nuclear Safety Research Association, Tokyo, Japan; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 29-39) (1995)

"Back end" measures, which establish the ways of appropriately accomplishing treatment and disposal of radioactive waste and decommissioning of nuclear facilities, are regarded as the most important remaining task to ensure a consistent system of nuclear power generation. The fundamental policy for decommissioning nuclear facilities has been established, and the R&D aimed at gaining the technologies necessary for actual decommissioning of commercial nuclear plant in the future is being conducted. This R&D activity covers the overall decommissioning technologies and includes actual decommissioning of nuclear facilities to verify the technologies. This paper outlines the national policy, regulations, and research and development programs of decommissioning.

638

V18/021158

Decommissioning of Nuclear Installations in Russia and the Other Countries of the CIS

Gavrilov, S.D.; Kremnev, V.A.

DECOM Engineering Company Limited, Moscow, Russian Federation

Jahrestagung Kerntechnik '93, Proceedings of a Conference, Cologne, Germany, May 25-27, 1993; Nuclear Engineering and Design 159(2-3):105-115 (November 1995)

This study sums up the results of decommissioning of nuclear power plants (NPPs) and other nuclear installations in the period 1989-1994. Particular emphasis is put on the pre-decommissioning stage, the stage of final shutdown NPP units and facilities in the CIS. Special attention is given to the feasibility of VVER units, the

recycling of metals from nuclear islands and the working up of specifications for residual activity concentration content in its materials, approaches to the design of bioshielding for the next generation NPPs and choice of their structural materials. Fundamental and applied research in the CIS over recent years is reviewed. It is stressed that fundamental investigations can change the approach to the solution of the problem for different nuclear installations decommissioning. Decommissioning of transportable nuclear facilities and integrated plants is also briefly outlined.

639

V18/021496

Decommissioning of Nuclear Installations: A European Perspective

Simon, R.A.

Commission of the European Communities, Brussels, Belgium

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (16 pp.) (1995)

Since 1978, the European Community has been funding research programs on nuclear decommissioning. The objective has been to develop a scientific technical basis for the safe, environmentally acceptable and affordable decommissioning of redundant nuclear facilities. Many important dismantling techniques and other relevant methods have reached commercial maturity and demonstrated their safety and environmental compatibility (the three decommissioning stages of the IAEA scale). As more and more nuclear facilities become obsolete after operating times of 25 to 40 years, the demand for safe and cost-effective decommissioning services will increase steadily. The basic regulatory systems for such activities exist in most of the European countries. The decommissioning strategy for fuel cycle facilities is to dismantle plants as soon as the operational waste is removed after the final shutdown. In most member states, a proposal for decommissioning is submitted to the licensing authority for approval and to implement it. Costs normally include the management and disposal of the materials arising from decommissioning. All materials are first managed as radioactive materials unless they have been cleared by the appropriate procedures. After, they can be recycled in the nuclear field, including direct reuse of the component, or released from the nuclear control if clearance is feasible, or treated and disposed as radioactive wastes.

640

V18/020890

Decommissioning of Nuclear Power Reactors - Proposed Rule

Markley, A.W.; Feldman, C.

U.S. Nuclear Regulatory Commission, Washington, DC CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 42-45) (1996)

The Nuclear Regulatory Commission is proposing to amend the regulations that govern the decommissioning process for nuclear power reactors. This rulemaking addresses the process which begins

with a licensee's decision to permanently cease operations at the facility and concludes with the Commission's approval of license termination. These rule revisions reduce regulatory burden while providing greater flexibility for implementing decommissioning activities. The proposed amendments are expected to result in a level of NRC oversight commensurate with the level of safety concerns experienced during ongoing and previous decommissioning projects, streamline the regulatory process for decommissioning, and increase the opportunities for the public to become informed of the decommissioning process. This will result in resource savings through a more efficient and uniform regulatory process.

641

V18/023366

Decommissioning of Nuclear Power Stations

Gore, D.

House of Commons, London, United Kingdom

Report; 1 p. (July 18, 1996)

The Government has offered British Energy plc for sale. This company operates the United Kingdom's (UK) Advanced Gas Cooled Reactors (AGR) and Pressurized Water Reactors (PWR) reactors, the most modern in the nuclear inventory. The older Magnox stations run by Magnox Electric plc will remain in the public sector. This paper briefly describes the history of development of the UK nuclear industry including details of the main differences between the three principal reactor types -Magnox, AGR and PWR stations. Current strategy, both physical and financial, for decommissioning at the end of their economic lives is presented. Arrangements are outlined for spent fuel management from the AGRs and PWRs, including possible arrangements for the siting of dry stores for spent fuel prior to reprocessing. Information about methods for dealing with the liabilities of radioactive waste disposal and decommissioning in other countries is also included.

642

V18/020622

Decommissioning of Nuclear Reprocessing Plants: French Past Experience and Approach to Future Large Scale Operations

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Commissariat a l'Energie Atomique, Center d'Etudes de la Vallee du Rhone, Departement d'Exploitation du Retraitement et de Demantelement, Marcoule, France; Societe Generale pour les Techniques Nouvelles (SGN), Saint-Quentin-en-Yvelines, France; Compagnie Generale des Matieres Nucleaires (COGEMA), Velizy-Villacoublay, France

CEA-CONF-12176; CONF-940417; Nuclear Fuel Reprocessing and Waste Management, Proceedings of the Fourth International Conference, London, United Kingdom, April 24-28, 1994; (10 pp.) (1994)

Over the years, France has built up significant experience in dismantling nuclear fuel reprocessing facilities or various types of units representative of a modern reprocessing plant. However, only small or medium scale operations have been carried out so far. To prepare the future decommissioning of large size industrial facilities

such as UP1 (Marcoule) and UP2 (La Hague), new technologies must be developed to maximize waste recycling and optimize direct operations by operators, taking the integrated dose and cost aspects into account. The decommissioning and dismantling methodology comprises: a preparation phase for inventory, choice and installation of tools and arrangement of working areas; a dismantling phase with decontamination; and a final contamination control phase. Detailed description of dismantling operations of the MA Pu finishing facility (La Hague) and of the RM2 radio metallurgical laboratory (CEA-Fontenay-aux-Roses) are given as examples.

643

V18/022136

Decommissioning of Old Laboratories: 1995 Scientific Report of the Belgian Nuclear Research Centre

Noynaert, L.

Centre d'Etude de l'Energie Nucleaire, Mol, Belgium
INIS-mf-14878; 138 pp. (p. 36) (1996)

The scientific achievements for 1995 with respect to the decommissioning of four nuclear laboratories and installations in which elements such as uranium, thorium, cesium, strontium, and americium were handled are summarized. The decommissioning program consisted of: (1) the drawing up of a decommissioning plan describing the physical and radiological inventory of the installation, the work and the working procedures; (2) the execution of the decommissioning work; and (3) the assignment of the decommissioning certificate by the authorities.

644

V18/021500

Decommissioning of Production Reactors of Siberian Chemical Integrated Plant

Bagaev, V.D.; Baranov, I.I.; Kabanov, Y.I.; Kolobova, E.I.; Nikolaev, A.G.; Petukhov, I.I.; Shestera, V.F.

Atomnaya Ehnergiya 80(2):71-73 (February 1996)

Results of work on complex engineering examination of decommissioned production nuclear reactors are generalized. Results of conducted quantitative evaluation of the presence of fissionable materials in the masonry allowing a conclusion about nuclear safety of core of I-1, Eh-2 and ADEh-3 reactors, are presented. Data on state of the graphite masonry and results of corrosion investigations are given. (This document is in Russian).

645

V18/020623

Decommissioning of Reprocessing Plants

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British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 17-27) (1995)

The paper illustrates, with detailed reference to the British Nuclear Fuels plc (BNFL) program at Sellafield, that the decommissioning of full scale reprocessing facilities can be achieved within predicted targets and with technologies and techniques available today. With the experience gained to date and with the organizing research and development programs there can be confidence that the currently operating reprocessing plants can be safely decommissioned.

646

V18/021024

Decommissioning of Reprocessing Plants at BNFL Sellafield: A Practical Success

Sheil, A.E.

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (13 pp.) (1996)

The BNFL Sellafield site has developed extensively since the start of the first construction in the late 1940's and even without further development there will have been some 120 radioactive plants in operation. The decommissioning of these plants requires a coordinated and integrated program. The paper describes BNFL's approach to the challenge, its overall strategies, the constraints and the progress achieved to date using real experience from the 18 decommissioning projects currently underway.

647

V18/025826

Decommissioning of Reprocessing Plants: A Shared Experience

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British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 43-47) (1996)

As the military nuclear programs are slowed down and the focus of attention has changed to the environmental impacts, there is recognition that decommissioning of the large military reprocessing plants will have to be undertaken. While reactor decommissioning has both been undertaken and publicized, the decommissioning of large scale reprocessing plants has been less extensively reported. This paper is intended to demonstrate, primarily with reference to BNFL's reprocessing site at Sellafield (England), that not only can decommissioning of reprocessing plants be carried out but that there is significant real experience.

648

V18/020644

Decommissioning of a Hot Laboratory and Cyclotron Complex to Green Field (Harwell)

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AEA Technology, Harwell, United Kingdom; United Kingdom Atomic Energy Authority, Harwell, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 343-353) (1995)

At the United Kingdom Atomic Energy Agency's (UKAEA) Harwell Laboratory a substantial decommissioning program has been under way for the past few years. Building 540.2 (the Variable Energy Cyclotron (VEC) and Hot Laboratory facility) was the first major facility within this program to complete Stage 3 decommissioning; it was returned to a green field site in June 1994. The facility started operation in the mid-1960s and remained fully operational until its formal closure in April 1991. The Cyclotron's primary function was the production of radioisotopes (e.g., I-123 for medical use) and the study of radiation damage to metals, particularly neutron damage. The Hot Laboratory contained a suite of fume cupboards and two heavily contaminated hot cells which were used in nuclear fuel handling studies. This paper concentrates on the remote decommissioning of the two hot cells and describes a number of key steps taken. It summarizes the key factors identified in the options study and decommissioning plan and describes the steps taken to minimize risks in terms of project cost and timescale. The technologies involved (remote handling, waste posting and ventilation), the decommissioning methodology, tooling and the final manual decommissioning work are described. In addition, the paper also details the main elements of the program to decommission the 250 ton Cyclotron and the subsequent Stage 3 civil demolition of the 5000 tons of concrete shielding and the external building structure. Timescales and the operational experience for each of the above major Stages of work are discussed.

649

V18/022129

Decommissioning of a Mixed Oxide Fuel Fabrication Plant at Winfrith Technology Centre

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AEA Technology, Dorchester, United Kingdom

Enclosure 7(1):5-15 (January 1994)

The Alpha Materials Laboratory (Building A52) at Winfrith contained a mixed oxide fuel fabrication plant which had a capability of producing 10 te/yr of pelleted/compacted fuel and was in operation from 1962 until 1980, when the requirement for this type of fuel in the United Kingdom diminished, and the plant became surplus to requirements. A program to develop decommissioning techniques for plutonium plants was started in 1983, addressing the following aspects of alpha plant decommissioning: (1) re-usable containment systems, (2) strippable coating technology, (3) mobile air filtration plant, (4) size reduction primarily using cold cutting, (5) techniques, (6) waste packing, and (7) alpha plant decommissioning methodology. The technology developed has been used to safely and efficiently decommission radioactive plant and equipment including 63 Pu

contaminated glove boxes to date. The technology has been widely adopted in the United Kingdom and elsewhere. This paper outlines the general strategies adopted and techniques used for glove box decommissioning in Building A52.

650

V18/020645

Decommissioning of the AVR Experimental Nuclear Power Plant

Wahlen, E.; Wahl, J.; Pohl, P.

Arbeitsgemeinschaft Versuchs-Reaktor GmbH, Juelich, Germany; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 255-263) (1995)

The German-developed 15 MWe AVR experimental nuclear power plant with a pebble-bed high-temperature gas cooled reactor (HTGR) in Juelich was successfully operated for 21 years and shut down at the end of 1988 for political reasons. In 1994 the license for SAFSTOR decommissioning was granted, and the decommissioning has begun with discharging the fuel elements which are dry stored in casks of the type CASTOR AVR/THTR. Although the SAFSTOR is licensed, there are good reasons to switch over to green field decommissioning. This challenging option is being thoroughly studied at present in financial, managerial, and technical terms.

651

V18/022126

Decommissioning of the BR3 Pressurized-Water Reactor: 1995 Scientific Report of the Belgian Nuclear Research Centre SCK-CEN

Massaut, V.J.

Centre d'Etude de l'Energie Nucleaire, Mol, Belgium

INIS-mf-14878; 138 pp. (pp. 27-31) (1996)

The dismantling and the decommissioning of nuclear installations at the end of their life-cycle is a new challenge to the nuclear industry. Different techniques and procedures for the dismantling of a nuclear power plant on an existing installation, the BR-3 pressurized-water reactor, are described. The scientific program, objectives, and achievements in this research area at the Belgian Nuclear Research Centre SCK-CEN for 1995 are summarized.

652

V18/021164

Decommissioning of the Compact Sodium Cooled Nuclear Power Plant

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Nachrichten-Forschungszentrum Karlsruhe 27(4):276-284 (1995)

Decommissioning of the KNK-2 facility is being done as a cooperative activity of Karlsruhe Research Center and the

Kernkraftwerk-Betriebsgesellschaft, except for parts of the activated primary loop which is contained in the reactor containment. The decommissioning work and schedule is largely determined by the work to be accomplished at the primary loop, and by the deloading work in the reactor tank. In addition, the conventional water-steam cycle and the secondary loop will be dismantled. Every step in the decommissioning schedule is subject to licensing under the Atomic Energy Act, and the goal of complete decommissioning, safe isolation from the biosphere, is planned to be achieved by the year 2000. (This document is in German).

653 V18/023379

Decommissioning of the Dry Granulation Production Plant at Sellafield Using Remote Assistance

Hardey, G.; Webster, D.A.

British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom; British Nuclear Fuels plc, Risley, United Kingdom; British Nuclear Energy Society, London, United Kingdom; International Atomic Energy Agency, Vienna, Austria; European Nuclear Society (ENS), Bern, Switzerland; Institution of Nuclear Engineers, London, United Kingdom
CONF-9604100; Remote Techniques for Hazardous Environments, Proceedings of an International Conference, Leicestershire, United Kingdom, April 29-30, 1996. Thomas Telford Publishing, London, United Kingdom, 322 pp.; (pp. 20-26) (1996)

Sellafield has been the United Kingdom's major site for the storage, management and reprocessing of irradiated nuclear fuels and for the manufacture of plutonium based fuels for over 40 years. Some of the existing plants have undergone major repairs and modifications, often in beta-gamma plants using remote techniques where radiation levels precluded man access, to extend their lives well into the next century. However, there is inevitably a large backlog of redundant plant which requires surveillance, monitoring and periodic attention to maintain and update ventilation and containment systems and to ensure continued safety. The best option, both economically and environmentally, is to decommission these facilities to the stage where they no longer have any radiological significance. This paper outlines the engineering design and development work carried out to decommission a large glovebox facility. This work has been supported by the Commission of the European Communities (CEC) Nuclear Development Program.

654 V18/023376

Decommissioning of the HOBEG Fuel Element Fabrication Plant in Hanau

Sohnius, B.; Boerner, P.; Schmidt, D.

DETEC GmbH, Alzenau, Germany; NUKEM GmbH, Alzenau, Germany; NUKEM Nuclear Technologies, Columbia, SC

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 98-101) (1996)

The HOBEG fuel element fabrication plant was operated to manufacture graphite fuel elements for the thorium/high-temperature reactor in Hamm/Westf., Germany. The site comprises a 6000 sq m fenced area, an office/laboratory unit, and the production unit. In 1989, Nukem applied for a license to shut down the HOBEG fabrication plant in compliance with German atomic law (ATG article 7.3) and the radiation protection code with the goal of using the site and buildings for any other nonradioactive purpose. Approval for decommissioning was received in April 1995. Meanwhile, the existing equipment is being dismantled on the basis of single planning permissions and release for further use, for remelting, or for intermediate storage.

655 V18/022545

Decommissioning of the HOBEG Nuclear Fuel Fabrication Plant in Hanau

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DETEC GmbH, Alzenau, Germany; NUKEM GmbH, Alzenau, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany
CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 570-572) (May 1996)

Short communication. No abstract available. (This document is in German).

656 V18/022537

Decommissioning of the Karlstein Superheated Steam Reactor (HDR)

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CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 550-553) (May 1996)

Short communication. No abstract available. (This document is in German).

657 V18/023362

Decommissioning of the Russian-Type Reactors in Germany

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 77-84) (1996)

At the time of the reunification of the German states in October

1990, there were eight nuclear power reactors of the Russian pressurized water type (VVER 440/230, 213) on the Greifswald site. Four units were in operation, one was under startup conditions, one was ready for startup, and two were under construction. Initially, the operator and different utilities investigated the possibilities of continuing operation of at least some of the units in Greifswald after necessary modifications, mainly in safety-relevant areas, especially in instrumentation. The possibilities of using the site for new nuclear or conventional power plants have also been investigated. However, at the end of 1991, the new owner decided to decommission and dismantle all plants. Dismantling of the Russian designed VVER reactors should not require special new techniques, but existing ones applied elsewhere must be adapted and optimized. It is a major objective, parallel to the decommissioning activities, to create and support a new use for the Greifswald site in order to give the employees and the region wider horizons. Two major projects are being pursued: creation of a technology center and building of a non-nuclear power station.

658 V18/025830

Decommissioning of the Santo Amaro Monazite Processing Plant

Rezende, D.A.O.; Oliveira, A.R.; Seixas, A.; Teixeira, F.; Majdalani, S.A.; Franca, R.N.

Brazilian Nuclear Industries, Sao Paulo, Brazil; Brazilian Nuclear Industries, Rio de Janeiro, Brazil

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 108-114) (1996)

The Santo Amaro monazite processing plant (USAM), an undertaking of the Brazilian Nuclear Industries (INB), processed continuously, for almost 45 years, monazite sands in an urban and densely populated area in the city of Sao Paulo. Owing to the type of technology employed in the USAM, known as alkaline leaching, the operation generated large volumes of radioactive waste, basically constituted of thorium daughters, like mesothorium (Ra228), and a by-product called Cake II, rich in thorium and uranium, elements of strategic and commercial value respectively, which together with the long operation caused plant contamination and a potential environmental threat. This paper presents a report on the current activities developed by INB to decontaminate the premises of USAM aiming at decommissioning purposes and further release of the area for unrestricted use. The management of the solid waste generated by the chemical process during the last decades will also be discussed.

659 V18/024187

Decommissioning of the THTR 300 Facility

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Hochtemperatur-Kernkraftwerk GmbH, Hamm-Uentrop, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt,

Projektraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 109-121) (November 1995)

The THTR 300 facility is planned to be decommissioned in 4 consecutive phases. In Phase I the THTR 300 facility will be transferred from status of experimental operation into decommissioning operation. In Phase II the reactor core will be unloaded including shutdown decommissioning as well as dismantling of some systems and facility parts. In Phase III safe containment will be established. In Phase IV the facility will be operated in the status of safe containment. Phase I was covered by the existing operating license. In contrast, Phases II through IV require licensing in accordance with nuclear legislation pursuant to Section 7 (3) of AtG (Atomic Energy Act). A permit for Phase II was necessary because - in contrast to light-water reactors or reactor fuel elements in the form of pins - the complete unloading of the core was not covered by the license for experimental operation in accordance with nuclear legislation. In the course of doing work for Phase II and preparing the application documents for Phases III and IV, there were changes in the peripheral conditions demanding a slight modification of the phases and the content of the application. (This document is in German).

660 V18/023356

Decommissioning of the Thorium High-Temperature Reactor, THTR 300

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Hochtemperatur-Kernkraftwerk GmbH, Hamm-Uentrop, Germany

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 67-71) (1996)

The pebble bed thorium high-temperature reactor THTR 300 was shut down on September 1, 1989, after greater than 16,000 hours of operation time. The THTR 300 is a project that is jointly sponsored by the Federal Republic of Germany, North Rhine-Westphalia, and Hochtemperatur-Kernkraftwerk GmbH. The public financiers of this prototype reactor and the operators could not solve the financial problems for continued operation of this technically intact plant. The decommissioning decision had not been expected by the operator. This is why safe enclosure, the German term for SAFSTOR, turned out to be the only technical solution for quick decommissioning of the plant, apart from financial reasons and the nonavailability of a final storage facility. The plant is intended to be dismantled after about 30 yr of safe enclosure, provided funds are available. The decommissioning was and will be performed in three steps, which are largely scheduled one after the other. This paper presents a description of the actual

work.

661 V18/020643

Decommissioning of the Universities Research Reactor

England, M.R.; Riding, K.; Lyons, J.

British Nuclear Fuels plc, Risley, United Kingdom;
Manchester University, Manchester, United Kingdom;
Institution of Mechanical Engineers, London, United Kingdom;
British Nuclear Energy Society, London, United Kingdom;
Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 245-254) (1995)

The Universities Research Reactor was a 300 kW Argonaut type water moderated and cooled reactor located on a site jointly owned by the Universities of Manchester and Liverpool. It was shut down in 1991. British Nuclear Fuels plc (BNFL) were contracted to decommission the reactor, dispose of all waste and return the site to a "greenfield" condition. The defuelling, decommissioning and dismantling program is described. Low-level radioactive wastes have been disposed of at BNFL's Drigg site, and intermediate-level wastes are at a storage site pending ultimate disposal at the National Nuclear Waste repository when constructed. Demolition of the reactor hall and all associated buildings was planned for 1995 with a view to making formal application for the delicensing of the site in November 1995.

662 V18/022538

Decommissioning of the Wuergrass Nuclear Power Plant: A Commercial Challenge

Albrecht, S.; Schiffer, K.J.

Kernkraftwerk Wuergrass, Beverungen, Germany;
Deutsches Atomforum e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 36-53) (June 1996)

In response to the inspection results which detected cracks in the core shroud, economic aspects have induced PreussenElektra to opt for decommissioning and dismantling of the Wuergrass reactor. As this shutdown of the nuclear power plant is not a planned shutdown, costs arising in addition to the original decommissioning framework studies have to be assessed, especially the expenditure for the adjusted plant manpower requirements and the additional operating and phase-out costs. Experience has shown that the decommissioning of nuclear power plants does not pose problems in terms of safety or technology, but still is a commercial challenge. Expense forecasts have to be adjusted in response to the unplanned shutdown. PreussenElektra, therefore, has set up a modified project and operating structure. The analysis and evaluation of the first decommissioning phase will show whether the cost assessment approaches are in agreement with reality. (This document is in German).

663

V18/022987

Decommissioning/Dismantling of Two Power Stations: Canada - Saskatchewan

Borycki, G.G.

SaskPower, Regina, Saskatoon, Canada

CONF-9604158; Electricity '96, Proceedings of a Conference, Montreal, Quebec, Canada, April 28-May 3, 1996; (19 pp.) (May 1996)

The processes and methods used for demolition of two thermal power plants (A.L. Cole Power and Estevan Generating Stations) are described. Asbestos removal was completed in 1995 at the 65 MW coal-fired Estevan Generating Station, and dismantling was completed in 1996. Some of the plant equipment, including the boilers, was sold. The steam generators were scrapped. Polychlorinated biphenyls were cleaned up at the 106 MW A.L. Cole Power Station and asbestos was removed over the period 1992-94. Dismantling will be completed in 1996. Both sites will be left acceptable for future safe use.

664

V18/022124

Decommissioning: A United Kingdom Perspective

Haworth, A.; Reed, D.L.; Bleeze, A.

Her Majesty's Nuclear Installations Inspectorate, Health and Safety Executive, London, United Kingdom; Associacao Brasileira de Direito Nuclear, Rio de Janeiro, Brazil; International Nuclear Law Association (INLA), Brussels, Belgium

CONF-930943; Nuclear Inter Jura'93: Nuclear Energy and Sustainable Development - The Role of the Law, Proceedings of the Congress of the International Nuclear Law Association, Rio de Janeiro, Brazil, September 12-17, 1993. Forense, Rio de Janeiro, Brazil, 639 pp.; (pp. 59-70) (1995)

The paper considers the United Kingdom (UK) legislative framework relevant to decommissioning of facilities on nuclear licensed sites. It describes the various legislative bodies involved in regulating this activity and the inspectorate concerned. The licensing regime is described in some detail, highlighting the UK arrangements whereby a license is granted for the site upon which nuclear facilities are planned or exist. The license remains in place throughout the life of the plant on the site: from initial planning through the end of decommissioning. A site (or part of) is not de-licensed until it can be stated that there has ceased to be any danger from ionising radiations from anything on the site (or appropriate part of the site). The final part of the paper considers the changes arising from the commercialization of the nuclear power industry in the UK and the restatement of the Nuclear Installation Inspectorate's policy on decommissioning which has arisen as a result of a review made in response to these changes.

665

V18/024206

Decommissioning: Investigation for the Application of Water Abrasive Suspension Jets - Final Report

Brandt, C.; Louis, H.

Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

ITR-WE-9610; 106 pp. (October 21, 1996)

Cutting with abrasive water suspension jets (AWSJ) represents an enlargement to today's cutting techniques. This technique seems especially suited for the cutting of large material thickness, hollow structures, and laminated materials composed of different kind of materials. For application of AWSJ to nuclear decommissioning it is necessary to reduce the flow rates of water and abrasives drastically. The reduction of flow rates has been realized by increasing the working pressure from today's 70 MPa to 200 MPa combined with a reduction of the nozzle diameter. The influence of the process parameters on the cutting result has been investigated and the parameters have been optimized to reach a maximum cutting performance at a minimum abrasive mass flow rate. Different measuring techniques to detect the abrasive mass flow rate have been investigated, and recycling concepts for the abrasives have been developed. The maximum thickness of cutting has been determined in stainless steel and concrete. In these materials maximum thicknesses of 300 and 500 mm, respectively, have been cut through reliably. A further increase in cutting performance can be reached by an increase of the hydraulic power. For future users methods for the estimation of optimum parameters are given. (This document is in German).

666 V18/021509

Decontamination Device and Method for Radioactive Metal Waste

Enda, M.; Hosaka, K.; Sakai, H.

Toshiba Corporation, Kawasaki, Kanagawa, Japan

Japanese Patent 8-68894; 9 pp. (August 31, 1994; March 12, 1996)

Cylindrical metal wastes such as pipelines are disposed in a cylindrical anode, a rod-like cathode is inserted in the inside of the wastes, and DC voltage is applied from a DC power source connected between the anode and the cathode. Then the inner surface of the cylindrical metal wastes is positively charged to dissolve the metal matrix on the inner surface. Accordingly, since it is not necessary to connect an anode and metal wastes such as in a case of conventional contact-type electrolytic decontamination, the operator's radiation exposure dose during the connecting operation can be reduced. In addition, since insulative annular plates each having an opening are disposed to the upper and lower portions of the cylindrical insulative shielding member, electrolysis between the anode and the cathode is suppressed, and thereby capable of dissolving the metal matrix efficiently. Further, since radioactivity can be reduced with the reduced dissolving amount of the metal matrix, the amount of secondary waste can be reduced. (This document is in Japanese).

667 V18/022132

Decontamination Device for Radioactive Metal Waste

Fukushima, T.; Sakurai, J.; Enda, M.; Sakai, H.

Toshiba Corporation, Kawasaki, Kanagawa, Japan

Japanese Patent 8-94795; 8 pp. (April 12, 1996)

This patent describes a decontamination device comprised of a decontamination vessel and a decontamination vessel lid having substantially the same shape as the outer shape of radioactive metal wastes. A product to be inserted having substantially the same shape

as that of the metal wastes is inserted to the space. The decontamination vessel and the decontamination vessel lid are formed by metal frames and plates, and a removable inner liners are formed on the inner side thereof. The inner liner is made of vinylidene fluoride. Since the gap between the surface of the large-sized metal wastes with the decontamination vessel and the product to be inserted and being filled with a decontaminating agent is narrow, the small amount of the decontaminating agent is sufficient, the temperatures can be controlled conveniently, and the amount of radioactive wastes can be reduced. The decontamination vessel and the decontamination vessel lid can be used repeatedly by exchanging the inner liners. (This document is in Japanese).

668 V18/023387

Decontamination Melting of Low Level Waste: A Complete Environmental Restoration Solution

Clements, D.W.

British Nuclear Fuels plc, Manchester, United Kingdom; Electric Power Research Institute, Palo Alto, CA; Paul Williams and Associates, Medina, OH

EPRI-TR-106929; CONF-960783; Proceedings of the 1996 Electric Power Research Institute (EPRI) International Low Level Waste Conference, New Orleans, LA, July 22-24, 1996, 715 pp.; (pp. 626-632) (October 1996)

British Nuclear Fuels plc has almost completed the decommissioning of a major nuclear enrichment facility in the United Kingdom (UK) - the Capenhurst Diffusion Plant. This massive facility, 1,200 m long and 150 m wide housed under a single roof, consisted of a cascade of 4,800 stage units of various sizes connected by 1,800 km of process gas pipework. Dismantling the plant yielded over 160,000 tons of suspect surface-contaminated material. By the time the project is fully completed, around the middle of 1996, over 99.5% of the contaminated material will have been safely and cost-effectively treated such that it can be recycled for unrestricted use in a non-nuclear environment. The remaining material, as well as minimal quantities of secondary wastes arising from decontamination activities, will have been size-reduced and/or encapsulated to maximize the cost-effective use of the UK's low-level waste burial facility at Drigg.

669 V18/025501

Decontamination Method and Device for Metal Waste

Enda, M.; Hosaka, K.; Kanesaki, K.; Hiraki, M.

Toshiba Corporation, Kawasaki, Kanagawa, Japan; Toshiba Engineering and Construction Company Limited, Tokyo, Japan

Japanese Patent 9-21898/A (January 21, 1997)

The present invention provides a technique of decontaminating metal wastes contaminated by radioactive materials generated during operation, upon periodical inspection, and disposal of nuclear power facilities. Namely, in a decontamination treatment of blowing blasting material, the blasting material comprises spherical ceramic particles formed by adding yttrium oxide to zirconium oxide. The amount of the yttrium oxide added to the zirconium oxide is determined to 6% or less by weight ratio. Since the zirconium oxide is hardly pulverized, it can provide a stable decontamination effect

even if it is used repeatedly. In particular, the addition of the yttrium oxide makes the abrasion resistance excellent. If the blasting material comprises spherical particles substantially of a true sphere shape and having a grain size of 50 μm or greater, and the width of the grain size distribution is made narrow, the abrasion powder and the spent blasting material can be separated easily. The angle between the jetting nozzle of the blasting material and the metal surface is determined to from 60 to 90 degrees, and the distance between the jetting nozzle and the metal surface is made 100 millimeters or less. As a result, abrasion speed for the metal mother material is maximized. (This document is in Japanese).

670

V18/022133

Decontamination Method and Device for Radioactive Metal Waste

Nishiwaki, H.

NGK Insulators Limited, Nagoya, Japan

Japanese Patent 8-94796; 5 pp. (April 12, 1996)

Radioactive metal wastes are contained in the inside of a barrel, and abrasives are injected to the surface of the radioactive metal wastes while stirring them by rotating the barrel. An abrasive for high contamination and that for low contamination are subjected to dry blast decontamination while circulating them in separate paths. Further, an abrasive injection device and a classifier for recovered abrasives are disposed to the barrel rotated while containing radioactive metal wastes, and a circulating path for the abrasives comprising a conveyor for an abrasive for high contamination and a conveyor for an abrasive for low contamination is formed between the classifier and a hopper of the abrasive injection device. With such a constitution, the abrasives are injected uniformly to the whole surface of the radioactive metal wastes thereby enabling to decontaminate the whole surface uniformly. In addition, since the inner surface of the barrel is also decontaminated by the abrasive, the inner surface of the barrel is always maintained clean, not suffering from reverse contamination of the radioactive metal wastes. (This document is in Japanese).

671

V18/022828

Decontamination Processes for Low Level Radioactive Waste Metal Objects

Longnecker, E.F.; Ichikawa, S.; Kanamori, O.

American Morikawa Industries Corporation, Naples, FL; Morikawa Industries Corporation, Koshoku City, Japan; Genden Engineering Services and Construction Company, Tokyo, Japan

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1909-1914) (1996)

Disposal and safe storage of contaminated nuclear waste is a problem of international scope. Although the greatest volume of such waste is concentrated in the USA and former Soviet Union, Western Europe and Japan have contaminated nuclear waste requiring attention. Japan's radioactive nuclear waste is principally generated at nuclear power plants since it has no nuclear weapons

production. However, their waste reduction, storage and disposal problems may be comparable to that of the USA on an inhabited area basis when consideration is given to population density where Japan's population, half that of the USA, lives in an area slightly smaller than that of California's. If everyone's backyard was in California, the USA might have insoluble radioactive waste reduction, storage and disposal problems. Viewing Japan's contaminated nuclear waste as a national problem requiring solutions, as well as an economic opportunity, Morikawa began research and development for decontaminating low level radioactive nuclear waste seven years ago. As engineers and manufacturers of special machinery for many years Morikawa brings special electro/mechanical/pneumatic skills and knowledge to solving these unique problems. Genden Engineering Services and Construction Company (GESC), an affiliate of Japan Atomic Power Company, recently joined with Morikawa in this R&D effort to decontaminate low level radioactive nuclear waste (LLW) and to substantially reduce the volume of such nuclear waste requiring long term storage. This paper will present equipment with both mechanical and chemical processes developed over these several years by Morikawa and most recently in cooperation with GESC.

672

V18/022836

Decontamination and Decarburization of Stainless Steel by Vacuum Induction Melting

Worcester, S.A.; Twidwell, L.G.; Webber, D.S.; Mizia, R.E.

Montana Tech of the University of Montana, Department of Metallurgical Engineering, Butte, MT; Lockheed Idaho Technologies Company, Idaho Falls, ID

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1966-1973) (1996)

A program for determining the effectiveness of melt refining of radioactive scrap stainless steel, utilizing lanthanide elements as surrogates for the radionuclides, is described. Surrogate removal to less than one ppm was achieved on laboratory and pilot scale melts with air induction melting and vacuum induction melting. Vacuum induction melting, in addition, provided decarburization to less than 300 ppm.

673

V18/020727

Decontamination and Decommissioning of Nuclear Facilities

Bhatia, S.C.; Jain, N.; Goswami, J.L.; Siddiqui, H.R.; Balu, K.

Indian Nuclear Society, Bombay, India; Bhabha Atomic Research Centre, Nuclear Waste Management Group, Bombay, India

CONF-951287; Experience with Dilute Chemical Decontamination in Indian Nuclear Reactors, Proceedings of a Seminar, Kalpakkam, India, December 12-13, 1995. Indian Nuclear Society, Kalpakkam, India, 222 pp.; (pp. 96-102) (December 1995)

Decontamination and decommissioning features which are significantly different for non-reactor facilities as compared to

nuclear reactors can be summarised as: potentially high levels of chemical toxicity and radiotoxicity of the alpha emitting radioisotopes, need for criticality control throughout, higher potential for spread of contamination, prompt decontamination or decommissioning preferred over mothballing or entombing alternatives, complex radiological mapping and characterization situations, and complex radiological protection requirements for occupational workers. A brief review of the various aspects of decommissioning of various nuclear installations are given.

674

V18/025852

Decontamination and Disposal of Steam Generators

Hamilton, G.T.; Hultman, C.W.; Radomicki, J.; Byrne, M.

Frank W. Hake Associates, Memphis, TN; BNFL, Inc., Aiken, SC; Hake, Inc., Eddystone, PA; Manufacturing Sciences Corporation, Oak Ridge, TN

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 268-272) (1996)

Since replacement of the first steam generator in the U.S.A., two options have existed for disposal of the old generators: on-site storage and burial. Onsite storage in a mausoleum is substantially less expensive at the time of removal, but has unknown future costs for disposal when the plant is decommissioned. Onsite storage also increases the quantity of waste retained on site. Burial of the generators achieves final disposal, but has become uneconomical due to high cost for burial. With the development of the metal decontamination and recycle industry, a number of firms have considered a third alternative: to decontaminate the generators and recycle the metal content. Hake Associates has formed a team of highly qualified companies to achieve this objective. The SAFECON TEAM includes Frank W. Hake, Inc., for rigging and transportation; BNFL, Inc. for engineering services and a primary side chemical decontamination system; Hake Associates facility for its segmenting and secondary decontamination; and, Manufacturing Sciences Corporation for specialty decontamination including melting and potential product fabrication from the generator components.

675

V18/020621

Decontamination and Melting of Low Level Waste: A Complete Environmental Package

Clements, D.W.

British Nuclear Fuels plc, Capenhurst, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 371-381) (1995)

The Capenhurst Diffusion Plant originally produced highly enriched uranium for defense purposes and was later modified for civil use. The Decommissioning Project has yielded over 160,000 tons of surface contaminated materials, 99.5 percent of which will have been recycled for unrestricted re-use by completion in 1995. The main techniques described - dismantling, size reduction, decontamination, melting, and encapsulation - are now available for use singly or in different combinations to tackle waste arisings with varied nuclide inventories in the most environmentally effective way. Practical experience is reviewed from the aspects of cost and cost reduction, safety, and environmental factors, including the influence of free release limits and measurement of very low activity levels.

676

V18/020931

Decontamination and Melting of Low Level Waste: A Complete Environmental Restoration Solution

Clements, D.W.; Conboy, T.M.; Hexter, B.C.

British Nuclear Fuels plc, Manchester, United Kingdom

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (15 pp.) (1996)

BNFL has almost completed the decommissioning of a major nuclear enrichment facility in the UK - the Capenhurst Diffusion Plant. This massive facility, 1,200 m long and 150 m wide and housed under a single roof, consisted of a cascade of 4,800 stage units of various sizes connected by 1,800 km of process gas pipework. Dismantling the plant yielded over 160,000 ton of suspect surface-contaminated material. By the time the project is fully completed, around the middle of 1996, over 99.5% of the contaminated material will have been safely and cost-effectively treated such that it can be recycled for unrestricted use in a non-nuclear environment. The remaining material, as well as minimal quantities of secondary wastes arising from decontamination activities, will have been size-reduced and/or encapsulated to maximize the cost-effective use of the UK low level waste burial facility at Drigg. Although a number of novel and specialized techniques have been developed for use in this project, maximum use of "off-the-shelf" equipment, customized as necessary, has resulted in total project costs below the sum of 100M. The project has utilized a wide variety of size-reduction measures, including robotic plasma cutting, novel decontamination techniques, melting for high and low melting point metals, and incineration of non-metallic arisings. The project has also met the challenges posed by the need to accurately and cost effectively measure very low activity levels after decontamination in order to confirm that the UK criteria for unrestricted release of material into the external market have been met. All activities have been performed without compromising environmental discharges, the safety of plant operators, or the general public. In particular the personnel involved with the exercise have received confirmed radiation exposure levels of less than 0.2 mSv/yr.

677

V18/022805

Decontamination by Ultraviolet Laser: The LEXDIN Prototype

Costes, J.R.; Briand, A.; Remy, B.; Mauchien, M.

Commissariat à l'Energie Atomique, Bagnols-sur-Ceze, France

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1760-1764) (1996)

Decontaminating nuclear facilities to very low residual levels while protecting the personnel and generating little or no liquid waste remains a difficult objective to achieve. From this standpoint, the ultraviolet laser could constitute a highly effective decontamination tool. A number of laboratory studies have focused on the possibilities of surface treatments by laser but few of them have produced working prototype robots suitable for the heavy decontamination involved in decommissioning nuclear installations. LEXDIN is the anagram of Exciplex laser decontamination in the nuclear industry, and is a prototype intended for the decontamination of plastic or metal tanks and chambers used in the nuclear industry. Its rate of work is 1 square metre per hour for a metal erosion depth of 10 nanometers.

678

V18/020726

Decontamination for Decommissioning: EPRI DfD Process - Final Report

Bradbury, D.; Elder, G.R.; Waite, M.

Electric Power Research Institute, Palo Alto, CA; Bradtec Limited, Bristol, United Kingdom

EPRI-TR-106386; 11 pp. (May 1996)

Chemical decontamination is a technique applied to sub-systems of operational LWR plants for the purpose of reducing radiation exposure to plant workers. Several processes are routinely used for this operation, such as the LOMI process originally developed by EPRI. It is necessary to avoid base metal damage on items of the plant which are to be returned to operational service, whereas removal of a thin layer of base metal is required to achieve the high decontamination effectiveness required for decommissioning. Operational decontamination processes therefore have limited value for decontamination of redundant plant items. EPRI has funded a research project with Bradtec Ltd. to develop a decontamination process for decommissioning which could achieve the necessary effectiveness, while retaining the major features of (and hence experience with) operational sub-system processes. The result of this program is the "EPRI DfD process" which is the subject of a patent application. The EPRI DfD process uses dilute fluoroboric acid under conditions of controlled oxidation potential to remove contamination from surfaces and collect the contamination on ion exchange resin. High effectiveness is achievable; for example, decontamination factors of 8,000 on stainless steel and 2,000 on Inconel-600 reactor artifacts have been achieved with the process, and these figures are not considered to be limiting. The process can in principle be applied by decontamination vendors' existing equipment, and retains the waste management characteristics typical of sub-system decontamination. There is no chelant present in the ion exchange waste form.

679

V18/025473

Decontamination for Free Release

Simpson, K.A.; Elder, G.R.

Bradtec Limited, Bristol, United Kingdom; International Atomic Energy Agency, Vienna, Austria

IAEA-TECDOC-929; Treatment Technologies for Low and Intermediate Level Waste from Nuclear Applications, Final Report of a Co-Ordinated Research Programme 1991-1996, 207 pp.; (pp. 147-152) (February 1997)

Many countries are seeking to treat radioactive waste in ways which meet the local regulatory requirements, but yet are cost effective when all contributing factors are assessed. In some countries there are increasing amounts of waste arising from nuclear plant decommissioning, which are categorized as low level waste. However, with suitable treatment a large part of such wastes might become beyond regulatory control and be able to be released as non-radioactive. The benefits and disadvantages of additional treatment before disposal need to be considered. Several processes falling within the overall description of decontamination for free release have been developed and applied, and these are outlined. In one instance the process seeks to take advantage of techniques and equipment used for decontaminating water reactor circuits intermittently through reactor life.

680

V18/021947

Decontamination of Large Metal Objects

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CORPEX Technologies Inc., Research Triangle Park, NC; Bechtel National, Inc., Oak Ridge, TN;

Nuclear Plant Journal 13(4):3 (July-August 1995)

Decommissioning a nuclear station generates vast amounts of radwaste. Disposal costs are exorbitant and the desire of regulatory agencies and burial sites is to reduce radwaste volume. Unnecessary burial utilizes space needed for further decommissioning. Many contaminated items may be decontaminated and free released using the correct process. Chemical decontamination using proper methods and chemical solutions can result in free release of most nonactivated metal objects processed. After processing, radwaste generated during decontamination is minimal compared to the original volume while recovery of precious resources is an added economic benefit.

681

V18/020730

Decontamination of Process-Cell Equipment at Fuel Reprocessing Plant - Tarapur

Chandra, M.; Dey, P.K.; Das, S.

Indian Nuclear Society, Bombay, India; Power Reactor Fuel Reprocessing Plant, Tarapur, India

CONF-951287; Experience with Dilute Chemical Decontamination in Indian Nuclear Reactors, Proceedings of a Seminar, Kalpakkam, India, December 12-13, 1995. Indian Nuclear Society, Kalpakkam, India, 222 pp.; (pp. 196-204) (December 1995)

Reprocessing of spent fuels to separate and purify U and Pu is an important step at the back end of the nuclear fuel cycle. Power Reactor Fuel Reprocessing Plant (PREFRE), Tarapur has been processing zircaloy clad spent fuels from PHWR's Rajasthan and

Madras Atomic Power Stations. It is a radiochemical plant using the Purex process with TBP as solvent in nitric acid medium and chop-leach head-end treatment. Irradiated bundles are chopped into small pieces, then its uranium core is dissolved in nitric acid and the solution is chemically processed inside heavily shielded process cells. Each cell houses a large number of stainless steel process equipment and piping items such as dissolvers, conditioners, columns, evaporators, remote valves, steam jets, air lifts, etc. Replacement or repair of any of this equipment is carried out by contact maintenance, e.g., by making personnel enter inside cells. Hence decontamination of process equipment prior to undertaking any maintenance jobs assumes great significance in the context of bringing down individual personnel exposures and yearly man-rem expenditure for the plant. Elaborate decontamination in line with ALARA principles is carried out on each piece of equipment to bring down general background level and to control air activity inside cells. This paper highlights the procedure and processes used for decontamination of process cell equipment in the PREFRE Plant. The paper also gives decontamination details as a case study on one of the major maintenance jobs recently completed inside process cell number 2 in the PREFRE Plant, the replacement of the heat exchanger of the waste evaporator.

682 V18/024171

Decontamination of Steel by Melt Refining: A Literature Review

Ozturk, B.; Fruehan, R.J.

Carnegie Mellon University, Pittsburgh, PA; Los Alamos National Laboratory, Los Alamos, NM

LA-SUB-94-35; 22 pp. (1994)

It has been reported that a large amount of metal waste is produced annually by nuclear fuel processing and nuclear power plants. These metal wastes are contaminated with radioactive elements, such as uranium and plutonium. Current Department of Energy guidelines require retrievable storage of all metallic wastes containing transuranic elements above a certain level. Because of high cost, it is important to develop an effective decontamination and volume reduction method for low level contaminated metals. It has been shown by some investigators that a melt refining technique can be used for the processing of the contaminated metal wastes. In this process, contaminated metal is melted with a suitable flux. The radioactive elements are oxidized and transferred to a slag phase. In order to develop a commercial process it is important to have information on the thermodynamics and kinetics of the removal. Therefore, a literature search was carried out to evaluate the available information on the decontamination of uranium and transuranic-contaminated plain steel, copper and stainless steel by melt refining techniques. Emphasis was given to the thermodynamics and kinetics of the removal. Data published in the literature indicate that it is possible to reduce the concentration of radioactive elements to a very low level by the melt refining method.

683 V18/024060

Decontamination of Water Cooled Reactors

International Atomic Energy Agency, Vienna, Austria

IAEA Technical Reports Series No. 365; 73 pp. (1994)

In most countries, the approach to reducing occupational radiation exposure is multifaceted. Attempts are made to control the buildup of radiation fields by appropriate selection of reactor coolant system materials, preconditioning and chemistry control. These approaches have been reviewed in the IAEA co-ordinated research program WACOLIN, now entitled Coolant Technology of Water Cooled Reactors. This report is a summary of work performed on decontamination which consists of a survey of the current decontamination methods used throughout the world. It is focused on the following objectives: man-sievert reduction, plant life extension, fuel life extension and general safety and materials reliability. There are sections dealing with the following subjects: nature of oxides and contamination, physical, chemical and electrochemical decontamination, chemical decontamination processes, review of experience, and technical issues.

684 V18/025392

Decontamination of a Large Luminising Factory Site Using a Novel Radium in Soil Analytical Method

Coleman, F.J.; Collett, K.F.

WasteChem Limited, Risley, Warrington, United Kingdom

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

The factory site of one of the main UK suppliers of radium luminized dials to the public, aerospace and defense industries, covers an area of 6.7 hectares. It contained laboratory and factory buildings which had been in use since the factory site was first established for this purpose in 1937. Luminizing of dials ceased in the early 1980s. Part of the site formed the company's sports field which had been built on infill waste materials. The company owning the site had been given planning permission for development, and a certain amount of decontamination work had been carried out in the 1980s. WasteChem contracted to remove, segregate, package and transport the remaining radium radioactivity, which was spread throughout the site on land to a depth of 3 meters, and in buildings to the foundations. Onsite analysis of soil and rubble sampling was normally carried out by sodium iodide gamma spectrometry, an occasional sample being sent to a NAMAS Approved Laboratory for measurement on a GeLi gamma spectrometer for calibration quality assurance purposes. To speed up the process, reduce waiting time and the high cost of off-site analysis, a novel instrument was developed by WasteChem. The original prototype instrument consisted of a large area plastic scintillator (LAPS) attached to a commercially available portable counter-timer-EHT unit. The combined LAPS and associated counter instrument formed a portable laboratory-type analytical system that could be used anywhere on site in four operational modes. The calibration and readout method has been designed so that immediate in-the-field specific activity levels in Bq can be obtained to an acceptable accuracy by non technical staff. Experience with the prototype on this project has led to a robust improved design that incorporates within the body of the LAPS its own miniature counter-timer-EHT unit.

685 V18/020642

Decontamination of the Bohunice A-1 Reactor Hall

Cowley, M.A.; Krstenik, A.

AEA Technology, Winfrith, United Kingdom; Atomova Elektraren Bohunice, Jaslovske Bohunice, Slovakia; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 219-228) (1995)

The A-1 nuclear power plant at the Bohunice power station, Slovakia, was a 150 MW(e) demonstration plant of Russian design. The reactor hall became radiologically contaminated as a result of a small number of accidents during and after its short operational life. In 1992 an agreement was signed for AEA Technology to produce the technical documentation for the decontamination of the reactor hall. During the planning of the project a number of technical challenges were identified for which engineered solutions were required. Technical and contractual constraints have emerged which have required a flexible approach during the course of the work.

686

V18/024185

Demolition of the Biological Shield Using Explosive Fracturing: A Comparison of Large-Scale Experiments at the Superheated Steam Reactor (HDR) with Explosive Fracturing Within the Framework of Dismantling Work at KKN (Niederaichbach Nuclear Reactor Station)

Freund, H.U.

Battelle Ingenieurtechnik GmbH, Eschborn, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 203-218) (November 1995)

From the point of view of radiation protection and economics, explosive technology is currently regarded as a favorable technology for dismantling the activated internals of the biological shield and possibly other radioactive by contaminated concrete structures. This is shown by the fact that the biological shield of the KKN was successful dismantled by a commercial contractor ARGE NOELL/NIS. Battelle carried out blasting experiments with inactive concrete structures which served the purpose of assessing processes as well as ascertaining safety parameters. The decisive large-scale experiments were carried out in the HDR on an about 1:2 model shield with realistic dimensioning of the explosives. The results of these experiments were incorporated for process design as well as the licensing procedure for explosive demolition of the Niederaichbach reactor. (This document is in German).

687

V18/023354

Demonstration of D&D Technologies by the Japan Power Demonstration Reactor Decommissioning Program

Yanagihara, S.; Seiki, Y.; Tachibana, M.

Japan Atomic Energy Research Institute, Ibaraki, Japan

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 132-138) (1996)

In consideration of the future decommissioning of commercial nuclear power plants, the Japan Power Demonstration Reactor (JPDR) decommissioning project was initiated in 1981 by the Japan Atomic Energy Research Institute to demonstrate complete dismantling. After a 5 year study on decommissioning technology, actual dismantling of the JPDR commenced in December 1986 as a demonstration of decommissioning technology. The technologies for D&D were developed over eight items in the R&D phase. The JPDR was then dismantled using the developed techniques to demonstrate their capability. In the demonstration, all components were removed from the JPDR site and the project was completed by the end of March 1996. Various data on the project were systematically collected and analyzed for the future decommissioning of commercial nuclear power plants. This paper describes the results of the demonstration of the D&D technologies in the JPDR decommissioning program.

688

V18/023708

Depreciation Implications of FAS Exposure Draft 158-B
White, R.E.

Foster Associates, Inc., Fort Meyers, FL

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (17 pp.) (1996)

These viewgraphs present proposed accounting standards that reflect the current obligation of an entity for closure or removal of its long-lived assets, and allocate the costs of closure or removal over the useful life of the long-lived assets.

689

V18/020732

Design Aspects and Procedures for Decontamination and Decommissioning (D&D) a Reprocessing Plant

Mahudeeswaran, K.V.; Dakshinamoorthy, A.; Patil, M.P.

Indian Nuclear Society, Bombay, India; Bhabha Atomic Research Centre, Project KARP, Kalpakkam, India

CONF-951287; Experience with Dilute Chemical Decontamination in Indian Nuclear Reactors, Proceedings of a Seminar, Kalpakkam, India, December 12-13, 1995. Indian Nuclear Society, Kalpakkam, India, 222 pp.; (pp. 190-195) (December 1995)

Unlike in the conventional chemical industry, in a reprocessing plant it is necessary to incorporate in the design stage provisions

for remote decontamination and decommissioning of the plant and to demonstrate that it is possible to carry them out safely. These provisions can also be used for good house-keeping of processing areas, thereby preventing buildup of radioactivity in these areas. This will help to extend the life of the plant without major decommissioning of the plant. It has also been demonstrated in Plutonium Plant Trombay that decommissioning and reconstruction can be carried out without overexposure of any personnel.

690 V18/020933

Design and Construction of a State of the Art Metals Decontamination and Melt Facility

Austin, C.; Bird, C.; Cottam, M.

BNFL, Inc., Oak Ridge, TN; Manufacturing Sciences Corporation, Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (16 pp.) (1996)

Manufacturing Sciences Corporation, in partnership with British Nuclear Fuels, has designed and built what is recognized in the industry as a state-of-the-art metals decontamination and melt facility. The partners have combined talents and experiences of their respective businesses to design and construct a facility that directly challenges the problems associated with existing approaches to metal recycle. This they achieved from concept to reality in less than 15 months. This paper addresses the central design principles of minimizing worker exposure, industrial safety, Just-in-Time philosophy and process control. It will describe the comprehensive computerized traceability system, the extensive automated/remote handling, the main line decontamination processes, and the technologically advanced melt facility. Further, the approach to project/construction management will be discussed to demonstrate the value of extending the partners' ability as team players to include subcontract design and construction groups. The purpose of this paper is to present a successful approach to the design and construction of a facility, with new and novel features, to meet an extremely aggressive schedule.

691 V18/023367

Design, Construction and Deployment of a Large Underwater Bandsaw for Decommissioned LWR Internal Dismantling

Massaut, V.J.; Klein, M.; Dadoumont, J.; Roberts, P.R.; Lefebvre, A.

Centre d'Etude de l'Energie Nucleaire, Mol, Belgium; Rolls-Royce Limited, Derby, United Kingdom; Belgatom, Brussels, Belgium; British Nuclear Energy Society, London, United Kingdom; International Atomic Energy Agency, Vienna, Austria; European Nuclear Society (ENS), Bern, Switzerland; Institution of Nuclear Engineers, London, United Kingdom

CONF-9604100; Remote Techniques for Hazardous Environments, Proceedings of an International Conference, Leicestershire, United Kingdom, April 29-30, 1996. Thomas Telford Publishing, London, United Kingdom, 322 pp.; (pp. 51-54) (1996)

Dismantling of nuclear installations is raising new challenges for the nuclear industry. The remote dismantling of highly radioactive reactor internals is one of the most demanding operations in the decommissioning of a nuclear power plant. In the framework of the BR3 PWR pilot decommissioning project, a large underwater band saw has been developed by Rolls-Royce and Associates to carry out this type of operation, allowing easy use and maintenance, reducing the generated secondary waste to a minimum while keeping the operational cost and dose uptake very low. The main constraining parameters were the remote control, the underwater working, the high radiation environment, and the necessity to allow easy access to the tool for maintenance, saw blade replacement and repairs. The bandsaw has been used successfully for the complete dismantling of the two sets of reactor internals from the BR3 PWR reactor, situated at the nuclear research centre SCK CEN in Mol, Belgium. This paper will summarize the main features of the machine, as well as the results obtained, and the lessons drawn for future operation.

692 V18/022915

Detection of Contaminants in Concrete Surfaces Using Prompt Gamma Neutron Activation Analysis

Dulloo, A.R.; Congedo, T.V.; Ruddy, F.H.; Seidel, J.G.; Williams, R.P.; Weigle, D.H.

Westinghouse Science and Technology Center, Pittsburgh, PA; Scientific Ecology Group, Inc., Pittsburgh, PA

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:61-62 (1995)

The characterization of contaminants located at or near the surface of floors and walls is an important step in the decontamination and decommissioning (D&D) of facilities. Prompt gamma neutron activation analysis (PGNAA) is an attractive method for the characterization of contaminants with suitable nuclear characteristics (e.g., mercury and cadmium) because PGNAA is noninvasive, does not generate secondary waste, and is capable of providing results in real time. Previous PGNAA work in this area has been limited by a lack of sensitivity due to the high background levels typically encountered during measurements. However, a low-background PGNAA system (N-SCAN), developed by the Westinghouse Science & Technology Center and Scientific Ecology Group, Inc., has been able to detect small amounts of contaminants in the near-surface region of concrete (0 to 3 in. deep).

693 V18/021511

Determination of Tritium Content in Reactor Decommissioning Waste

Huaiyuan, Y.; Wei, L.; Xuelian, W.

Ministry of Nuclear Industry, Institute of Radiation Protection, Taiyuan, China

Radiation Protection (Taiyuan) (Fushe Fanghu) 16(3):203-208,240 (May 1996)

A determination method of tritium content in solid material samples such as stainless steel, carbon steel rust, scrap aluminum alloy and scale and sediment deposit in storage water pool is studied experimentally by wet-outgassing at high temperature, catalyst

oxidation and bubbles collection. The parameters involved in this method and the details of measurement results are discussed. (This document is in Chinese).

694 V18/023704

Developing an Area-Based, Activity-Dependent Decommissioning Cost and Schedule Estimate
Griffiths, G.M.

TLG Services, Inc., Bridgewater, CT

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (9 pp.) (1996)

These viewgraphs summarize the procedures for developing cost estimates that are based on activities within particular work areas. In general, the process should: Capitalize on the repetitive nature of activity-dependent tasks; Account for local working conditions; Account for local area work inventories; Stimulate thoughts on the schedule's logical process; and, Provide efficient input to project management and control software

695 V18/023371

Development of Database System for Decommissioning of Nuclear Facilities

Mizuno, O.; Fuse, T.; Komatsu, J.; Shimada, T.; Miya, K.
Research Association for Nuclear Facility Decommissioning (RANDEC), Tokai, Ibaraki, Japan

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996.

American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 48-52) (1996)

A wide range of information and technical knowledge is required for decommissioning of nuclear facilities. The database system for decommissioning information has been developed for this reason. This database system consists of three sub-systems, such as bibliography, general information, and technical information. The information is systematically ordered, and the necessary information is deleted from this database in a timely manner during decommissioning planning and practice sessions. This database system works on personal computers and is a user friendly system since it has adopted a dialogue operating mode using menus, tool bars, dialogue boxes, etc.

696 V18/023385

Development of Decommissioning Technology for Nuclear Power Plants: Demonstration of Decommissioning Techniques by the Japan Power Demonstration Reactor Decommissioning Project
Miyasaka, Y.

Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan

Science and Technology in Japan 15(58):26-28 (August 1996)

Short communication. No abstract available.

697

V18/025495

Development of Guidance on Applications of Regulatory Requirements for Low Specific Activity Materials and Surface Contaminated Objects

Pope, R.B.; Easton, E.P.; Shankman, S.F.

Oak Ridge National Laboratory, Oak Ridge, TN; U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Washington, DC

CONF-970520; Proceedings of the Fourth International Conference on Transportation for the Nuclear Industry, Bournemouth, United Kingdom, May 13-15, 1997; (15 pp.) (1997)

In 1985, the International Atomic Energy Agency issued revised regulations for the safe transport of radioactive material. Significant among the changes were major revisions to requirements for Low Specific Activity (LSA) material and Surface Contaminated Objects (SCOs). In preparation for the adoption of these requirements into regulations in the United States, it became apparent that guidance on how to apply these requirements, clarifying technical uncertainties and ensuring proper implementation, would be needed both by the regulators and those regulated. Thus, the US Department of Transportation and the US Nuclear Regulatory Commission, with the assistance of staff from Oak Ridge National Laboratory, are preparing regulatory guidance for LSA material and SCO transport. The guidance will present examples of acceptable methods for demonstrating compliance with the revised rules. Ideas being investigated for inclusion in the pending guidance are discussed in this paper. Under current plans, the guidance will be issued for public comment prior to final issuance of the guidance in 1997.

698

V18/021124

Development of Induction Heated Hybrid Type Melter with Plasma Torch for the Treatment of Low Level Radioactive Solid Waste from Nuclear Facilities

Yamate, K.; Ikenoya, H.; Murata, M.; Umemera, A.; Sakurai, D.

Mitubishi Materials Corporation, Nuclear Engineering Center, Tokyo, Japan

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (10 pp.) (1996)

The melting process is one of the most promising techniques for processing Low Level Radioactive Solid Waste (LLSW) due to its advantages of volume reduction and stability of processed solid form. The Hybrid type Melting Process (HMP), which combines induction heating with plasma torch has been developed and investigated in this study. Non-radioactive simulated waste is fed to the melting furnace as a bench-scale investigation of the characteristics of solidified products and the off-gas. It is demonstrated that HMP can melt or decompose any waste, even concrete or PVC. Plasma arc provides high temperature and agitation to assist melting and increases NOX content in off-gas.

699

V18/025329

Development of Remote Controlled Plant Data

Acquisition System (REDAS) for Decommissioning of Nuclear Facilities

Mimori, T.; Iwasaki, Y.; Tanaka, K.

Japan Atomic Energy Research Institute, Ibaraki, Japan;
Mitsubishi Heavy Industries Limited, Yokohama, Japan

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Japan Atomic Energy Research Institute (JAERI) has been developing the remote controlled plant data acquisition system as a part of the technology improvement program for decommissioning of nuclear facilities sponsored by the Science and Technology Agency. The system will use a small mobile robot equipped with TV and laser range finders. This system has been planned to apply to the JAERI's reprocessing test facility (JRTF). The remote plant data acquisition system consists of three sections, mobile section, vision section, and control section. The vision section is composed of the TV cameras and the laser range finder, and is able to collect pictures of the object and data on its location and distance. In decommission engineering, the remote controlled plant data acquisition system is used to check the differences between actual plant image and 3D-CAD plant data based on the old drawings. Plans are to test this system in the plant model of the JRTF and evaluate the performance, the efficiency, and the restrictions of the system. This system will be developed to apply the actual decommissioning works of the JRTF.

700

V18/020954

Development of Remote Controlled Plant Data Acquisition System for Decommissioning of Nuclear Facilities

Mimori, T.; Uchikoshi, T.; Tanaka, K.

Japan Atomic Energy Research Institute, Ibaraki, Japan;
Mitsubishi Heavy Industries Limited, Yokohama, Japan

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (9 pp.) (1996)

JAERI has been developing the remote controlled plant data acquisition system as a part of the technology improvement program for decommissioning of nuclear facilities under a contract with the Science and Technology Agency of Japan. The outline of the system development and some results are described in the poster session. Decommissioning procedure planning of nuclear facilities has to be based on the latest and exact plant data. But sometimes the latest data can not be constructed from the design drawings if many years have passed after the construction and some modifications have been made after the start of the operation. So data acquisition about the location and dimension of the facilities is indispensable for decommissioning. Also the development of a remote controlled plant data acquisition system is necessary for decommissioning procedure planning of the high radiation area because of the difficulty of accessibility to the area. JAERI has developed a remote controlled plant data acquisition system which uses a small mobile robot equipped with ITV and laser pointer. Plans are to apply this system to the decommissioning engineering of the

JAERI's reprocessing test facility (JRTF). The remote plant data acquisition system consists of three sections, mobile section, vision section, and control section. Mobile section has two main drive wheels at the center of the body, two pairs of legs with 2 joints and 1 assist wheel at the front side and the rear side. By the movements of these parts, the robot is able to traverse the flat face and slope, and to cross the piping. Vision section is composed of the TV camera for normal view, the TV camera for close-up view, the laser pointer and the light, and be able to collect the pictures of the object and the data of its location and distance.

701

V18/024224

Development of a Prototype Gamma Camera (Aladin) for Use in Decommissioning Nuclear Facilities

Imbard, G.; Carcreff, H.

Commissariat a l'Energie Atomique, Centre d'Etudes de la Vallee du Rhone, Department d'Exploitation du Retraitement et de Demantelement, Marcoule, France; Commissariat a l'Energie Atomique, Centre d'Etudes de Saclay, Department des Reacteurs Experimentaux, Gif-sur-Yvette, France

CONF-950216; Waste Management '95: Working Towards a Cleaner Environment, R.G. Post (ed.), Proceedings of a Conference, Tucson, AZ, February 26-March 2, 1995; (12 pp.) (1995)

Mapping the gamma activity of irradiating zones is often an important prerequisite in dismantling nuclear facilities. This operation is necessary to define a suitable decommissioning strategy before any work begins. It is also required during the procedure to measure the residual activity wherever dose rates are too high to allow human intervention. This paper summarizes the work carried out to develop a prototype imaging system designed to display radioactive sources superimposed in real time over a visible light image on a video monitor. This project was developed from an earlier off-line system.

702

V18/024168

Development, Modification and Qualification of Specific Underwater Fastening Techniques for the Dismantling of Components During Decommissioning of Nuclear Facilities: Final Report

Haferkamp, H.; Bach, F.W.; Schreiber, W.; Poege, M.

UTEG - Forschungs- und Ausbildungsstelle
Unterwassertechnik Hansestadt Greifswald, Lubmin,
Germany; Hannover University, Institute fuer
Werkstoffkunde, Hannover, Germany

Report; 141 pp. (June 1996)

For the dismantling of austenitic components of nuclear facilities fastening techniques that can be remote controlled under water are investigated. The components are only one-sided accessible. The fastening techniques are based on Drawn Arc Stud Welding, Mechanical Drilling followed by mechanical clamping of the fastening elements and thermal drilling with Contact Arc Metal Cutting (CAMC) followed by mechanical clamping of the fastening elements. In the thermal drilling process with CAMC, hollow electrodes of different materials with internal water scavenging are investigated with regard to wear behavior and removal rate. The graphite type EG 88 shows the longest electrode life, tested in

plates of thickness from 20 mm up to 65 mm and using dielectric fluids of both drinking water and deionized water. Fourteen holes were drilled in a plate of thickness 30 mm (adequate to 420 mm) without electrode-changing. Minor tapered holes and rough interior surfaces of the piercing holes are the results. Fastening elements plug and blind rivet, which are customary in the trade, have been investigated. The latter guarantees the necessary mould clamp. The selected blind rivet is usable for plate-thicknesses from 6 mm up to 42 mm. In a tensile test the rivet pin breaks from 78 kN upwards. The rivet case is formed in minor tapered holes in the same way as in rough interior surfaces of holes. Drill bit does not influence the results. The developed combined one-way fastening elements and repeatedly applicable fastening elements are able to pierce (CAMC), to interlock and also to fix and to transport the segments of the components without changing the end effector of the manipulator. Such a general ideal process is demonstrated in 1:1 experiment. The developed fastening technologies are usable at least up to a water depth of 20 m. (This document is in German).

703

V18/024178

Direct Measurement of Actinides in Concrete by Alpha-Spectrometry of Thin-Layer Specimens

Nebelung, C.; Bernhard, G.; Huebener, S.; Nitsche, H.

Forschungszentrum Rossendorf e.V., Institute fuer Radiochemie, Dresden, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 417-424) (November 1995)

Approximately 90% of the total mass of the waste materials arising from nuclear facilities dismantling is concrete. One criterion for the decision whether to dispose of or recycle the residual materials is the concentration of alpha-emitting nuclides. The direct alpha-spectrometric measurement of large-surface, thin-layer specimens by means of a grid ionization chamber and semiconductor detector was examined as a method for exemption measurement of the building rubble. Calibration measurements of preparations with a known nuclide content at varied layer thickness permit experimental determination the self-absorption of the alpha-radiation. (This document is in German).

704

V18/020626

Directory of Information Resources on Radioactive Waste Management, Decontamination and Decommissioning, and Environmental Restoration - Data as of June 1995

International Atomic Energy Agency, Vienna, Austria
IAEA-TECDOC-841; 65 pp. (November 1995)

This directory is intended to aid scientists, engineers, policy makers and managers in finding other information sources in addition to the information they derive from their personal contacts.

705

V18/024195

Dismantlement of Biological Shield

Kozawa, K.

Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan

Genshiryoku Kogyo (Nuclear Engineering) 42(12):15-19 (December 1996)

Japan Power Demonstration Reactor (JPDR) biological shields were constructed of strong reinforced concrete with a liner of 13 mm thickness on the surface. A part of them was activated strongly by neutron radiation in operation. On removal of the JPDR biological shields, the range of dismantlement was determined by the radiation level. The dismantling was carried out by the mechanical cutting process, the water jet cutting process, and the controlled blasting method. As the center part of core with 40 cm larger thickness showed high level of radiation, the part was cut by the mechanical and the water jet cutting process using remote handling. The working conditions of each method are explained. (This document is in Japanese).

706

V18/024229

Dismantlement of the Dodewaard Reactor can Lean on Worldwide Experience: Current and Finished Projects in Germany and the USA

Dodd, D.H.; Heijdra, J.J.

ECN-Nucleaire Energie, Petten, Netherlands

Energie en Milieuspectrum 12:28-31 (December 1996)

The planned closure of the Dutch nuclear power Plant Dodewaard caused many speculations on the costs and risks of the dismantlement and all preliminary actions. However, already a lot of experience with using safe techniques and strategies for decommissioning exists. The costs of decommissioning depend strongly on the design and local conditions, e.g. licensing. (This document is in Dutch).

707

V18/022541

Dismantling and Disposal of a Low-Pressure Turbine from the Philippsburg BWR (KKP1)

Hillebrand, I.; Pfeiffer, R.; Schwarzkopf, W.; Majunke, J.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Hauptabteilung Dekontaminationsbetriebe, Karlsruhe, Germany; Kernkraftwerk Philippsburg GmbH, Philippsburg, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 359-362) (May 1996)

Short communication. No abstract available. (This document is in German).

708

V18/024186

Dismantling and Disposal of the Niederaichbach Nuclear Power Station

Valencia, L.; Precht, E.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektbereich Stilllegung, Karlsruhe, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 327-339) (November 1995)

The project of decommissioning and dismantling the Niederaichbach Nuclear Power Reactor (KKN) showed that an activated power reactor can be decommissioned, dismantled and completely disposed of in an ecologically compatible manner, and that the real estate can be completely freed from artificial radioactivity. This was demonstrated when the Niederaichbach Power Reactor was decontrolled and released from atomic energy legislation on August 17, 1994. (This document is in German).

709

V18/022904

Dismantling and Reconstruction of the Budapest Research Reactor

Hargitai, T.

Atomic Energy Research Institute, Budapest, Hungary
IAEA-SR-190/37; GKSS-95/E/51; CONF-9505363; Proceedings of an International Topical Seminar on Management of Ageing of Research Reactors, F. Alcala-Ruiz and W. Krull (eds.), Geesthacht/Hamburg, Germany, May 8-12, 1995, 622 pp.; (pp. 383-395) (1995)

The Budapest Research Reactor was first commissioned in 1959. At that time, the power of the reactor was 2 MW, the name was WWR (water cooled and moderated) and EK-10 type fuel assemblies of 10% enrichment were used. In 1967 the reactor was upgraded, the power was increased to 5 MW, as a new fuel WWR-M2 (36% enrichment) was introduced, the core grid was replaced and also a beryllium reflector was put around the core. In 1983 a governmental decision was made for the full scale reconstruction and upgrading of the reactor to fulfil new trends in nuclear research and applications as well as new safety criteria and requirements. The reconstruction and upgrading project started in 1986 after 27 years of reactor operation without any incident. The dismantling of the reactor was done by the operation and maintenance staff of the reactor, while the reconstruction itself was a joint project of the operating organization and other Hungarian contractors. The reconstructed reactor reached first criticality on 12 December 1992. After having finished the commissioning programme, on 25 November 1993 the regulatory body issued the operating license and the regular operation started. The present paper summarizes the dismantling and the reconstruction experiences.

710

V18/024197

Dismantling and Removal of Buildings for Reactor Containment Vessel and Others

Seiki, Y.

Japan Atomic Energy Research Institute, Tokai Research

Establishment, Ibaraki, Japan

Genshiryoku Kogyo (Nuclear Engineering) 42(12):20-25 (December 1996)

In the practical test of dismantling, after the installed machinery and equipment in buildings were removed, the dismantling of the buildings was begun. Contamination was contained by removing contaminated concrete and closing openings in buried pipes that remained in the buildings. When contamination did not remain, the control zones of the buildings and their surroundings were removed, and the dismantling was begun from the upper part of buildings. When contaminated buried pipes remained, the control zones of the 1st kind were changed to control zones of the 2nd kind, and the dismantling was begun from the upper part. The dismantling of buildings was advanced by the procedure of the removal of the pipes penetrating building bodies, the separation and removal of contaminated concrete, the measurement for confirming contamination removal, the change of control zones, the dismantling of buildings, and refilling and ground leveling. (This document is in Japanese).

711

V18/024196

Dismantling and Removal of Installations, Machinery, and Equipment

Yanagihara, S.; Seiki, Y.;

Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan

Genshiryoku Kogyo (Nuclear Engineering) 42(12):7-14 (December 1996)

The practical test of dismantling the Japan Power Demonstration Reactor (JPDR) was begun in December, 1986, and the process that became the critical path in this work was the removal of the radioactivated machinery and equipment in the containment vessel. This is the work of dismantling the machinery and equipment with relatively high levels of radioactivity, such as in-core structures, the reactor pressure vessel and the biological shielding, using remote operating systems. After having finished the removal of these pieces of machinery and equipment, the dismantling of the biological shielding, the installations, machinery and equipment in attached buildings, and building structures, and the decontamination of buildings and the measurement for confirming radioactivity to remove radiation control zones were carried out. In the practical test of dismantling, the project management data, such as the man-hours of work and exposure dose, were collected, and by summarizing and analyzing them, the features of the work were clarified. The features of the dismantling work, the fundamental policy of the dismantling work, the dismantling by remote operation and conventional methods, the dismantling of large machinery and equipment, and the analysis of the dismantling work are reported. (This document is in Japanese).

712

V18/025822

Dismantling of Nuclear Facilities Industrial Organisation and Programmes of the CEA

Lambert, F.

French Atomic Energy Commission, Bagnols-sur-Ceze, France

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 3-7) (1996)

When shut-down, a nuclear installation still represents a potential risk for the public and the environment, and needs to be maintained in a safe state, which could become very expensive. The French Atomic Energy Commission (CEA), therefore dismantles the installation as soon as technical solutions are found, in particular regarding interim storage or final disposal of the end waste. A dismantling operation is generally aimed at freeing the facility site of all security and safety constraints. This is achieved by extracting, sorting, grouping, and packaging all the radioactivity contained in the installation so that it may be placed in interim storage facilities or disposed of under surveillance in nuclear waste repositories. The CEA has carried out considerable work in all fields, i.e. financial assessment, regulations, safety and radiological protection, work techniques, and products and waste management. The results of this work have already made it possible to declassify more than 20 of the oldest basic nuclear installations or parts of such installations belonging to the CEA and in so doing, to gain considerable experience.

713 V18/020617

Dismantling of the Damaged Chernobyl Reactor Number 4 and the Implications upon the Design of a Second Shelter

LeMao, J.L.; White, S.J.

Campenon Bernard Europe, Paris, France; AEA Technology, Windscale, Seascale, Cumbria, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 89-108) (1995)

During 1994/95 a study was undertaken by Alliance to assess the feasibility of constructing a new containment/shelter over the damaged Chernobyl reactor and its sarcophagus. This paper reviews the implications placed upon the design due to the ultimate dismantling requirements. The paper highlights some of the generic requirements and the impact upon the shelter design solution. Alliance is a consortium of leading European engineering companies comprising Campenon Bernard, AEA Technology, Walter-Bau, SGN, Taylor Woodrow and Bouygues.

714 V18/022526

Dismantling of the Experimental AVR Reactor - Entkopplungskonzept (Second Dismantling Concept, Extended Containment)

Gitzel, D.; Fuchs, A.; Rauschert, G.; Wimmers, M.; Wahlen, E.

Babcock Rohrleitungsbau GmbH, Oberhausen, Germany; STEAG Kernenergie GmbH, Essen, Germany; DETEC GmbH, Alzenau, Germany; Arbeitsgemeinschaft Versuchs-Reaktor GmbH, Juelich, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 554-557) (May 1996)

Short communication. No abstract available. (This document is in German).

715 V18/022530

Dismantling of the Steam Generator of Unit 5 of the Greifswald Nuclear Power Plant

Haeeger, M.; Schulze, H.

Energiewerke Nord GmbH, Rubenow, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 566-569) (May 1996)

Short communication. No abstract available. (This document is in German).

716 V18/020871

Disposal of the WAGR Heat Exchangers

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United Kingdom Atomic Energy Authority, Warrington, Cheshire, United Kingdom; AEA Technology Managing Agency Group, Windscale, Seascale, Cumbria, United Kingdom

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 173-185) (1996)

The Windscale Advanced Gas Cooled Reactor (WAGR) was used as a prototype for experimental research and development related to the Advanced Gas Cooled Reactor programme. Test work was completed and the WAGR was closed down in 1981. In the early 1980's during the formulation of the original plan for the decommissioning of WAGR, options for disposal of radioactive low level wastes (LLW) at sea and on land were available, however, following the London Conference in 1983, the sea disposal route was closed indefinitely. At that time the land burial option was not available for the heat exchangers on technical grounds: surface radiation levels exceeded those allowed in the then current conditions for acceptance of LLW at the UK low level waste repository. This paper discusses: the options considered for disposal of the heat exchanger, the changes which reopened the possibility of land burial, project definition, contract and contractorisation strategy, technical evaluations and contract implementation for the preparation, removal, transport and disposal of four heat

exchangers from the WAGR.

717 V18/020620

Disposal-Specific Requirements on Radioactive Waste Originating from Decommissioning

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 201-208) (1995)

Decommissioning and dismantling of nuclear installations started in the last decade and will be of growing importance beyond the year 2000 in the Federal Republic of Germany. Information is given on the respective nuclear fuel cycle installations including a survey on the types and expected amounts of radioactive waste originating from decommissioning and dismantling. Guidance for processing and packaging this waste is given in the waste acceptance requirements established for Morsleben repository and the Konrad repository project. The main requirements to be met are addressed. In addition, the planned disposal of decommissioning and dismantling waste is outlined.

718 V18/024379

Distribution of Radionuclides During Melting of Carbon Steel

Thurber, W.C.; MacKinney, J.

Sanford Cohen & Associates, Inc., Kirtland, WA; U.S. Environmental Protection Agency, Washington, DC

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (18 pp.) (1996)

During the melting of steel with radioactive contamination, radionuclides may be distributed among the metal product, the home scrap, the slag, the furnace lining and the off-gas collection system. In addition, some radionuclides will pass through the furnace system and vent to the atmosphere. To estimate radiological impacts of recycling radioactive scrap steel, it is essential to understand how radionuclides are distributed within the furnace system. This paper discusses the distribution of various elements with particular reference to electric arc furnace (EAF) steelmaking. The first two sections consider the calculation of partition ratios for elements between metal and slag based on thermodynamic considerations. The third section presents laboratory and production measurements of the distribution of various elements among slag, metal, and the off-gas collection system; and the final section provides recommendations for the assumed distribution of each element of interest.

719 V18/022811

Distribution of Radionuclides in the Process of Thermal Decontamination of Asphalt Layers

Golubtsov, I.V.; Korobkov, V.I.; Barinov, A.S.; Karlina, O.K.; Ojovan, M.I.

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CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1796-1798) (1996)

Autoradiographical analysis was used to investigate the radionuclides distribution in the process of thermal decontamination of asphalt. Cs-137 and Sr-90 were introduced in asphalt to simulate real contamination. It was found that penetration of these radionuclides is very small (about 1 mm). No significant emission of radionuclides was observed in the process of thermal decontamination.

720 V18/020888

Do Proposed Decommissioning Standards Provide the Basis for Recycling?

Nicolosi, J.F.; Parsons, E.

Scientific Ecology Group, Inc., Kingston, TN; Scientific Ecology Group - Colorado, Inc., Golden, CO

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 295-299) (1996)

The basis for recycling reusable materials, equipment and/or facilities from nuclear operations decommissioning are based on regulatory standards and economic factors. The categories of materials that may be available for recycling are identified. Potential reuses are discussed based on industry available knowledge. The actual recycling experience from decommissioning a nuclear power plant is reviewed based on information to date. Levels of nuclear and public sector acceptance for recycled materials are defined in light of regulatory standards and public understanding. The differences between U.S. and European standards for permissible levels of radioactive materials in recycled materials for unrestricted use are reviewed.

721 V18/023694

Dose Based Decontamination and Decommission Planning for Nuclear Facilities Using Pathway Cost Benefit Analysis

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Westinghouse Electric Corporation, Pittsburgh, PA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (10 pp.) (1996)

The dose based decontamination and decommissioning approach uses dose conversion factors derived from site specific conditions and relationships to guide the overall decommissioning plan, instead

of basing the release of buildings, components, soils, and groundwater solely on generic nuclide specific concentrations. Using the dose based approach, a site can be remediated in the most efficient manner, taking into consideration present and future site conditions, realistic remedial methods, and possible reuse options. This approach has been applied to an active nuclear site to ensure the decommissioning is consistent with the goals of the licensee and the regulators. Consequently, critical areas are identified and can be remediated using a phased approach targeting the highest ranked/priority areas first. Both management and the regulators can evaluate site reuse options and cost impacts which can influence financial accruals and final property disposition. This approach was applied to an active nuclear site located in the northeastern United States to generate a decommissioning plan that complies with both the goals of the licensee and the regulators. Several phases of characterization and assessment are needed to develop this type of decommissioning plan. The main phases include site characterization, groundwater modeling, cost estimating, dose assessment, incremental cost analyses, and prioritization. The dose based methodology, which integrates primarily the dose assessment and the cost analyses is the focus of this discussion. Details on this approach are provided and supported by site-specific calculations. Other key components and assumptions used for this approach are also identified in this discussion, which make the overall project planning more efficient and realistic.

722 V18/023519

EUROCHEMIC Reprocessing Plant Decommissioning Project: Status Report

Teunckens, L.; Lewandowski, P.

Belgoprocess, Dessel, Belgium

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (9 pp.) (1996)

This paper presents a status overview of the decontamination and decommissioning of the main process building of the former EUROCHEMIC reprocessing plant on the nuclear site of Dessel in Belgium. The main process building is a large rectangular construction of about 80 m long, 27 m wide and 30 m high. Basic inventories are: building volume: 56,000 cu m, concrete volume: 12,500 cu m, concrete surface: 55,000 cu m, and metal structures: 1,500 tons. The core of the building consists of a large cell block of 40 main cells, containing the chemical process equipment. Access areas and service corridors are located on 7 floor levels. Inside the cells, the sequence of operations was performed from west to east through the whole building. About 106 individual cell structures have to be dismantled.

723 V18/024885

Effects of Gases on Laser Cutting of Stainless Steels

Gabzdyl, J.T.

BOC Gases, Guildford, United Kingdom

CONF-961073; ICALEO '96: Laser Materials Processing, Proceedings of the 15th International Congress on Applications of Lasers and Electro-Optics, Detroit, MI, October 14-17, 1996. Laser Institute of America, Orlando, FL, 974 pp.; (pp. C39-C44) (1996)

This paper highlights the differences between the use of oxygen and nitrogen as the assist gas for laser cutting of stainless steels in terms of quality, productivity, and fume generation. Results show that gas purity has a significant effect on cutting speed and edge quality. The main gas supply options and their relative merits are also discussed.

724 V18/023526

Energiewerke Nord GmbH, Germany: Progress Report Stern, H.

Energiewerke Nord GmbH, Lubmin, Germany

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (19 pp.) (1996)

This paper presents an overview of D&D activities at the Greifswald and Rheinsberg Nuclear Power Stations. In Greifswald, dismantling of the controlled area in unit 5 has begun. Unit 5 will serve as a prototype for the remote systems testing and check-out. The dismantling of inactive units 7 and 8 was stopped due to lack of funding for non-contaminated parts. In Rheinsberg, the license to dismantle and refurbish the turbine hall was issued and work is progressing. Radiological measurement of the concrete monolith building has been terminated. The preparation of supplementary licensing documents for the 2nd license is underway. The basic time schedules for dismantling in both facilities has not been changed, however, the start of operation of the Interim Storage North has been delayed. The treatment of operational waste in Greifswald and the transport of waste from Rheinsberg and Greifswald to the final storage ERAM is beginning to run smoothly. The handling and loading of CASTOR casks have been licensed and the storage license will be treated with the public hearing of this storage part in the Interim Storage. The public hearing will take place in May. The hot operation of the Interim Storage is still critical for the overall project.

725 V18/023933

Enhanced Removal of Radioactive Particles by Fluorocarbon Surfactant Solutions

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Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (14 pp.) (1993)

The application of ESI's enhanced particle removal process to the nondestructive decontamination of nuclear equipment is discussed. The cleaning medium used in this process is a solution of a high molecular weight fluorocarbon surfactant in an inert perfluorinated liquid which results in enhanced particle removal. The perfluorinated liquids of interest, which are recycled in the process, are nontoxic, nonflammable, generally safe to use, and do not present a hazard to the ozone layer. The fluorocarbon surfactant solutions used as working media in the ESI process survived exposure of up to 10 Mrad doses of gamma rays, and are considered sufficiently radiation resistant for use as decontamination media.

Ultrasonic cleaning in perfluorinated surfactant solutions was found to be an effective method of removing radioactive iron (Fe-59) oxide particles from contaminated test pieces. Fifteen test assemblies were examined. Depending on part geometry and process conditions chosen, decontamination levels ranging from 88% to 100% (within experimental error) were obtained. For twelve of the fifteen assemblies tested, residual contamination levels of less than 1,100 decays/min/100 sq cm were noted. Radioactive particles suspended in the process liquids could be quantitatively removed by filtration through a 0.1 µm membrane filter, so that these process liquids can be recycled for further use. Projected economics indicate a pre-tax pay back time of 1 month for a commercial scale system. The above data indicate that the proposed ESI process is a technically effective and economically attractive method of nuclear decontamination. Because of the inertness of perfluorinated liquids, this method should be of particular interest for the decontamination of electrical and electronic equipment.

726 V18/022982

Enlarged Field of Nuclear Decommissioning Waste

Ishihara, T.

Japan Atomic Industrial Forum, Inc., Tokyo, Japan

Journal of the RANDEC 14:14-23 (August 1996)

Originally, nuclear decommissioning waste meant the waste generated from decommissioning activities at nuclear reactor and related nuclear facilities. At United States defense sites enormous quantities of radioactively and chemically contaminated waste, mixed waste, have been generated from the ongoing Environmental Management Project. At the same time after the end of the cold war, countries with nuclear weapons have been facing new problems of dismantling surplus nuclear weapons and disposition of fissile materials under nonproliferation conditions. All the wastes generated from decommissioning activities of civilian and defense nuclear apparatus and facilities should be defined as decommissioning wastes, including environmental management waste and dismantled warhead waste. New concepts and processes developed among these decommissioning activities should be valuable even in the Japanese nuclear world with no military aspects. (This document is in Japanese).

727 V18/020899

Equipment Decontamination Case Study: The Benefits of Reuse and Avoided Disposal Using the TECHXTRACT [TM] Process

Bonem, M.W.; Borah, R.E.; Hall, D.

EET, Inc., Bellaire, TX; EET, Inc., Michigan City, IN; Scientific Ecology Group, Inc., Oak Ridge, TN

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 70-72) (1996)

The need for and benefits of effective and economical decontamination technologies for nuclear facility decommissioning are substantial and without question. Decontamination and decommissioning (D&D) programs in the U.S. Department of

Energy (DOE), nuclear utility industry, and international markets are growing rapidly. With this growth, the acceptability and costs of traditional D&D approaches, which rely largely on demolition and disposal, are being increasingly called into question. Disposal in particular is a major complicating factor as disposal costs are rising, and the long-term availability/public acceptability of disposal capacity is a significant uncertainty for the industry. Thus, the stage is set for innovative technologies which can decontaminate structures and equipment to below regulatory levels, thereby avoiding large-scale bulk disposal. Such technologies must be effective in the removal of a variety of contaminants from different types of materials and substrates. They must also offer total economics (considering process costs, disposal, reuse, future liabilities, and other factors) which are attractive versus demolition and disposal. The TECHXTRACT [TM] process is a chemical technology for the extraction of radionuclides, heavy metals, PCBs, and hazardous organics from solid materials such as concrete and metal. Specifically designed chemical blends are used to penetrate below the surface and remove contaminants which have leached into the substrate. The technology has very high decontamination rates (e.g., 90-99%, per cycle). In addition to decontamination performance, economic analysis indicates that TECHXTRACT [TM] can save 25-75% of total project cost versus traditional methods. It is a full-scale, commercialized technology which has been used in the DOE complex, electric utility, and private industry. This paper discusses the technology in more detail and offers a case history from a recent full scale decontamination project for a private industry manufacturer.

728 V18/020652

Evaluation of Radioactive Inventory of Nuclear Ship Mutsu

Adachi, M.; Ezure, H.

Japan Atomic Energy Research Institute, Ibaraki, Japan; Nuclear Safety Research Association, Tokyo, Japan; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 189-199) (1995)

The operation of the Nuclear Ship Mutsu was terminated in January 1992. Radioactivities and dose rates on the surfaces of reactor components were measured in order to estimate the residual radioactive inventory in the Mutsu. The predicted radioactive inventory due to neutron activation was calculated by using a computer code system. The results show good correlation between predicted and measured values of radioactivities in the core baffle plate. The radioactive inventory was estimated to be 8.4×10^{14} Bq as of 1.5 years from the final shutdown of reactor operation. The contamination in reactor components was estimated from the contamination level measured in the Japan Power Demonstration Reactor (JPDR), from which the dose rates in the reactor room were calculated. The radioactive inventory due to contamination was estimated at 3.4×10^{10} Bq. Some

difference was found between these calculations and measurements.

729 V18/020733

Evaluation of Safety Relevant Technological Parameters for the General Application of Explosive Dismantling in Nuclear Installations: Final Report

Freund, H.U.; Baechler, M.; Obst, J.; Krutzik, N.J.; Tropp, R.

Battelle Ingenieurtechnik GmbH, Eschborn, Germany

BF-R-40.059-F; 144 pp. (December 1995)

The technical feasibility of explosive dismantling of activated concrete in the biological shield has been successfully demonstrated within the framework of the Niederaichbach nuclear plant dismantling project. The explosive tests were integrated into the commercial dismantling procedures. They were accompanied by measurements recording the dynamic structural loads. The results of the tests show that for the case of a massively reinforced biological shield, in particular heavy barite concrete, explosive dismantling by borehole blasting technique is technically feasible and economically recommendable. The specific advantage of the method is the generation of small size rubble which can be easily handled and the total separation of concrete and steel reinforcement such that both materials may be separately conditioned. A combination of explosive fragmentation and cracking and subsequent hydraulic chisel impact to remove the remaining fragmented concrete from the reinforcement array has proven to be particularly successful. Recommendations for the general application are given and data to be used as a basis for estimating the technical efforts as well as the structural loads are described. (This document is in German).

730 V18/023380

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Operations Maintenance Manual, Volume V - Final Report

Roy F. Weston, Inc., West Chester, PA

Report; 791 pp. (June 26, 1995)

Partial contents include: (1) manifest/shipping list, (2) general arrangement drawings, (3) controls operating sequence, (4) burner and premix blower data, (5) instrumentation specification sheets, (6) control panel instrument data combustor equipment data, (7) fumes blower and accessory information, and (8) material safety data sheets.

731 V18/023381

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Operations Maintenance Manual, Volume IV - Final Report

Roy F. Weston, Inc., West Chester, PA

Report; 881 pp. (1995)

This manual covers both model DR45AT and DR45AR Truline recorders. The data is tailored primarily for the standard model DR45AT, but it also applies for model DR45AR except as noted. The DR45AR functions that differ from model DR45AT are

detailed in Appendix D. The manual contains twelve sections numbered 1 through 12. The first four sections deal with set-up tasks for a DR 4500A recorder; sections 5, 6, and 7 cover operation, calibration, and service, respectively; section 8 is a replacement parts list; and sections 9-12 are appendices.

732 V18/023382

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Operations Maintenance Manual, Volume III - Final Report

Roy F. Weston, Inc., West Chester, PA

Report; 617 pp. (June 27, 1995)

Partial contents include: cautions and warnings; general description of the equipment and theory of operation; operating procedures; planned maintenance system settings and required utilities.

733 V18/024868

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Validation Test Report - Volume III, Appendices E-L

Roy F. Weston, Inc., West Chester, PA

Report; 914 pp. (September 1996)

No abstract available.

734 V18/024869

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Demonstration Test Report - Technical Report

Roy F. Weston, Inc., West Chester, PA

Report; 101 pp. (August 1996)

No abstract available.

735 V18/024870

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Operations Maintenance Manual - Volume I

Roy F. Weston, Inc., West Chester, PA

Report; 157 pp. (September 1996)

No abstract available.

736 V18/024872

Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Operations Maintenance Manual - Volume II, As-Build Drawings

Roy F. Weston, Inc., West Chester, PA

Report; 128 pp. (August 1996)

No abstract available.

- 737** V18/024871
Evaluation of a Transportable Hot-Gas Decontamination System for the Decontamination of Explosives-Contaminated Debris Piping: Validation Test Report - Volume II, Appendices A-D
 Roy F. Weston, Inc., West Chester, PA
 Report; 573 pp. (September 1996)
 No abstract available.
- 738** V18/022135
Evaluation of the Decommissioning Costs of Nuclear Facilities: 1995 Scientific Report of the Belgian Nuclear Research Centre
 Noynaert, L.
 Centre d'Etude de l'Energie Nucleaire, Mol, Belgium
 INIS-mf-14878; 138 pp. (p. 37) (1996)
 As an owner of nuclear installations, the Belgian Nuclear Research Centre SCK-CEN has to set up and to submit to the authorities decommissioning plans describing its nuclear installations. These plans contain a physical and radiological inventory, a description of the decommissioning work and techniques to be used, as well as a description of the management of the radioactive materials, the selected strategy, and an estimate of the costs. A data-processing system for the evaluation of the decommissioning costs of nuclear installations has been set-up. The progress in this field for 1995 is given.
- 739** V18/024172
Evaluation of the Efficiency of Technology and Equipment Used in Radwaste Management and Decontamination
 Zhilinskij, V.V.; Trembach, B.V.; Barsukovskij, V.V.
 Spetspyidprijemstvo Kompleks, Chernobyl, Ukraine;
 Ministerstvo Ukrainy po Delam Zashchity Naseleniya ot Posledstvij Avarii na Chernobyl'skoj AEhS, Kiev, Ukraine
 INIS-UA-026/A; CONF-960002; Chernobyl 96: Results of 10 Years Work on ChNPP Accident Mitigation, Proceedings of the Fifth International Scientific-Technical Conference, N.P. Arkhipov (ed.), Zelenyj Mys, Ukraine, 1996, 526 pp.; (p. 153) (1996)
 Short communication. No abstract available. (This document is in Russian).
- 740** V18/022118
Evolution or Revolution: Dismantling the FASB Standard on Decommissioning Costs
 Ferguson, J.S.
 Fortnightly 134(10):26-31 (May 15, 1996)
 The Financial Standards and Accounting Board (FASB) has issued for comments a draft of proposed financial accounting standard pertaining to nuclear plant decommissioning. This article examines the proposed rules and discusses alternate approaches in those areas in which the author takes issue with the FASB draft.
- 741** V18/022799
Experience Gained with the Dismantling of Large Components of the Pamela Vitrification Plant
 Luycx, P.; Demonie, M.; Snoeckx, M.; Baeten, L.
 Belgoprocess, Dessel, Belgium
 CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1717-1727) (1996)
 Belgoprocess acquired valuable experience during the dismantling of four large components of its vitrification plant at Dessel, Belgium. The four components, a ceramic melter, the vitromet equipment, the wet dust scrubber and the container lifting and weighing carriage, had to be dismantled in view of recommissioning the plant for a second vitrification programme. The dismantling strategy and operations were determined by the existing plant and equipment and by the available staff and experience. A strict programme of quality assurance was implemented. The work was completed within the scheduled time period of 2.5 years and largely within the cost estimate. Total manhours amounted to 25,000. Some 30 t of dismantling waste was conditioned into cement in 187 stainless steel drums containing 200 liters. Five tons of low-level dismantling waste were sent to treatment facilities onsite. Total costs amounted to \$3.5 million. The collective occupational radiation dose amounted to 48 mSv and was mainly due to repair and maintenance jobs. Dismantling costs and occupational doses can be substantially lowered by taking into account dismantling requirements at the design phase of plant and equipment.
- 742** V18/024184
Experience Gathered from the Dismantling of the Niederaichbach Power Reactor (KKN), Including as a Major Aspect Release from Liability Pursuant to Atomic Energy Law
 Schwald, P.; Auler, I.; Orwantschke, D.; Valencia, L.
 NIS Ingenieurgesellschaft mbH, Hanau, Germany; Noell GmbH, Wuerzburg, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Karlsruhe, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany
 CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 341-354) (November 1995)
 When the Niederaichbach Power Reactor (KKN) was dismantled, this demonstrated conclusively that a decommissioned nuclear facility can be safely dismantled without a posing hazards to man or the environment. In the present paper legal framework conditions and the course of work are first reported. The final project phase - release of the facility from the scope of application of nuclear legislation - is explained in greater detail. Subsequently, experience gathered with the project is discussed. (This document is in German).

743

V18/024209

Experience Gathered in Dismounting Pressure Vessel Internals of the Kahl Experimental Reactor (VAK Kahl)

Kalwa, H.; Eickelpasch, N.; Reiter, W.

Versuchatomkraftwerk Kahl GmbH, Karlstein am Main, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projekttraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 191-202) (November 1995)

Mechanical cutting processes are preferred for dismantling of activated pressure vessel internals in the VAK Kahl. Up to now, sawing, nibbling, grinding and electroeroding have been tried. For a realistic under-water trial run on a scale of 1:1, an inactive experimental facility was erected in the empty turbine building of the VAK. (This document is in German).

744

V18/023355

Experience in Decommissioning a Research Reactor: A Case Study

England, M.R.; Lyons, J.

British Nuclear Fuels plc, Warrington, Cheshire, United Kingdom

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 85-90) (1996)

The Universities research reactor was an Argonaut type water moderated reactor operated from July 1964 until July 1991 by the Universities of Manchester and Liverpool to support post-graduate training and research. Operations were supported by other site facilities including a radiochemistry laboratory, counting room, and hot cells. British Nuclear Fuels was contracted to decommission the reactor and dispose of all waste, thereby returning the site to "green field" status. The eventual goal was revocation of the site license. Notification ending the Universities' period of responsibility was received on July 26, 1996. Following receipt of this notification, the Universities finalized the sale of the land to a private developer who is now constructing a distribution warehouse for a large computer company.

745

V18/021504

Experience of Dismantling in Spain

Ulibarri, A.

Empresa Nacional de Residuos Radiactivos S.A., Madrid,

Spain

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (21 pp.) (1995)

This paper describes the ENRESA Spanish Company activities in reactors and uranium mill dismantling. Dismantling costs are evaluated taking into account the equipment, structures and components required, the radiological plant zone inventory, the inventory of macro components and the management of wastes. The calculated cost does not include activities performed prior to dismantling, shutdown and fuel removal operations (for reactors), transport and disposal of radioactive wastes, insurance, taxes, etc. A description of the dismantling of Vandellós 1 Nuclear Power Plant, JEN-1, ARGOS, and ARBI research reactors is given with a description of the legal framework, the options proposed and the approved alternative, the basic design and licensing phase, the environmental radiological surveillance, the inventory and classification of dismantling waste materials. The closeout of an uranium mill site and the site rehabilitation remedial action plan carried out to ensure the long-term stability of tailing piles, to contain the dismantling wastes, and to reduce the radon flux and water infiltrations is also described.

746

V18/022903

Experience of Operating and Decommissioning of the Research IRT-M Reactor

Mikhalevich, A.A.; Strelkov, G.I.; Savushkin, I.A.

Academy of Sciences, Institute of Power Engineering Problems, Minsk, Belarus

IAEA-SR-190/14; GKSS-95/E/51; CONF-9505363; Proceedings of an International Topical Seminar on Management of Ageing of Research Reactors, F. Alcala-Ruiz and W. Krull (eds.), Geesthacht/Hamburg, Germany, May 8-12, 1995, 622 pp.; (pp. 143-150) (1995)

The nuclear reactor of IRT-type was in operation for 25 years at the Institute of Power Engineering Problems/Academy of Sciences of Belarus (the former Institute of Nuclear Power Engineering/Academy of Sciences of Byelorussian SSR). The reactor, with the designed power of 2000 kW, was put into operation in April 1962. The reactor was under operation, with the same level of power, until 1971 using rod fuel elements of 10 percent enrichment to U-235 as fuel and a side graphite reflector. As the research works were developed, it became clear that comparatively small power of the reactor, and as a consequence of this, low level of neutron flux in experimental channels were insufficient for further development of the investigations. The reactor core had downward-upwards circulation of the coolant which led to vibration of fuel assemblies, suspended in upgoins flow of the coolant. The hood-baffle plate of water flow and assembly-holder above the core, which are necessary in the scheme of cooling given, restricted the accessibility to the core for carrying out experiments there. In 1971 modernization of the reactor was directed to the increasing of its power up to 4000 kW and improving its design but preserve the main designed principles peculiar to a basin-type reactor. In modernization several changes was made.

747

V18/023360

Experience on Decommissioning Commercial Nuclear

Power Stations in the United Kingdom

Holt, G.; Lee, J.C.; Woollam, P.B.

Magnox Electric plc, Berkeley, Gloucestershire, United Kingdom

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 72-76) (1996)

Magnox Electric is the U.K. government-owned utility that is responsible for nine commercial Magnox nuclear power stations. The stations were commissioned between 1962 and 1971, each having twin gas-cooled, graphite-moderated reactors. Three stations (Berkeley, Hunterston A, and Trawsfynydd) were shut down between 1989 and 1993, and they are being decommissioned in accordance with the preferred SAFSTOR strategy. The six reactors have been defueled, and extensive dismantling and decontamination have already been carried out.

748

V18/021493

Experience with Electrodecontamination to Reduce the Surface Contaminated Metal at INER

Wei, T.Y.; Chung, Z.J.; Lu, D.L.; Hsieh, J.C.

Institute of Nuclear Energy Research, Lung-Tan, Taiwan

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 145-155) (1996)

A project of cleaning dismantled metals is under way at INER. Results of the test work showed that the exposure rate decreased from 45 [micro]Sv/h to background levels after 20 minutes of electrolytic polishing. These cleaned metals could be reused through melting and fabricating. Some electro-decontamination facilities have been established to achieve the planned target. An automatic electropolishing facility with six cells was designed to clean the contaminated metals in plate type with dimensions less than 50 cm x 50 cm. The other automatic electropolishing facility was specially designed for treating the contaminated pipes. In addition, mobile electropolishing facilities were also established for large pieces of metal and some fixed equipment. Importantly, a practical recycling and treatment method for the electrolyte has been developed to comply with the requirement of secondary waste minimization.

749

V18/021507

Experience with the Dismantling of the Gundremmingen Unit A and the VAK Plant

Eickelpasch, N.

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (10 pp.) (1995)

The Gundremmingen Unit A plant (KRB A) and the VAK plant are BWR's and represent the first generation of nuclear reactors in Germany. KRB A is under dismantling since 1983, VAK since 1988. The actual work is the dismantling of highly contaminated components inside the reactor buildings and the underwater cutting of activated internals of the rpv's.

750

V18/021157

Experience with the Legal Aspects Involved in the Decommissioning of WWR Reactors in Germany: A Possible Contribution to a Forthcoming International Regulatory Framework

Schattke, H.

Umweltministerium Mecklenburg-Vorpommern, Schwerin, Germany

CONF-9409429; New Atomic Energy Law - International and National Developments, N. Pelzer (ed.), Proceedings of the Fifth Regional Conference of the German Branch of AID/INLA, Landshut, Germany, September 8-9, 1994. Nomos Verlagsges, Baden-Baden, Germany, 377 pp.; (pp. 299-333) (1995)

The legal basis to be provided is a licence for decommissioning work, issued for a particular reactor, including activities for recycling of disassembled, radioactive components and materials, subject to radioactivity measurements and exemption from radiological control of materials not exceeding the legally defined maximum level of contamination. (This document is in German).

751

V18/020729

Experiences on Dilute Chemical Decontamination of Moderator System Equipment of NAPS-1

Rout, D.; Sinha, B.K.; Agarwal, S.K.; Nagaich, N.

Indian Nuclear Society, Bombay, India; Rajasthan Atomic Power Project 3 and 4, Kota, India; Narora Atomic Power Station, Narora, India

CONF-951287; Experience with Dilute Chemical Decontamination in Indian Nuclear Reactors, Proceedings of a Seminar, Kalpakkam, India, December 12-13, 1995. Indian Nuclear Society, Kalpakkam, India, 222 pp.; (pp. 205-211) (December 1995)

This paper presents an exhaustive study on cobalt-60 decontamination of moderator system equipment of Narora Atomic Power Station (NAPS). The efficacy of cobalt-60 removal, downgrading of isotopic purity of heavy water, corrosion rate of construction material and removal of chemical formulation by ion exchangers were studied using various dilute chemical decontaminants. A total of 65.6 millicuries and 18.9 millicuries of cobalt-60 could be removed effectively from the internal surfaces of ALPAS and SHIM tank respectively within two successive cycles of decontamination. This resulted in about 60% reduction in occupational radiation exposures.

752

V18/025461

FBIS Report, Science and Technology - Japan: Results and Outline of Japan Power Demonstration Reactor Dismantling Demonstration Project - February 10, 1997

Foreign Broadcast Information Service, Washington, DC

FBIS-JST-97-007/XAB; 35 pp. (February 10, 1997)

The Table of Contents of this report is as follows: (1) Introduction; (2) JPDR Outline; (3) Outline of Nuclear Reactor Dismantling Technology Development; (4) JPDR Dismantling Demonstration; (5) Future Outlook for Development of Dismantling Technology; (6) International Cooperation; and (7) Conclusion.

753

V18/024194

FORM: A Project for Optimization of the Recycling Quota in the Manufacture of Nuclear Components

Sappok, M.; Holland, D.; Schlesinger, H.J.

Siempelkamp Giesserei GmbH & Company, Krefeld, Germany; Gesellschaft fuer Nuklear-Service mbH, Essen, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projekttraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 437-448) (November 1995)

In the future nuclear reactor dismantling will generate higher amounts of radioactive metallic waste materials which can not be conventionally recycled. The possibilities and consequences of processing more of these residual materials in the manufacture of shipping and storage containers made of nodular graphite (GGG 40) will be investigated in the framework of the research and development project described. The project's goal is to develop an extended strategy for utilization in order to increase the proportion of recycled scrap. SIEMPELKAMP are carrying out the necessary studies on manufacturing and materials technology and GNS is responsible for carrying out the studies on the mechanical design of the containers in accordance with the defined purpose. (This document is in German).

754

V18/025395

Feasibility Study on Recycling of Dismantled Metal by Induction Cold Crucible Melting Method

Suzuki, M.; Tsurumaki, K.; Komatsu, J.; Tanaka, T.; Ikenaga, Y.; Nose, H.

Research Association for Nuclear Facility Decommissioning (RANDEC), Tokai, Ibaraki, Japan; Sumitomo Metal Industries Limited, Corporate Research Laboratories, Kashima, Ibaraki, Japan; Sumitomo Metal Technology Industries Limited, Chiyodaku, Tokyo, Japan

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (13 pp.) (1997)

An induction cold crucible melting is one of the most promising technologies for the reuse of radioactively contaminated metals because it ensures a long life operation without generating secondary wastes under the high temperatures of metal melting. A feasibility

study on MERC (Melting and Recycling of Metals by Cold Crucible) process has been recently finished in RANDEC. In MERC, an induction cold crucible, which mainly consists of a melter, decontaminator, and continuous caster is used for the melting and recycling of metals contaminated by low level radiation with small section generated from the nuclear facilities. A cylindrical ingot of 3 kg and 45 mm in diameter was continuously cast by the MERC process through melting and solidifying simulated radioactive metallic tubes with the addition of flux composed of lime, alumina, and silica. Neither splash of the melt nor increase in the temperature of the hook supporting tubes took place during releasing the tube onto the melt dome. The ingot surface was smooth and crack free, promising removal of radioactive elements contained in a slag stuck to the ingot surface. There was not macro segregation inside. Tracer elements of Sr and Hf remained in the slag, Cs, and Zn in the dust. Co and Mn mostly remained in the ingot. However, up to 10% of Co could be transmitted to the slag. Necessary data in the scheduled scale-up of MERC process was obtained through experiment as well as theoretical study. These results are transferred to the design and manufacturing of testing apparatus.

755

V18/025833

Fiber Delivered Lasers for Dismantlement Applications

Subbaraman, G.; Spiegel, L.B.; Vetrovec, J.; Hindy, R.N.

Boeing North American, Inc., Rocketdyne Division, Canoga Park, CA

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 126-131) (1996)

The capability of fiberoptic delivered lasers to direct power to remote locations makes them an attractive tool for dismantlement applications in hazardous D&D environments. Test results show that commercially available high power Nd:YAG lasers are suitable candidates for near-term use for applications requiring thick section cutting. The upcoming field trials should provide increased confidence in using this tool. Because of their high capital costs, consideration should be given to using the laser under conditions where (a) conventional techniques are difficult to implement, (b) a production campaign is feasible, and (c) multiple applications are envisioned. Comparison of remote fiberoptics-delivered lasers with current practices are provided and utilization of these lasers to relevant dismantlement applications are discussed. Results from laboratory tests are shown along with near-term plans for field testing a commercially available 2-kW Nd:YAG laser.

756

V18/021474

Final Environmental Impact Statement on the Disposal of Decommissioned, Defueled Cruiser, Ohio Class, and Los Angeles Class Naval Reactor Plants

U.S. Navy, Washington, DC

DOE/EIS-0259; 362 pp. (April 1996)

This statement describes in detail the preferred alternatives - land

burial of the entire reactor compartment at the Department of Energy Low Level Waste Burial Grounds at Hanford, Washington; the "no-action" alternative - protective waterborne storage for an indefinite period; disposal and reuse of subdivided portions of the reactor plant; and indefinite storage above ground at Hanford. Other alternatives examined in limited detail are sea disposal; land disposal at other sites; and permanent aboveground disposal at Hanford.

757 V18/025498

Final Report of Reactor Dismantling Technology Development: Dismantling of JPDR and Technology Development

Miyasaka, Y.; Tanaka, M.; Nomura, F.

Japan Atomic Energy Research Institute, Tokyo, Japan

JAERI-Tech-97-001; 102 pp. (February 1997)

Establishment of reactor dismantling technologies for preparation for future decommissioning of commercial nuclear power plants is extremely important for the development of nuclear energy. For this reason, the Atomic Energy Commission prescribed the strategy for the decommissioning of nuclear facilities in the Long-Term Nuclear Power Development and Utilization Plan published in 1982. Based on the strategy, the Japan Atomic Energy Research Institute (JAERI) initiated the reactor dismantling technology development program for the Japan Power Demonstration Reactor (JPDR) in 1982 under contract with the Science and Technology Agency. In the technology development phase, reactor dismantling technologies were studied. The JPDR dismantling demonstration project started in 1986 using the developed technologies. The JPDR dismantling demonstration project was safely completed by March 1996, achieving its initial objectives, in which it was demonstrated that the dismantling of reactor facilities is possible in a safe manner. In addition, data on dismantling of reactor facilities were collected and accumulated throughout the project. The experience and the data will effectively contribute to future dismantling of commercial nuclear power plants. An outline of the reactor dismantling technology development conducted by JAERI is described in this report. (This document is in Japanese).

758 V18/021292

Financial Risks Versus Decommissioning Options

Perkett, L.

Northern States Power Company, Minneapolis, MN

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:15-16 (1995)

Much discussion is taking place and work is being done to analyze the decommissioning process. The cost estimate is extensively planned through site-specific studies and then scrutinized to find the lowest reasonable value. The storage of fuel is agonized over to determine its impact on and detriment to the decommissioning timeline. The possible investment vehicles and techniques are argued over to arrive at the best long-term growth potential. In all this work, the final assessment should be to determine the financial risk the company is willing to assume with the culmination of the decommissioning process. Financial risk is defined as the magnitude

and probability of a monetary loss occurring. This risk is analyzed by reviewing factors exposing one to a loss potential, such as fund earnings, inflation, regulation, or cost estimates. Will the company have enough funds to cover the future expenditures for nuclear plant removal? Unfortunately, all the exhaustive and extensive work will not be able to answer this question with certainty. The best one can hope is that the estimates provide enough risk protection to avert a shortage of funds. This paper should provide assistance in measuring what is at stake if the future follows a different path than the one expected.

759 V18/021165

First Time in Europe: Successful Decommissioning Demonstrated by the Nuclear Power Plant KKN

Valencia, L.; Precht, E.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektbereich Stilllegung, Karlsruhe, Germany

Nachrichten-Forschungszentrum Karlsruhe 27(4):256-275 (1995)

The project work for decommissioning and dismantling of the Niederaichbach nuclear power station (KKN) has shown that an activated, commercial nuclear power station can be decommissioned, dismantled and completely removed so as to restore at the decontaminated site a "green field" status posing no risk to the environment. (This document is in German).

760 V18/021770

Fort St. Vrain - Decom Project Involves New Tools, Communication

Nuclear News 60:16-17 (May 1996)

In decommissioning the Fort St. Vrain nuclear power plant, Public Service Company of Colorado (PSC) emphasized using proven technology in new configurations. Partly because of the emphasis on simplicity, PSC was able to finish the physical work of decommissioning the plant on March 22, 1996, three months ahead of schedule. The most important issues PSC faced in decommissioning Fort St. Vrain had to do with managing people. A special severance package helped reduce attrition. The utility also had to focus on communication, with the contractor personnel it brought in, with the surrounding community concerned about losing its tax base, and with the Nuclear Regulatory Commission, which was doing this for the first time as well. PSC is currently performing its final survey of the site to make sure all radioactivity is under the limits set. PSC expects to finish the final survey by August and to be released from its nuclear license by the NRC by the end of 1996.

761 V18/021175

From Megawatts to Empty Lots: Decommissioning in Europe

Pasqualetti, M.J.

Arizona State University, Tempe, AZ

NUKEM Market Report (June 1995):4-18 (June 1995)

There are essentially three types of obsolescence: regulatory; technological; and economic. Regulatory obsolescence derives from an inability to continue operating in compliance with changed regulations. Technological obsolescence can be caused by progress

leading to either a more efficient or more economical alternative production method. Economic obsolescence can be caused either by aging of equipment and components to the extent that maintenance, repair and replacement costs are too high to permit continued economic operation, or by the unavailability of replacement parts which necessitate expensive large-scale renovation.

762

V18/022523

Full System Chemical Decontamination for NPP Dismantling

Runge, H.; Bertholdt, H.O.; Demant, W.

DETEC GmbH, Alzenau, Germany; Siemens AG Bereich Energiezeugung (KWU), Erlangen, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Karlsruhe, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inform Verl, Bonn, Germany, 734 pp.; (pp. 573-574) (May 1996)

Short communication. No abstract available.

763

V18/024200

Future Development of Nuclear Reactor Dismantling in Japan

Miyasaka, Y.; Yanagihara, S.

Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan

Genshiryoku Kogyo (Nuclear Engineering) 42(12):31-34 (December 1996)

The data from the dismantling test were collected by computer or recorded by hand and accumulated in the decommissioning data base. To evaluate the control data by using the calculation code system (COSMARD) in order to manage the decommissioning of a reactor, the unit operating efficiency and the calculation model should be kept in perfect repair. The development technologies for dismantling the Japan Power Demonstration Reactor (JPDR) were four technologies: the evaluation technology for radioactive inventory, the remote control technology for decommissioning of activated equipment and structures, the treatment technology for radioactive waste, and the technology for management of the dismantling project. Data about these technologies were gathered, analyzed, and interpreted. Other countries are going to stop the operation of 54 reactors in the next several years. The status of other countries, international cooperation, and the activity in the restoration of the environment in the USA are discussed. (This document is in Japanese).

764

V18/025837

GE Gamma Spectroscopy Characterization Tools for Contaminated Materials in Buildings, Boxes, and Dirt

Bronson, F.L.

Canberra Industries, Inc., Meriden, CT

CONF-961103; Decommissioning, Decontamination, and

Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 156-158) (1996)

The most expensive items in characterization, decontamination, and release of buildings and grounds that are potentially contaminated with radioactive material are labor and radioactive waste disposal. These new instrumentation tools will reduce the labor costs, improve quality, and significantly reduce the volume of radioactive waste. The keys to this improvement are nuclide-specific instrumentation with instantaneous output, practical in-situ characterization of buildings and dirt before and during the remediation process, and high volume but low level automatic characterization of building debris in boxes and conveyORIZED dirt.

765

V18/023527

Garigliano: Progress Report

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (2 pp.) (1996)

At the Garigliano power Station the building yard of the new conventional plant on the site of the old nuclear plant has been opened. The agreement with the local authority must still be signed. Some problems are arising from people of the surrounding towns and delays in the construction will be incurred. The vault containing high level solid waste has been completely decontaminated. Future work will involve filling the vault with inert material and constructing a stainless steel facility to be used for decontamination purposes. Other topics presented include the retrieval and conditioning of intermediate level wastes, safe storage of the reactor building, stack demolition, and the radwaste system design.

766

V18/023019

Gel That Retains Radioactive Contamination, and Its Use for Surface Protection or Decontamination

Gauchon, J.P.; Alcaraz, J.L.; Gallo, L.

Commissariat a l'Energie Atomique, Paris, France

French Patent FR 2717709; 18 pp. (March 22, 1994)

In order to fix the radioactivity on already contaminated surfaces and to protect uncontaminated ones, a gel is proposed for coating onto the surface. The gel is composed of a colloidal aqueous solution containing 2.5 to 15 wt% of a gelling agent and 5 to 15 wt% of a film forming agent with eventually one or more additives chosen amongst conservative or anti-static agents, acrylic copolymers, colorants or absorbing agents. The gel is easily applied onto surfaces, and then removed, together with the fixed radioactivity, through a simple water rinsing. 5 refs., 7 tabs. (This document is in French).

767

V18/021428

Generalized Process for Treating Mixed Radioactive and Metal Contaminants from Groundwaters and Soil Leachates

Vijayan, S.; Wong, C.F.

Atomic Energy of Canada Limited, Chalk River Laboratories, Chalk River, Ontario, Canada

CONF-950877; Mixed Waste, A.A. Moghissi, B.R. Love and R.K. Blauvelt (eds.), Proceedings of the Third Biennial Symposium, Baltimore, MD, August 7-10, 1995, 545 pp.; (pp. 10.6.1-10.6.15) (1995)

Among the treatment process for mixed-waste solutions, the use of direct-contact chemical treatment, involving addition of suitable chemicals and sorbents to the waste solution, to transform the dissolved contaminants from a homogeneous solution to a heterogeneous solid-liquid suspension, provides many attractive features for effective removal of a wide spectrum of radionuclides and metals. The kinetics involved in the production of solids as precipitate and sorbed particles can be accelerated significantly through proper selection of chemicals and exploitation of the combined effects of thermal and sound energy fields. The contaminant-bearing solids are efficiently separated from the suspension using filter-press equipment. In this paper, several examples of mixed-waste solution treatment involving combinations of radionuclides (Sr-90, Cs-137, Co-60, Ru-106, U) and metals (As, Fe, Pb) in synthetic and actual waste solutions are presented to illustrate the generic nature of the Atomic Energy of Canada Limited (AECL) treatment process. The contaminant removal efficiencies are typically greater than 99%. Test results have shown that a waste volume reduction factor in the range of 400 to 500 can be readily achieved by the process. The use of powdered sorbents, including natural zeolites and industrial biomass, offer additional advantages. For specific waste solutions, the process can provide volume reduction factors as high as 700 to 1,000. Depending on the waste solution being treated, the secondary solid waste generated as a result of treatment can be prepared suitably to meet waste storage/disposal requirements. The paper will also include key engineering and cost implications of the treatment process compared with other volume reduction processes, such as reverse osmosis/evaporation and fixed-bed ion-exchange. Performance results together with a preliminary cost analysis of the AECL process suggest that the process is generic and is attractive for a variety of applications involving mixed-waste solutions.

768 V18/025500

Guide on Decommissioning of Nuclear Facilities According to Section 7 of the German Atomic Energy Act (Atg) as of 14 June 1996

Bundesministerium fuer Umwelt, Naturschutz und Reaktorsicherheit, Bonn, Germany

Bundesanzeiger 48(211a):1-24 (November 12, 1996)

This guide of the BMU (Federal German Ministry) defines the framework conditions of decommissioning from the legal perspective, gives references to existing national and international regulatory guides, defines administrative procedures to obtain a licence for decommissioning and the required documents for licence applications, and describes supervisory activities and procedures. There are five appendices with information on selected technical aspects and terminology. (This document is in German).

769 V18/020661

Hunterston "A" Power Station: A Structured Approach to Long-Term Storage and Preservation

Bryers, J.; McGranaghan, D.; Mitchell, T.G.

Scottish Nuclear Limited, Glasgow, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 209-218) (1995)

This paper discusses the means employed by Scottish Nuclear Limited to substantiate the approach of long term plant storage and preservation proposed for the care and maintenance phases of Hunterston A Power Station decommissioning. The system design and associated strategy for plant environmental monitoring is described in conjunction with the Computational Fluid Dynamics Model (CFD) developed to determine the most appropriate method/strategy for the long term storage of equipment and plant.

770 V18/020713

IAEA RADWASS Safety Standard on Decommissioning

Laraia, M.

International Atomic Energy Agency, Vienna, Austria; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 169-177) (1995)

It is generally felt that, in the technological area of decommissioning, the existing International Atomic Energy Agency (IAEA) publications by and large satisfy the current needs of Member States. Therefore, over the years emphasis has been enhanced in another area of interest which covers regulations, standards and guides. More specifically, the IAEA should demonstrate harmonization of approach at the international level by promulgating standards that are developed, discussed and agreed upon internationally. In response to this request by Member States, the IAEA in 1991 established the Radioactive Waste Safety Standards (RADWASS) program to develop a special series of safety documents specifically directed at radioactive waste management. In the decommissioning field, an IAEA Safety Standard on decommissioning is being prepared.

771 V18/021492

ICONE-4 - Nuclear Engineering - Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability: Proceedings of an American

Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference, Vol. 5, New Orleans, LA, March 10-13, 1996

Rao, A.S.; Duffey, R.B.; Elias, D.

General Electric Nuclear Energy, San Jose, CA; Brookhaven National Laboratory, Upton, NY; Commonwealth Edison Company, Downers Grove, IL

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp. (1996)

The proceedings from this conference are divided into five volumes. This particular volume is divided into the following sections: spent fuel and nuclear waste processing; transportation and characterization of nuclear wastes; spent fuel and high level waste storage and disposal; D&D (decontamination and decommissioning) of reactors; D&D of nonreactor facilities; D&D related techniques and technology; assessment and management of aging, degradation, and damage; aging effects on failures; license extension and regulatory issues; assessment of aging effects; global advances in nuclear codes and standards; steam generator reliability; and reliability of reactor vessels and internals. Separate abstracts were prepared for most papers in this volume.

772 V18/023690

Impact of Deregulation on Decommissioning

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Sacramento Municipal Utility District, Sacramento, CA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (5 pp.) (1996)

This presentation explores the impact of electric utility deregulation on the decommissioning of nuclear power plants. The California Model is presented as an example and issues related to decommissioning are discussed.

773 V18/025847

Impact of Recent Regulatory Changes (HM-169A) on D&D Packaging and Transportation

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Edling & Associates, Inc., Russell Springs, KY

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 233-237) (1996)

On Thursday, September 28, 1995, the Department of Transportation (DoT) issued Docket No. HM-169A, "Hazardous

Materials Transportation Regulations; Compatibility with Regulations of the International Atomic Energy Agency." In the words of DoT, "This final rule amends the Hazardous Materials Regulations pertaining to the transportation of radioactive materials to harmonize them with those of the International Atomic Energy Agency (IAEA) and, thus most of the nuclear nations of the world." This Docket introduces several significant changes which will dramatically change the packaging and transport of radioactive materials, especially the categories of waste/materials generated as a result of the extensive Decontamination & Decommissioning programs which are underway throughout the Department of Energy, the nuclear industry as a whole, and the upcoming decommissioning of nuclear power plants. HM-169A provided new definitions for Low Specific Activity (LSA) materials, introduced Surface Contaminated Objects (SCO), introduced Industrial Packagings (IP-1,2 & 3) and numerous other items. As this paper discusses, shippers have a choice to make: (1) Continue business as usual and ship LSA/SCO Materials in Type A or strong-tight packagings and have the radioactive contents limited to one A2 value or (2) Use Industrial Packagings (IP-2 or 3) which for Alpha emitting radionuclides can have radioactive content limits 20,000 to 40,000 times greater than an A2 value. There are a number of factors which go into making this decision, but the direction of the industry is the use of larger waste containers.

774 V18/021125

Incineration of Highly Contaminated Graphite Waste for Keeping Clean Environment

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (9 pp.) (1996)

Flameless incineration under laminar gas flow was used to dispose of highly radioactive graphite from a nuclear reactor. The radioactive ashes were collected on filters, while the carbon dioxide that formed went through a freezing-sublimation process to achieve a better separation of the CO₂ from aerosols, which might be carried by the off gas of the incineration. Optimization of the incineration process was sought by studying the effect of gas flow speed, oxidation temperature and furnace rotation speed. Sublimation of the frozen CO₂ reduces its activity by a factor of 108. The following conclusions were drawn from the research. The graphite was ground to particles of size 22.5 microns and specific area of 15 square meters/gr. Since the rate of oxidation was constant, a parameter K(per hour) was defined, equal to the part of graphite incinerated in one hour. The dependence of K on oxidation temperature, gas flow speed and furnace rotation speed was investigated. The results are as follows: by changing the incineration temperature from 6000 deg C to 7000 deg C under air flow speed of 0.034 m/sec, the oxidation time reduced from 7.5 hours to 2.5 hours. At 7000 deg C the graphite powder ignited. The furnace rotation speed did not have a strong effect on incineration time in air. When the incineration was done under pure oxygen, ignition started at 5600 deg C. Changing pure oxygen flow rate from 0.025 m/sec to 0.051 m/sec at temperature of 5600 deg C, reduced the

incineration time by 20%. Changing the furnace rotation speed from 0 to 4.2 rad/sec (at 5400 deg C) reduced the incineration time from 30 to 5 hours. At the end of the process, after freezing the off gas and the CO₂ sublimation, the specific activity of the CO₂ was less than $4 \times 10(E+16)$ curie/liter.

775 V18/023934

Induced Radioactivity at Reactor Shutdown: Impact Upon Decommissioning and Low-Level Radioactive Waste Disposal

Levin, A.H.

TLG Engineering, Inc., Bridgewater, CT

Proceedings of the 1993 Electric Power Research Institute (EPRI) International Low-Level Waste Conference (Papers presented Thursday, November 11, 1993), Monterey, CA, November 10-12, 1993, 345 pp.; (8 pp.) (1993)

This work discusses current neutron activation calculations, the identification of greater-than-Class low level radioactive waste, and the estimated disposal costs associated with one-piece versus segmented removal of a reactor pressure vessel and its internals during decommissioning. The techniques used to perform the activation calculations have been chosen to minimize the effort required to perform such calculations at the planning stages of a decommissioning campaign. The conclusions of this paper demonstrate the importance of generating site-specific neutron-induced radioactive inventories when preparing decommissioning plans for submittal to the Nuclear Regulatory Commission.

776 V18/022533

Innovative Dismantling Technology for Reactor Pressure Vessels

Vrba, H.; Lampersberger, E.

VOEST-Alpine Machinery, Construction and Engineering GmbH, Linz, Austria; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 583-586) (May 1996)

Short communication. No abstract available. (This document is in German).

777 V18/020835

Integrated Apparatus for Mapping and Characterizing the Chemical Composition of Surfaces

Sebastian, R.L.; Beck, B.G.

Coleman Research Corporation, Fairfax, VA

U.S. Patent 05416321; 22 pp. (May 16, 1995)

An apparatus which accurately maps and detects contaminants within interior surfaces is provided. The apparatus finds use in supporting decontamination operations by providing on-site chemical analyses defining the condition of contaminated areas and monitoring the progress of clean-up operations. An optical vision system is used to accurately map the surface to be investigated or

treated as a reference. Analytical probes are used to sample the mapped surface to detect inorganic and organic contaminants in situ. Automated controls which manipulate the analytical probes and high speed analytical equipment, such as a high speed gas chromatograph, are optionally used to take large numbers of samples quickly and remotely. The optical vision system tracks the position of the analytical probes, providing an accurate map of the location of the contaminants. The precise positioning of the contaminants and ease of sampling allows for more accurate characterization of the surfaces before, after, and during clean-up operations. The real-time analysis of the inspection sites also eliminates unnecessary and wasteful clean-up activity.

778 V18/022735

Integrated Dismantling and Monitoring Strategy for Historic Plutonium Plants

Orr, C.H.

BNFL Instruments Limited, Calderbridge, Cumbria, United Kingdom

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 803-808) (1996)

The development and implementation of an integrated decommissioning and waste monitoring strategy for plutonium plants and facilities at BNFL Sellafield is described. This strategy has been the result of close collaboration over a 5 year period between decommissioning managers and the scientists and engineers of BNFL Instruments Ltd. The resulting "family" of radiometric measurement systems described have now been an integral part of BNFL's plutonium facility decommissioning operations for several years. These systems have given managers and engineers the information needed to successfully plan and execute programmes which ensure cost effective waste management whilst satisfying the requirements of nuclear safety as well as the needs of industry regulators.

779 V18/022127

International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning

Kocherov, N.P.

International Atomic Energy Agency, International Nuclear Data Committee, Vienna, Austria

INDC(NDS)-355; International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning, N.P. Kocherov (ed.) International Atomic Energy Agency (IAEA), Vienna, Austria, 98 pp. (April 1996)

This document summarizes the results of the second phase of the Intercomparison Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning.

780 V18/021495

International Contribution to Decommissioning of Nuclear Facilities

Lazo, T.

Organization for Economic Co-Operation and Development (OECD), Nuclear Energy Agency (NEA), Paris, France

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp.; (36 pp.) (1995)

Nuclear power plants and fuel cycle facilities must be retired from service when they have completed their design objective, become obsolete or when they no longer fulfill current safety, technical or economic requirements. Decommissioning is defined as the set of technical and administrative operations that provides adequate protection of workers and public against radiation risks, minimizes impact on the environment and involves manageable costs. A traditional definition of the stages of decommissioning has been proposed by the IAEA and is largely used worldwide. A number of factors have to be considered when selecting the optimum strategy, which include the national nuclear policy, characteristics of the facility, health and safety, environmental protection, radioactive waste management, future use of the site, improvements of the technology that may be achieved in the future, costs and availability of funds and various social considerations. The paper describes the current situation of nuclear facilities and the associated forthcoming requirements and problems of decommissioning. This task requires a complete radionuclide inventory, decontamination methods, disassembly techniques and remote operations. Radiation safety presents three aspects: nuclear safety, protection of workers, and protection of the public. An appropriate delay to initiate decommissioning after shutdown of a facility may considerably reduce workers exposures and costs. Decommissioning also generates significant quantities of neutron-activated and surface contaminated materials which require a specific management. Vigorous international cooperation and coordinated research programs have been encouraged by the Nuclear Energy Agency (NEA) for a minimization of costs and efforts and to provide a base for consensus of opinions on policies, strategies and criteria.

781 V18/024212

Investigating the Operability of Mobile Remote-Handling Systems Under the Influence of Ionizing Radiation

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 287-301) (November 1995)

The present paper describes the exemplary investigation of manipulator vehicle systems for use in areas exposed to ionizing radiation. The SMF and MF4 manipulator vehicles under consideration are two different levels of development of the same system. Each of their designs marks possible extremes with regard to functionality and expenditure made for radiation shielding. It was possible to detect weak points in the subassemblies during the experiments. It became clear that a radiation-tolerant system can be mass-produced from standard original equipment manufacturer (OEM) components only to a limited extent. The investigations into improving the system's radiation resistance produced a promising draft design for the development of future manipulator vehicle systems as well as the planning of other electronic systems to be used in an area exposed to radiation. This design is a mixture of miniaturization and radiation protection. Components which can be made more resistant with a reasonable expenditure are transferred from the containment to the outside and used in their radiation improved form. The highly integrated components whose radiation tolerance level is very difficult to improve will be better shielded in the remaining construction space. (This document is in German).

782

V18/020897

Investment Guidelines for Nuclear Decommissioning Trust Funds

Cook, D.N.

Federal Energy Regulatory Commission, Washington, DC
CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 37-41) (1996)

The Federal Energy Regulation Commission (FERC or Commission) has recently revised its investment guidelines for nuclear decommissioning trust funds. This paper discusses the development and current status of the rules that govern the formation and organization of nuclear decommissioning trust funds (Funds) and the investments that public utilities can make with the money that they collect for the decommissioning of their nuclear facilities. The Nuclear Regulatory Commission (NRC) and the FERC work in tandem in this area. Although it is the NRC that properly insists on the assurance that there will be sufficient monies to cover decommissioning liabilities, it is the FERC that determines how public utilities will accumulate those monies throughout wholesale rates. When public utilities with nuclear units collect decommissioning funds in advance of decommissioning expenditures, they become fiduciaries for their ratepayers; it is the FERC's responsibility to ensure that the utilities properly invest the decommissioning monies that they collect in their wholesale rates. The State commissions have the same responsibility as to retail rates. The FERC has long been concerned that adequate funds be available at the time that decommissioning takes place. It recognizes that to achieve this, Fund yields must at least keep pace with inflation. So the tension in this area is between security on the one hand and maximum yield on the other. The Commission has recently adopted rules that should improve return earned on funds contributed through wholesale electric rates and thus decrease the amount that public utilities must collect from their ratepayers for nuclear decommissioning. At the same time, the rules preserve Fund

security.

783 V18/023707

Investment Management of Decommissioning Trust Funds

Tuschen, T.R.

Strong Capital Management, Inc., Milwaukee, WI

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (18 pp.) (1996)

The first part of this presentation will review the basics of the funding calculation presuming a level payment over the life of the power plant. The four elements are cost, term, inflation, and return. With those facts and assumptions, plus current reserve values once the collection of a contribution has begun, one can calculate the required annual contribution to fund the endeavor. The discussion gets interesting when you add in assumptions about the expected decommissioning expense outflows following the shut-down of the nuclear plant. Those assumptions about the timing and type of decommissioning plan including the possible need to include funding for a long-term spent fuel storage facility after the decommissioning of the plant itself vary greatly by plan. Lots of factors are involved such as planned disposition of spent fuel, realistic availability of low level waste disposal facilities, or possible complementary timing of decommissioning activities for an associated plant with a later decommissioning date.

784 V18/020725

Ion Exchange Removal of Metal Ions During Dilute Chemical Decontamination

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Indian Nuclear Society, Bombay, India; Bhabha Atomic Research Centre, Indira Gandhi Centre for Atomic Research Campus, Water and Steam Chemistry Laboratory, Kalpakkam, India

CONF-951287; Experience with Dilute Chemical Decontamination in Indian Nuclear Reactors, Proceedings of a Seminar, Kalpakkam, India, December 12-13, 1995. Indian Nuclear Society, Kalpakkam, India, 222 pp.; (pp. 160-167) (December 1995)

Cation exchange resin is used in dilute chemical decontamination (DCD) processes for removing the dissolved inactive and radioactive metal ions and also to regenerate the decontamination formulation. A thorough investigation of the above process goes a long way in making the plant decontamination a success. This paper discusses the ion exchange removal of important species like Co(-3), Co(-2), Ni(-2) and Cu(-2) in presence of Fe(-2) from EDTA based formulations. The observed capacities of the ion exchange resin for the above mentioned species were also estimated and the data presented. It has been shown that Co(-3) present in the formulation cannot be removed by strong acid cation exchange resin while Co(-2) which exists as Co(II)EDTA complex is picked-up by cation exchange resin in the initial stages; but as the ion exchange column is loaded with iron, a significant portion of the absorbed cobalt gets eluted out even before the cation exchange resin is completely exhausted. Also it was found that the observed

ion exchange capacities for Ni(-2) and Cu(-2) are very low and they get eluted out by iron. The observed ion exchange behavior of metal ions in EDTA based formulations have been explained based on the stability of complexes formed by the metal ions with EDTA.

785 V18/022851

JPDR Dismantling Demonstration Project: Dismantling of Equipment and Components in JPDR

Seiki, Y.; Yanagihara, S.; Tachibana, M.

Research Association for Nuclear Facility Decommissioning, Tokyo, Japan

Journal of the RANDEC 15:12-23 (December 1996)

The Japan Power Demonstration Reactor (JPDR) dismantling demonstration project was completed by March 1996. The objectives of this project were to demonstrate the techniques developed in R&D phase, to obtain experience in dismantling activities, and to establish the decommissioning database. By 1990, removal was complete for the highly activated components such as the reactor internals, the reactor pressure vessel (RPV) and the pipes connected to the RPV using the rotary disk knife, the shaped explosive, the plasma arc, and the arc saw cutting techniques with remote operation. After removing these components, the dismantling of the biological shield was conducted from 1990 to 1994. Dismantling of equipment and components in the facility was one of the more important activities. Through the dismantling activities, various data on cutting performance, radiological safety, and waste generation were collected and these were accumulated in the database. This report describes the dismantling procedure and the results of the data analysis on the dismantling of the equipment and steel components in the JPDR facilities. (This document is in Japanese).

786 V18/023528

JRTF Decommissioning Program: Progress Report

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Japan Atomic Energy Research Institute, Nuclear Fuel Facility Decommissioning Technology Division, Ibaraki, Japan

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (10 pp.) (1996)

During the period April 1995 through March 1996, liquid waste treatment, investigation for decommissioning techniques and R&D for dismantling techniques have been continued. In consultation with the Science Technology Agency (STA), the overall schedule has been reviewed and extended. Project completion is now scheduled for 2004. The actual dismantlement of the JRTF will be carried out for 9 years because the schedule is 3 years behind. The treatment of spent solvent has now been completed. In addition, the manufacturing of the treatment apparatus for the unpurified uranium solution has been completed, and manufacturing of the treatment apparatus for the high level liquid was started. The investigation for dismantling techniques and the research and development for dismantling techniques has been continued. It was decided that the actual dismantlement of the JRTF will start in the middle of FY 1996.

787

V18/022431

Japan Power Demonstration (JPDR) Dismantling Activities: Dismantling of the Biological Shield

Seiki, Y.; Kozawa, K.

Journal of the RANDEC 14:34-45 (August 1996)

Actual dismantling of the Japan Power Demonstration Reactor (JPDR) in the Japan Atomic Energy Research Institute (JAERI) was started in 1986 and was completed by 1996. The objectives of dismantling activities are to obtain the data necessary for decommissioning of nuclear power reactors, to verify and confirm the developed techniques. By 1990, the highly activated components such as the reactor internals, the reactor pressure vessel (RPV) and the pipes connected to the RPV were already removed by remote operation using the newly developed dismantling techniques. After removing the highly activated components, the dismantling activities proceeded to dismantling the concrete structures of the biological shield. The dismantling activities of the biological shield were started in September 1990 and were completed by January 1994. The inner protrusion of the biological shield which had high radioactivity was removed using the Diamond Sawing/Coring and the Abrasive Water Jet techniques with remote operation. The remaining biological shield which had low radioactivity and large amount of concrete was dismantled using the controlled blasting technique. These techniques were selected to minimize the radiation exposure of workers and to demolish powerfully the massive reinforced concrete and structures. Through the dismantling activities, various data on cutting performance, radiological safety, waste generation were collected. This report describes the dismantling procedure and the results of data analysis on dismantling of the JPDR biological shield. (This document is in Japanese).

788

V18/023529

Japan Power Demonstration Reactor (JPDR) Decommissioning Program: Status Report

Yanagihara, S.

Japan Atomic Energy Research Institute, Department of Decommissioning and Waste Management, Ibaraki, Japan
OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (25 pp.) (1996)

The main activities conducted in October 1995 through March 1996 for the JPDR Decommissioning Program were: Removal of piping embedded in the building structures in the reactor and turbine buildings; Demolition of the turbine and reactor buildings and stack; Disposal of extremely low-level waste into the near surface burial site; and, Landscaping of the JPDR site. In the removal of piping in the building structures, a temporal radiation control area was established for preventing radioactive materials being released into the environment. The concrete wastes arising from removal of piping and decontamination of building surface, and dismantling of the bio-shield were put into flexible containers and disposed into near surface burial sites. The JPDR decommissioning program was completed by the end of March 1996.

789

V18/022432

Japan Power Demonstration Reactor (JPDR) Dismantling Activities: Dismantling of the Reactor Enclosure and the Auxiliary Buildings

Seiki, Y.; Kubo, T.

Journal of the RANDEC 14:47-59 (August 1996)

As the final stage of the JPDR decommissioning program, after the major components were removed from each building of JPDR, the dismantling activities proceeded to the decontamination of contaminated concrete surface and the final radiation survey of buildings. These activities were conducted to verify the developed techniques and the detailed procedures for decontamination, and to allow unrestricted use of the JPDR buildings. Following the decontamination of buildings, the dismantling of each building was started. Before dismantling the buildings, the radiation control designations were changed. The buildings that contained contaminated embedded pipes were changed from first-class radiation controlled areas to second-class radiation controlled areas. On the other hand, the buildings that had no contaminated pipes were changed to uncontrolled areas. A first-class radiation controlled area allows the use of unsealed sources; thus, radioactive contamination may exist. A second-class radiation controlled area is one where only sealed sources are allowed. Significant quantities of data and experience were obtained during these activities. The practical procedures for decontamination, the final survey of radioactivity, and the dismantling work of buildings were described in this report. (This document is in Japanese).

790

V18/022855

Japan Power Demonstration Reactor (JPDR) Dismantling Activities: Management of JPDR Dismantling Waste

Abe, M.; Nakata, S.; Ito, S.

Research Association for Nuclear Facility Decommissioning, Tokyo, Japan

Journal of the RANDEC 15:35-49 (December 1996)

The management of wastes, both radioactive and non-radioactive, is one of the most important issues for a safe and reasonable dismantling operation of nuclear power plants. A large amount of radioactive wastes is arising from a reactor dismantling operation in a relatively short period of time, ranging in a wide variety from very low level to relatively high level. Moreover non-radioactive waste is also in a huge amount. The dismantling operation of Japan Power Demonstration Reactor (JPDR) resulted in 24,440 tons of dismantling wastes, of which about 15% was radioactive and 85% non-radioactive. These wastes were managed successfully implementing a well developed management plan for JPDR dismantling waste. Research and development works for handling of JPDR dismantling wastes were performed, including fixation of loose contamination on surface, volume reduction and waste containers for on-site transportation and interim storage. The JPDR dismantling wastes generated were classified and categorized depending on their materials, characteristics and activity level. Approximately 2,100 tons of radioactive wastes were stored in the interim storage facilities on site using developed containers, and 1,670 tons of radioactive concrete waste were used for a safe demonstration test of a simple near-surface disposal for very low level waste. Other dismantling wastes such as steel and concrete

which were categorized as non-radioactive were recycled and reused as useful resources. This paper describes the management of the JPDR dismantling wastes. (This document is in Japanese).

791 V18/021022

Japan Power Demonstration Reactor Decommissioning Program: Lessons Learned on Operation and Maintenance of Auxiliary Equipment During Dismantling Activities

Hagiwara, M.; Okawa, S.; Seiki, Y.

Japan Atomic Energy Research Institute, Department of Decommissioning and Waste Management, Ibaraki, Japan

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (13 pp.) (1996)

Dismantling of the Japan Power Demonstration Reactor Decommissioning Program (JPDR) was initiated in December 1986, and planned to be finished by March 1996. During this period of dismantling, several useful lessons have been learned such as use of existing facilities, dismantling tools, and project management. Among these, facility maintenance and operation are two key elements that must be considered for effectively conducting dismantling activities.

792 V18/025347

Japan Power Demonstration Reactor Decommissioning Program: Overview and Lessons Learned

Tanaka, M.; Yanagihara, S.; Seiki, Y.

Japan Atomic Energy Research Institute, Ibaraki, Japan

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

The Japan Power Demonstration Reactor (JPDR) decommissioning program was successfully completed by March 1996. This was the first trial to dismantle a nuclear power plant in Japan. The program consisted of two phases: Phase I was the R&D on decommissioning technologies, and Phase II was the actual dismantling of the JPDR facility. Special efforts were made to develop various kinds of dismantling techniques. The developed techniques in the Phase I program were practically applied to actual dismantling activities. The usefulness of the developed techniques was verified through the dismantling activities. Various data were collected on the dismantling activities and these were accumulated in the decommissioning database. The data and lessons learned in the JPDR decommissioning program will be useful for future decommissioning of commercial nuclear power plants in Japan.

793 V18/022854

Japan Power Demonstration Reactor Dismantling Project: Radiation Control

Tomii, H.; Seiki, Y.

Research Association for Nuclear Facility Decommissioning, Tokyo, Japan

Journal of the RANDEC 15:24-34 (December 1996)

In the Japan Power Demonstration Reactor (JPDR) dismantling project, radiation control was performed properly with routine and special monitoring to keep the occupational safety and to collect data necessary for future dismantling of nuclear facilities. This report describes a summary of radiation control in the dismantling activities and some results of parametric analysis on dose equivalent evaluation, and introduces the following knowledge on radiological protection effectiveness of the dismantling systems applied in the project. (a) Use of remote dismantling systems was effective in reducing equivalent workplace exposure. (b) Utilization of existing facilities as radiation shield or radioactivity containment was effective in reducing workplace exposure, and also in increasing work efficiency. (c) Use of underwater cutting systems was useful to minimize air contamination, and to reduce the dose equivalent rate in the working area. (d) In the planning of dismantling, it is necessary to optimize the radiation protection by analyzing dismantling work procedures and evaluating radiological features of the dismantling systems applied. (This document is in Japanese).

794 V18/022429

Journal of the RANDEC

Journal of the RANDEC 14:1-81 (August 1996)

The Research Association for Nuclear Facility Decommissioning (RANDEC) plays a key role in establishing overall technology for decommissioning nuclear facilities. The capability and service of RANDEC are to: implement decommissioning research, development and investigation; provide technical information on decommissioning; train for decommissioning; and inform and enlighten the public about decommissioning. This issue focuses on JPDR Decommissioning. (This document is in Japanese).

795 V18/023525

Karlstein Superheated Steam Reactor (HDR): Progress Report

Valencia, L.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Karlsruhe, Germany

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (9 pp.) (1996)

After the final shutdown in 1971 and subsequent plant modifications, the HDR plant was used for the performance of various reactor safety experiments between 1974 and 1992. The aim of the D&D project is the complete dismantling of the facility to green field conditions. The project shall be carried out in three steps: 1st StG: Dismantling and removal of all experimental equipment. 2nd StG: Dismantling and removal of reactor equipment and machines including the reactor pressure vessel (RPV) and simultaneous disassembly of other plant components except for some few infrastructural auxiliary systems, e.g., ventilation system. 3rd StG: Removal and disposal of the concrete structures inside the reactor containment including the biological shield, release measurement of the reactor containment and the annular gap between the reactor containment and the reactor hall as well as elimination of the controlled area in the sections. To date, size reduction of the reactor vessel was performed using a band saw

similar to that used by the BR-3 Project in Belgium. Oxy-propane cutting was used for the size reduction of the reactor vessel. The average dose rate from the vessel was 80 micro Sievert/hour with a maximum of 220 micro Sievert/hour. All metal was below the German recycling requirement of 100 Bq/gram. Concrete removal is now ready to begin. A licensing action from the authority is required to allow this work to begin and is expected to be issued shortly. Decontamination and demolition is scheduled for completion in 1998. The removed concrete will be used to backfill the void created with the demolition of the reactor containment building.

796

V18/023523

Kernkraftwerk Lingen (KWL): Progress Report - September 1995-May 1996

Harbecke, W.

Kernkraftwerk Lingen, Lingen, Germany

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (5 pp.) (1996)

During this reporting period the KWL D&D program operated in a "Safe Enclosure" status without any remarkable events. The airborne activity-releases in 1995 were a little bit higher than in the former years due to increased flowrates in the venting system. The change of the drying system from freezing to adsorbing brought the relative moisture down to an average value of 45% while the amount of condensed water went up to 33m³ in 1996. The investigation of the nuclide-vector of the operational waste showed that under certain circumstances the waste will meet the final storage conditions of ERAM. The most restrictive conditions for KWL waste result from special alpha nuclides. The strongest limitations for the waste result from the alpha limitations of ERAM, but the alpha content may be balanced with other, low-alpha content waste. Thus it makes no sense to decontaminate or compact low level waste.

797

V18/022543

Key Nuclide Concept for Declaration of Radioactive Residues from the WAK and Its Application to Phase 2 of the Decommissioning of the WAK

Hanschke, C.; Stollenwerk, A.H.; Bopp, P.

Wiederaufarbeitungsanlage Karlsruhe Betriebsgesellschaft mbH, Eggenstein-Leopoldshafen, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 333-336) (May 1996)

Short communication. No abstract available. (This document is in German).

798

V18/024183

Knowledge Gathered from Expert Opinion on Radiation Protection in the Course of Reactor Decommissioning

Jaehnert, B.; Ibach, T.M.; Lehmann, K.H.

TUEV Bayern Sachsen, Hauptabteilung Strahlenschutz, Munich, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 355-365) (November 1995)

The TUEV Bayern Sachsen (The Bavarian Saxon Technical Inspection Agency) participated in the decommissioning and disassembly of the Niederaichbach Power Reactor as the agency providing radiological expert opinion and guidance. Apart from examining radiological conditions and evaluating the radiological effects, its main task in the area of radiation protection was that of monitoring and management of residual materials, buildings and surfaces by ensuring their treatment in accordance with their radioactivity levels. Within the framework of the expert opinion, specific decontrolling procedures were established for component parts, materials and buildings. The problem of difficult-to-measure nuclides, such as Fe-55, were also taken into consideration when establishing limits. The TUEV-Bayern Sachsen carried out control measurements as a form of supervision to verify observance of limits (surface-specific measurements and materials sampling followed by nuclide-specific analysis). (This document is in German).

799

V18/023705

Large Vessel, Pipe and Concrete Cutting Process [October 1995]

Solano, A.

Wachs Technical Services, Wheeling, IL

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (5 pp.) (1996)

Currently, decommissioning managers are faced with overcoming many unique circumstances. One of the more challenging obstacles is the removal of large radioactive components. The removal process begins with careful planning to determine the most cost effective method of disposal. Large components such as steam generators, pressurizers and reactor vessels are both highly radioactive and consume a great deal of volume in their present operating configuration. These characteristics have a great influence on disposal planning. The evaluation should first determine the amount of radioactivity of each nuclide with respect to the component volume. Once these items have been clearly identified, the decommissioning site will need to determine the feasibility of removing the components as a whole or segment. Among the many cutting technologies available, conventional machining technologies have proven to be the optimum method for large component removal in the decommissioning process. To date, Wachs Technical Services has applied this proven technology to four major nuclear decommissioning projects.

800 V18/021275

Large Vessel, Pipe, and Concrete Cutting Process [June 1995]

Stouky, R.J.

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:21-23 (1995)

Currently, decommissioning managers are faced with many unique circumstances to overcome. One of the more prevalent obstacles is the removal of large radioactive components. Some of the cutting technologies available for the removal of reactor coolant piping, steam generators, pressurizers and reactor vessels are: arc sawing, electrical discharge machine cutting, flame cutting, hydraulic shears, laser cutting, plasma-arc cutting, water jet cutting, and mechanical cutting. Of these, conventional machine cutting techniques (mechanical cutting) have proven to be an effective, low-dose decommissioning process. Applications of that proven technology to five major nuclear decommissioning projects are described.

801 V18/024884

Laser Removal of Contaminant Films from Metal Surfaces

Walters, C.T.; Siwecki, S.A.; Dosser, L.R.; Kershner, C.J.; Hull, R.J.; Campbell, B.E.

Craig Walters Associates, Columbus, OH; Mound Laser and Photonics Center, Miamisburg, OH; U.S. Air Force, Wright Laboratory Materials Directorate, Wright Patterson Air Force Base, OH; B.E. Campbell Associates, Columbus, OH
CONF-961073; ICALEO '96: Laser Materials Processing, Proceedings of the 15th International Congress on Applications of Lasers and Electro-Optics, Detroit, MI, October 14-17, 1996. Laser Institute of America, Orlando, FL, 974 pp.; (pp. A95-A104) (1996)

In precision cleaning operations, it is essential to remove all traces of organic films and other contaminants, such as particles and fibers, from critical aerospace components. In the past, this was accomplished effectively with powerful solvents such as CFC-113, which can no longer be used because of its adverse effects on the environment. Among many alternative cleaning technologies under investigation, use of lasers to remove contaminants has recently shown promise in several applications, particularly in the area of particle removal from semiconductor surfaces for microcircuit manufacture. We present here, results of some of the first definitive studies of removal of organic films from metal surfaces using pulsed lasers. The substrate metals included aluminum and stainless steel, test coupons of which were contaminated with controlled amounts of organic substances (oils and greases) that might be present from normal use or handling of parts made from these materials. The test coupons were laser cleaned with short pulses having wavelengths selected to span a range of physical removal mechanisms from photo-chemical ablation to pure thermal effects (248, 355, and 1064 nm). Cleaning thresholds were measured using sloped irradiance profiles and post-test scanning electron microscope (SEM) observation of the position of the boundary between cleaned and uncleaned zones. These test results were combined with engineering studies of optical fiber beam delivery approaches in the

design of a system for precision cleaning of the inside surfaces of metal tubes. Quantitative results of the laser cleaning tests and their applications for optical fiber-based laser cleaning systems are presented.

802 V18/023396

Legacy of Three Mile Island: Implications for Today's DOE Challenges

Coe, R.P.; Williams, M.S.; Conaway, W.T.

Radwaste Magazine 3(3):30-33 (May 1996)

In the 16 years following the accident at Three Mile Island, several lessons have been learned, changes have been made, and the US commercial nuclear industry is safer and more reliable. Two major sources of information emerged from this event. First were the important safety issues requiring immediate answers and modifications to existing plants. Second are the lessons involved with the recovery, cleanup, and defueling of TMI-2 and its unprecedented transition into long-term monitored storage. This later had no immediate application, but the tasks and methods used in the TMI-2 recovery have strong parallels in the present-day DOE cleanup program. This article discusses the cleanup lessons of TMI-2 in the context of how it would benefit DOE cleanup.

803 V18/022539

Legal and Technical Consequences Arising from the License Issued for Decommissioning and Dismantling the Lubmin/Greifswald Nuclear Power Station

Schattke, H.

Deutsches Atomforum e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96: Technical Session on Decommissioning of Nuclear Installations, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 66 pp.; (pp. 5-18) (June 1996)

The decommissioning license issued for the decommissioning work is very extensive and in its regulatory content and coverage goes far beyond the permits issued under the law of the former German Democratic Republic (GDR). It also contains many provisions governing the entire dismantling phase, all the way through creating a green field site. Significant examples in this context are the provisions on decontrolling radioactivity measurements and clearance levels. Any possibly required modifications of the decommissioning license issued requires legal appraisal of planned modifications under section 7, sub-sec. 1 AtG, as well as review of licensing criteria under section 7, sub-sec. 2 AtG. New dismantling permits will be necessary only for those station components not yet covered by the license. New applications will not be subject to more rigid criteria as compared to those applied to the partial license for decommissioning and dismantling issued on 30 June 1995, unless novel scientific and technical knowledge is to be taken into account. In summary, the licensing procedure as it has been applied and explained in this paper has shown that the nuclear supervisory and licensing authority of the Land Mecklenburg-Vorpommern, its experts and advisory bodies, are well capable of coping with a legal and technical challenge of this kind in the short period of time available. (This document is in German).

804

V18/023364

Lessons Learned by Dismantling Two German BWRs in Gundremmingen, Unit A (KRB), and Kahl (VAK)

Eickelpasch, N.; Steiner, H.; Schmidt, D.

Versuchatomkraftwerk Kahl GmbH, Karlstein am Main, Germany; NUKEM Nuclear Technologies, Columbia, SC
Radwaste Magazine 4(1):27-36 (1996)

Decommissioning of the first generation of nuclear reactors in Germany has been under way at the Gundremmingen Unit A (KRB A) nuclear power plant (NPP) since 1983 and at the pilot NPP Versuchatomkraftwerk Kahl (VAK) since 1988. Although these are both boiling reactors (BWRs), they differ in terms of their size and construction. As the first German NPP, the purpose of VAK was mainly scientific. KRB A was the first commercial reactor in Germany. The actual work has consisted of dismantling the highly contaminated components inside the reactor buildings and cutting under water the activated internals of the reactor pressure vessels (RPVs). The decommissioning of KRB A is expected to be finished before the year 2000, and the work at VAK will end about 3 years later. Because of the different designs of VAK and KRB A, various tools have been developed and modified to gain experience and to compare the results from both projects. The dismantling experience gained from KRB A and VAK has been transferable to both BWRs and pressurized water reactors. Moreover, the experience gained from both projects has increased our knowledge of not only dismantling work but also of costs, effective decontamination techniques, and scrap recycling.

805

V18/025349

Lessons Learned by Dismantling Two German BWRs in Gundremmingen, Unit A (KRB), and Kahl (VAK)

Mertin, D.; Eickelpasch, N.; Steiner, H.; Schmidt, D.

RWE Energie AG, Essen, Germany; DETEC GmbH, Alzenau, Germany

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

The decommissioning of the first generation of nuclear reactors in Germany has been underway since 1983 in the Gundremmingen Unit A plant (KRB A) and since 1988 in the pilot nuclear power plant in Kahl (VAK). Although they are both of the boiling water type, they are rather different to each other with reference to their size and construction. As the first German nuclear power plant, VAK served mainly scientific purposes. KRB A was the first commercial reactor in Germany. The actual work is the dismantling of highly contaminated components inside the reactor building and the underwater cutting of activated internals of the reactor pressure vessels. The decommissioning of KRB is expected to be finished before the year 2000. The work on VAK will end about three years later. Experiences in both projects are not limited to dismantling work only, but also include know-how on costs, effective decontamination techniques, and scrap recycling.

806

V18/021265

Low Activity Decontamination Wastes Storage in the Republic of Belarus

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Academy of Sciences, Institute of Geological Sciences, Minsk, Belarus

CONF-950917 (Vol. 2); ICEM '95, Proceedings of the Fifth International Conference on Radioactive Waste Management and Environmental Remediation, Vol. 2: Management of Low-Level Waste and Remediation of Contaminated Sites and Facilities, S. Slate, R. Baker and G. Benda (eds.), Berlin, Germany, September 3-7, 1995. American Society of Mechanical Engineers, New York, NY, 913 pp.; (pp. 1631-1632) (1995)

Special features and volumes of radioactive wastes in Belarus lands contaminated by radionuclides due to the accident at the Chernobyl Nuclear Power Plant are characterized. Data regarding their burial conditions and of the ecological efficiency of decontaminating low background radiation territories are cited.

807

V18/023712

Low Level Radioactive Scrap Metal Disposition Options Available to the Nuclear Industry: Costs of Various Processes

Nichols, F.; Hanes, K.

Manufacturing Sciences Corporation, Woodland, WA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (13 pp.) (1996)

Decontamination and Decommissioning (D&D) is a costly process resulting in much waste to be dispositioned. A systems integration model is presented on how to deal with metal resulting from the D&D activities. Although this paper deals with only metal, the decision tree is applicable to the concepts of how to deal with all waste from D&D. The project manager of the D&D activity must become the systems integrator of the services offered by a multitude of contractors in the market place. Each contractor has its own agenda which may or may not be the best answer to all of the problems facing the D&D project manager. Manufacturing Sciences Corporation (MSC) is a contractor offering its services as part of the multitude. The model explains how the services of MSC can be integrated into the project managers "tool kit". Recycling of Radioactive Scrap Metal (RSM) is the fundamental option of RSM; but only when it makes sense to the project manager by cost justification. Costs of the various processes are presented in order that a D&D project manager may make informed decisions about the options available. Other relevant data is provided regarding the packaging density achievable in the material disposition, cost of labor for packaging, cost of transportation and the cost to survey RSM for free release.

808

V18/023702

Low Level Waste: Industry Activities to Address Disposal Availability

Hendricks, L.

Nuclear Energy Institute, Washington, DC

CONF-961032; Proceedings of the 1996 TLG Decommissioning

Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (12 pp.) (1996)

This series of viewgraphs presents information on the management of low-level radioactive waste by the nuclear energy industry. An overview of Low-Level Waste (LLW), and process, regional, and facility status timelines are presented. The decommissioning of llw volumes is discussed along with D&D waste volumes. Finally, principles for LLW policy and related regulatory initiatives are discussed.

809 V18/021156

Main Problems Regarding the Decommissioning of VVR-S Research Reactors

Garlea, I.; Turcanu, C.; Mocioiu, D.; Garlea, C.; Ion, M.; Ene, D.; Postelnicu, C.; Ilas, D.; Dogaru, D.; Margineanu, R.; Stanescu, P.; Popescu, C.; Paun, S.

Institute of Physics and Nuclear Engineering, Institute of Atomic Physics, Bucharest, Romania; Center of Technology and Engineering for Nuclear Projects, Bucharest, Romania
Romanian Journal of Physics 40(4-5):475-481 (1995)

The Romanian VVR-S research reactor was put in operation in 1957 and it has worked continuously without major events up to the present moment. During this period, there were no major modifications made concerning the core and the main circuits. The reactor works with the original equipment and control instrumentation supplied by the Soviets. Taking into account the long time of operation (over 35 years), the limited fuel reserve [about 3-4 years], the low neutron flux performances (about $10(E+13) \text{ n/cm}^2$) and the safety aspects, a decommissioning project was implemented. This complex activity began in Romania in 1992. This paper presents the major aspects of the following activities in this field: preparation of up-to-date libraries of nuclear data including all materials in the real composition of the reactor structures; the reactor calculation system adaptation at the specific activities of decommissioning; technical analysis of VVR-S Bucharest research reactor; safety analysis; the improvement of decontamination methods; and modern methods for waste management and disposal. There are also preliminary results regarding calculated radioactive inventory, measured primary circuit contamination, and technical and safety analysis.

810 V18/024380

Management Options for Recycling Radioactive Scrap Metals

Dehmel, J.C.; Bartlett, J.W.; MacKinney, J.

Sanford Cohen & Associates, Inc., Kirtland, WA; U.S. Environmental Protection Agency, Washington, DC

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (8 pp.) (1996)

The feasibility and advantages of recycling radioactive scrap metals (RSM) have yet to be assessed, given the unique technical, regulatory, safety, and cost-benefit issues that have already been raised by a concerned recycling industry. As is known, this industry has been repeatedly involved with the accidental recycling of

radioactive sources and, in some cases, with costly consequences. If recycling were deemed to be a viable option, it might have to be implemented with regulatory monitoring and controls. Its implementation may have to consider various and complex issues and address the requirements and concerns of distinctly different industries. There are three basic options for the recycling of such scraps. They are: (1) recycling through the existing network of metal-scrap dealers and brokers, (2) recycling directly and only with specific steelmills, or (3) recycling through regional processing centers. Under the first option, scrap dealers and brokers would receive material from RSM generators and determine at which steelmills such scraps would be recycled. For the second option, RSM generator would deal directly with selected steelmills under specific agreements. For the third option, generators would ship scrap only to regional centers for processing and shipment to participating steelmills. This paper addresses the potential advantages of each option, identifies the types of arrangements that would need to be secured among all parties, and attempts to assess the receptivity of the recycling industry to each option.

811 V18/025352

Management of Decommissioning in Belgium: NIRAS/ONDRAF's Responsibilities, Decommissioning Waste Streams and Cost Breakdowns

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National Agency for Radioactive Waste and Enriched Fissile Materials (NIRAS/ONDRAF), Brussels, Belgium

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

Since 1988, major nuclear facilities have been in the process of decommissioning on three sites in the Mol and Dessel areas. Other facilities have been decommissioned and the remaining buildings demolished or re-used, e.g., for conventional research, by a new owner. NIRAS/ONDRAF is directly involved in these operations. Indeed, the Agency is legally bound to collect and assess information about the decommissioning of nuclear facilities in Belgium, to approve the decommissioning plans and, in some cases, to execute the decommissioning programs. As costs for radioactive waste management are rather high and the recycling of materials was decided to be a major objective to preserve precious raw materials, efforts have been made since 1992 to minimize final amounts of radwaste arising from decommissioning. In this manner, encouraging results have been gained in building surface decontamination, where the removal of a 1.5-3 mm layer allows in most cases the remaining structure to be released. In the same way, the development and the implementation of an industrial decontamination unit for ferrous components by a dry abrasive technique will allow free release of up to 90% of steel components in the near future.

812 V18/020883

Managing Nuclear Liabilities: "Hospital Pass" or Major Opportunity? [April 1996]

May, D.

Nuclear Liabilities Management Company Limited,

Manchester, United Kingdom

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 256-263) (1996)

Decommissioning and decontamination, together with associated waste management cannot be considered separately from issues such as public acceptability, long term financing arrangements, technology development and regulatory matters. In the UK this wide range of issues has been termed Liabilities Management. BNFL's extensive experience of successfully managing and eliminating nuclear liabilities on a large commercial scale provides key pointers for the management of nuclear facilities worldwide. These pointers are supported by the extremely encouraging experience and progress made by BNFL to date. Similar approaches, with appropriate adjustment for local circumstances, will be necessary for the successful management and elimination of nuclear liabilities elsewhere on all nuclear sites.

813 V18/020710

Managing Nuclear Liabilities: Completion of the Nuclear R&D Mission

Nelson, R.L.

Nuclear Energy Institute, Washington, DC; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom
CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 321-331) (1995)

This paper describes the liabilities generated over the last 40 years of nuclear research and development (R&D) in the United Kingdom Atomic Energy Authority (UKAEA). It sets out the new task of the UKAEA in the safe and cost effective management of these liabilities. Responsibilities, new management arrangements, and contract strategies are discussed, together with the measures whereby value for money is achieved. Progress to date in managing the R&D liabilities is promising and should assist in convincing the public that decommissioning and radioactive waste management can be accomplished in a safe, controlled and cost effective manner.

814 V18/020711

Managing Nuclear Liabilities: Hospital Pass or Major Opportunity [November 1995]

May, D.

Nuclear Liabilities Management Company Limited, Manchester, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995.

Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 315-319) (1995)

This paper sets out to start changing the perception that liabilities management is an unattractive part of the United Kingdom (UK) Nuclear Industry. The paper describes British Nuclear Fuel plc (BNFL) successes and long term challenges in this area and concludes that liabilities management presents a major opportunity to remove an Achilles heel of the industry, create value for the companies concerned by successfully driving down costs, and sustain and exploit internationally a major UK competitive edge.

815 V18/024216

Manipulator Systems for Nuclear Reactor Decommissioning that Can Take End Effectors

Lampersberger, E.; Hell, W.; Vrba, H.

VOEST-Alpine Machinery, Construction and Engineering GmbH, Linz, Austria; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 277-285) (November 1995)

The development of a remote-handling system on the basis of the new master-slave manipulator will decisively influence the possibilities of remote-controlled manipulation in nuclear technology under the premises of high availability, universal range of application, a standard normal for industry, and maintenance friendliness. (This document is in German).

816 V18/024205

Manipulator and Materials Handling Systems for Reactor Decommissioning - Cooperation Between the University and the Plant Operator

Schreck, G.; Bach, F.W.; Haferkamp, H.

Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 233-238) (November 1995)

Nuclear reactor dismantling requires suitable handling systems for tools and disassembled components, as well as qualified and reliable disassembly and cutting techniques. From the angle of radiation protection, remote-controlled handling techniques and underwater techniques are the methods of choice. The latter is particularly desirable during continuation of plant operating conditions, and all the more important as disassembly work proceeds towards the

reactor core. Because of the experience accumulated for 20 years by the Institute fuer Werkstoffkunde (materials science) of Hannover University by basic research and application-oriented development work in the field of thermal cutting technology, the institute is the cut-out partner for disassembly tasks in reactor decommissioning. Experience is especially strong in plasma arc cutting techniques and development work in the field of remote-controlled materials handling systems. (This document is in German).

817 V18/025308

Manufacturing Low-Level Waste Disposal Containers from Radiologically Contaminated Scrap Metal

Loiselle, V.; Liby, A.

American Technologies, Inc., Oak Ridge, TN; Manufacturing Sciences Corporation, Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (3 pp.) (1997)

American Technologies, Inc., and Manufacturing Sciences Corporation are responsible for producing the first low-level waste disposal container of significant quantity from recycle metal obtained at the DOE, K-25 Site in Oak Ridge, Tennessee. The companies present their product design, the facilities utilized, and the program status and results to date.

818 V18/025496

Measurement of Residual Radioactive Surface Contamination by 2-D Laser Heated TLD Report for October 1, 1992-April 30, 1997

Jones, S.C.

Keithley Instruments, Inc., Cleveland, OH

NUREG/CR-6037; 98 pp. (June 1997)

This report discusses the research results of a two phase Small Business Innovative Research (SBIR) project on the use of a two-dimensional laser heated thermoluminescence dosimetry system for surveying for residual radioactive contamination. The research presented in this report describes the Phase I effort to explore the feasibility of applying an existing two-dimensional radiation level mapping system, developed by the contractor, to detect, locate, and measure residual radioactive contamination. It also describes the progress made in Phase II to improve and modify the system to tailor it to this particular application. The potential advantages of the system over standard techniques include: the ability to detect contamination in otherwise inaccessible areas and greater reliability as a result of eliminating uncertainties inherent in the hand-held instrument scanning process.

819 V18/022808

Measurement of Residual Radioactivity in the Nuclear Facility Being Decommissioned

Ezure, H.; Yokota, M.; Komatsu, J.; Mizuno, O.; Watanabe, Y.

Research Association for Nuclear Facility Decommissioning (RANDEC), Tokai, Ibaraki, Japan; Fuji Electric Company

Limited, Tokyo, Japan

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1778-1784) (1996)

Before the radioactive-free release of a nuclear facility being decommissioned, a termination survey should be carried out on radioactivity, because the site may possibly be contaminated by Co-60, Cs-137, etc. This requires confirmation by a radioactivity measurement. However, the site is characterized by a very large area and by a very low level or little residual radioactivity. Therefore, detection and measuring works are required to be very efficient. Further, the detection of Co-60 is disturbed by the background due to K-40 and other natural radioactivities. In order to enhance the efficiencies, a measuring system is being developed, which consists of several NaI(Tl) detectors and electronic circuits mounted on a vehicle and further, the position of measuring points is to be determined by an auto-positioning apparatus. Field tests demonstrate that the vehicle can be located within a short distance from the measuring goal and it was confirmed that measuring operation is organized in sequence.

820 V18/023574

Melt-Decontamination Method for Radiation-Contaminated Metal

Kobayashi, H.; Igarashi, H.; Fujita, M.

Power Reactor and Nuclear Fuel Development Corporation, Tokyo, Japan; Fuji Electric Company Limited, Kawasaki, Kanagawa, Japan

Japanese Patent 8-201586; 4 pp. (August 9, 1996)

Metals contaminated by radioactive materials are melted, and fluxes are added thereto to combine the flux and the radioactive materials to form slags. In a method of melt-decontaminating radiation contaminated metals by separating the slags from the contaminated metals, the flux is constituted by highly chemically active metal flux having a high melting point and halogenated flux as a metal compound of a halogen element having an atomic number greater than that of fluorine. If it is added to a zircaloy melted in a melting furnace, radioactive oxides as contaminants are formed into a fluoro-type material by way of two step chemical reactions, and floated as slag on the surface of the molten metal being separated from zircaloy. The slags after cooled and solidified, are removed by scraping out the surface to obtain zircaloy, from which contaminants are removed. The zircaloy can be reutilized for a cladding tube. (This document is in Japanese).

821 V18/024220

Melting Tests for Recycling Slightly Radioactive Metallic Wastes Arising from Decommissioning

Nakamura, H.; Fujiki, K.

Japan Atomic Energy Research Institute, Department of Decommissioning and Waste Management, Ibaraki, Japan
Nuclear Technology 117(2):195-205 (February 1997)

To address the future recycling of metallic wastes arising from the decommissioning of nuclear facilities, melting tests of radioactively

contaminated metals were carried out with attention to the resultant partitioning of radionuclides. The behavior of radionuclides is dominated by the volatility and the oxidizable tendency of each element. For the behavior of Zn-65, a different result is obtained; i.e., significant amounts of Zn-65 remain in the ingot. Melting procedures and flux compositions exert an effect on the transfer behavior of the volatile radionuclides evaluated.

822 V18/020728

Metal Speciation in a Dilute Chemical Decontamination Formulation - Theoretical Calculations

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Indian Nuclear Society, Bombay, India; Bhabha Atomic Research Centre, Indira Gandhi Centre for Atomic Research Campus, Water and Steam Chemistry Laboratory, Kalpakkam, India

CONF-951287; Experience with Dilute Chemical Decontamination in Indian Nuclear Reactors, Proceedings of a Seminar, Kalpakkam, India, December 12-13, 1995. Indian Nuclear Society, Kalpakkam, India, 222 pp.; (pp. 118-124) (December 1995)

The efficiency of an ethylenediamine tetraacetic acid (EDTA)-based formulation for decontamination purposes has been evaluated by an experimental run. The chemical equilibria involved in a typical decontamination process with the above formulation are discussed. The influence of pH on the speciation of complexed ions is analysed with respect to the most abundant iron species in order to understand the effect of varying compositions of the formulation. Some of the experimental results obtained from the process are explained by theoretical calculations based on the thermodynamic data available in the literature.

823 V18/022120

Method at Decontamination of Surfaces in a Nuclear Plant

Kornfeldt, A.

ABB Atom AB, Vaesteraas, Sweden

Swedish Patent 503373; 12 pp. (June 3, 1996)

After the decontamination substance has been applied to the contaminated surface, a microwave field is applied in order to enhance the penetration of the decontaminating substance and the dissolution of the contaminated surface. In this way, the time needed for decontamination can be shortened, and the amount of decontamination substance reduced. (This document is in Swedish).

824 V18/022532

Method for the Dismantling of the Reactor Pressure Vessel (RPV) Internals of KRB A

Steiner, H.; Eickelpasch, N.; Priesmeyer, U.; Bach, F.W.

Kernkraftwerke Gundremmingen Betriebsgesellschaft mbH, Gundremmingen, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.),

Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 579-582) (May 1996)

Short communication. No abstract available. (This document is in German).

825 V18/021285

Mobile Robot for Hazardous Environments

Bains, N.

Atomic Energy of Canada Limited, CANDU Operations, Sheridan Park, Ontario, Canada

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:39-40 (1995)

This paper describes the architecture and potential applications of the autonomous robot for a known environment (ARK). The ARK project has developed an autonomous mobile robot that can move around by itself in a complicated nuclear environment utilizing a number of sensors for navigation. The primary sensor system is computer vision. The ARK has the intelligence to determine its position utilizing "natural landmarks," such as ordinary building features at any point along its path. It is this feature that gives ARK its uniqueness to operate in an industrial type of environment. The prime motivation to develop ARK was the potential application of mobile robots in radioactive areas within nuclear generating stations and for nuclear waste sites. The project budget is \$9 million over 4 yr and will be completed in October 1995.

826 V18/020712

NEA Activities in Economics and Funding of Decommissioning

Stevens, G.H.

International Energy Agency, Committee on the Safety of Nuclear Installations, Paris, France; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 383-392) (1995)

There are three main aspects of this topic that have been studied by the Nuclear Energy Agency (NEA) under auspices of its Nuclear Development Committee. They are the estimated costs of decommissioning, the burden of decommissioning on electricity generation costs, and the mechanisms for ensuring that resources will be available when decommissioning expenditures fall due.

827 V18/022856

NEA Co-Operative Programme on Decommissioning: The First Ten Years 1985-95

NEA Co-Operative Programme on Decommissioning: The First Ten Years 1985-95, Nuclear Energy Agency, Organisation for

Economic Co-operation and Development, Paris, France, 150 pp. (1996)

As a consequence of the continued and growing interest in decommissioning of nuclear facilities, the successful Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA) Co-operative Program on Decommissioning was renewed for a second five-year period starting in 1990. The basic scope of the Co-operative Programme remained unchanged regarding the exchange of scientific and technical information between projects. This data includes project descriptions, plans, data obtained from research and development associated with participating projects, together with data arising from the execution of plans and operations. Such exchange includes technical visits to participating projects. In addition, special arrangements can be set up between two or more participating projects to further enhance co-operation in fields of specific mutual interest. Where there were major topics that required and justified further and more detailed investigation than could be undertaken by the Technical Advisory Group, special Task Groups have been created. In addition to project managers presently participating in the Program, these Task Groups can include other experts having adequate knowledge in the topic under consideration. During the five-year period now finished, Task Groups were set up to consider: (1) decommissioning costs, (2) decontamination required for decommissioning, and (3) recycling and reuse of materials arising from decommissioning. The Program has grown significantly such that there are now 12 countries and 30 projects participating together with active support from the European Community (EC), the IAEA and UNIPED. The inclusion in 1992 of the first non-OECD country is the recognition of the continued value in the Programme, together with the increasing awareness to ensure safe, environmentally friendly and cost effective decommissioning, which is vital to the continuation of a nuclear generation programme. Hence the recent decision to renew the Program for a further five years commencing September 1995.

828 V18/023530

NPP A-1 Decommissioning Project: Progress Report

Krstenik, A.; Blazek, J.

Nuclear Power Plants Bohunice, Bohunice, Slovak Republic
OECD/NEA Co-Operative Program on Decommissioning,
Proceedings of the 20th Meeting of the Technical Advisory Group,
Stockholm, Sweden, May 6-10, 1996, 512 pp.; (6 pp.) (1996)

The Bohunice A-1 Reactor (NPP A-1) D&D Program activities in liquid radwaste, primarily evaporator concentrate and kalium dichromate (Chrompik) processing, conditioned radwaste temporary storage, design and fabrication of a new storage of damaged fuel are in progress. Encouraging results have been achieved in dealing with the following issues: Review and approval of the Project for bringing NPP A-1 into radiologically safe state; Spent fuel transport; Reactor hall decontamination; Evaporator concentrates bituminization; Long term storage pond water decontamination equipment manufacturing; Design and fabrication of equipment and construction of BSC (Radwaste conditioning centre); and, Non-active tests of the kalium bichromate vitrification.

829 V18/021177

NRC Looks to Speed Decommissioning Decisions

Newman, P.

Energy Daily 22(161):1-2 (August 23, 1994)

The U.S. NRC has proposed new generic rules designed to speed the decommissioning of NRC-licensed nuclear facilities. The new rules propose moving away from the commissions's current site-specific decommissioning policy and using radiological criteria for determining when a site can be considered cleaned. The proposal would establish 15 millirems per years as the total effective dose equivalent as the threshold for cleanup.

830 V18/021476

National Approach in Different Countries to the Policy of the Activity Regulation on Decommissioning of NPP and Nuclear Facilities

Koval'chuk, O.V.; Shul'ga, N.A.

Atomnaya Tekhnika za Rubezhom 6:7-16 (June 1995)

Modern state and basic trends in developing the policy and regulatory activities related to decommissioning of NPPs and other nuclear facilities in the IAEA member-countries: Belgium, Great Britain, Germany, Canada, the USA, France, Sweden and Japan are considered. Laws, standards, rules and criteria applied in practice by planning and conduct of works on nuclear facilities decommissioning are briefly described. Problems on NPP decommissioning are solved differently in various countries. This depends to a great degree on the state policy in the area, regulatory system, legislative structure and other factors. (This document is in Russian).

831 V18/021510

Near Surface Disposal of VLLW from Reactor Decommissioning and Safety Requirements

Okoshi, M.; Yoshimori, M.

Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan

INIS-JP-055; CONF-9509378; Proceedings of the Third Japan-Russia Joint Symposium on Radiation Safety, T. Kosako and N. Sugiura (eds.), Tokyo, Japan, September 18-19, 1995, 169 pp.; (pp. 75-85) (1996)

Large quantities of radioactive concrete waste will arise from reactor decommissioning. Much of the waste has very low level (VLL) activity. Its hazard is very low, and it is physically and chemically stable. To carry out reactor decommissioning successfully, it is essential to dispose of VLL concrete waste safely and economically. Therefore the Nuclear Safety Commission has determined upper limits of activities and guidelines for the near surface disposal of VLL concrete waste. According to the safety requirements, Japan Atomic Energy Research Institute is going to dispose of VLL concrete waste generated from the Japan Power Demonstration Reactor (JPDR) decommissioning in October 1995. The disposal program and its safety requirements are described in this paper.

832 V18/023522

Neideraichbach Nuclear Power Plant (KKN): Progress

Report

Valencia, L.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt,
Karlsruhe, GermanyOECD/NEA Co-Operative Program on Decommissioning,
Proceedings of the 20th Meeting of the Technical Advisory Group,
Stockholm, Sweden, May 6-10, 1996, 512 pp.; (13 pp.) (1996)

Dismantling of KKN started on 1 July 1987 after the appropriate license had been granted and immediate execution of the dismantling was ordered by the competent authority. Dismantling was carried out by a general contractor on behalf of Kerforschungszentrum Karlsruhe (KfK) which is now Forschungszentrum Karlsruhe (Karlsruhe Research Center). Upon completion of remote-controlled dismantling in September 1992 and dismantling and disassembly of the thermal shield by April 1993, the activated concrete structures were removed. This work which concerns above all the activated internal zone of the biological shield and adjacent activated structural components was completed successfully in October 1993. At that time, all activated and contaminated KKN plant components and materials had been dismantled. The remaining concrete containment and buildings were demonstrated to be free of artificial activity by means of complex measurements until August 1994. This manifested itself in the first release of a nuclear power plant of this size in Europe from the Atomic Law. After this, conventional demolition of the buildings could be started in October 1994. From March 1995 to July 1995 the final dismantling phase, conventional demolition of the buildings, was accomplished. At the end of July 1995, "green field" conditions were established. This paper describes the final dismantling process.

833 V18/021512

New Concepts in Decontamination Workshop, October 5-7, 1995, Jackson Hole, Wyoming [Program, Abstracts and Summary]

University of Wyoming, Laramie, WY

ARO-35060.1-CH-CF; 24 pp. (August 1996)

The motivation for this workshop was threefold: (1) the concern over the very low priority of decontamination research among the Joint Services Material Group's priority list of chemical and biological defense mission areas; (2) the recognition that it had been over seven years since the last workshop on this topic and the timeliness of bringing this research community together again; and (3) the recognition that there were still very difficult problems in decontamination which needed to be highlighted by the research community. The format of the workshop consisted of two full days of 30- to 40- minute oral technical presentations with a discussion and question period. These presentations were followed by another half-day session which began with brief service-specific needs/problems in decontamination, and ended with group discussions of several specific decontamination topics, such as wide area decon and sensitive equipment decon. It appeared that the workshop was an unqualified success in stimulating discussion among the participants. It should be noted that the DOE lab representatives were active participants in this workshop and they provided some fresh ideas and viewpoints which were most welcome. The results tallied in the overall workshop evaluation also

showed that the participants were quite satisfied with this workshop. Specific written comments on the workshop or on general decontamination research were invited, and several are included at the end of this report for the interested reader.

834 V18/020946

New Cutting and Packaging Technology for Large Activated and Contaminated Components from Nuclear Power Plants

Gestermann, G.

Gesellschaft fuer Nuklear-Service mbH, Essen, Germany

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (11 pp.) (1996)

In the past few years, large components from the primary cycle in a number of nuclear power plants have been exchanged. These include steam dryers and steam separators with diameters and heights greater than 5 meters and with weights up to 50 tons. Since the construction of the components is in part very complex and they exhibit surface doses of several mSv, cutting with thermal equipment is very difficult and is associated with relatively high dose exposures for personnel. The complex design and the size of the parts make remote handling of the equipment practically impossible. For these reasons, GNS had developed a concept in which the cutting is performed using a heavy-duty hydraulic scrap cutter, which is installed on an electrically driven caterpillar vehicle with an extending arm. Experiences with the cutting of similar, but unless complex components in a non-nuclear field of application are available and were taken into account in establishing the concept. The cutting and packaging of a steam dryer and a steam separator are scheduled to take place in a German power plant; in the process the parts are to be packaged in final disposal containers and then brought to the final repository ERM. In the report, the concept for cutting and packaging shall be explained and the experience gained from the actual cutting in the nuclear power plant shall be discussed.

835 V18/021502

New Start of Nuclear-Powered Ship Mutsu: 1 - Decommissioning Works of Mutsu and Research and Development of Nuclear-Powered Ships Hereafter

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Japan Atomic Energy Research Institute, Mutsu
Establishment, Mutsu, Aomori, Japan

Genshiryoku Kogyo (Nuclear Engineering) 42(2):14-23 (February 1996)

The nuclear-powered ship Mutsu was launched in June 1969, and used Ominato, Aomori Prefecture, as its home port. The initial criticality of the reactor was attained in August 1974. However, a radiation leak occurred, and the repair of shielding and the general safety checkup were carried out in Sasebo in 1980. The ship moved to the new home port, Sekinehama, in 1988, and after the trial, it received the certificate of inspection from the Science and Technology Agency and Ministry of Transport. Thus 'Mutsu' was completed as the nuclear-powered ship. The experimental voyage

was begun in February 1991, and finished in January 1992. The reconstruction work is in progress to change Mutsu to a large ocean observation and research ship. The course of the research and development, the reactor power raising test and the sea trial, the experimental voyage and the results attained by Mutsu are reported. One of the important items is the training of the crew who operate nuclear-powered ships and nuclear reactors; about 400 seamen took part in the operation of Mutsu. (This document is in Japanese).

836 V18/021503

New Start of Nuclear-Powered Ship Mutsu: 2 - On Decommissioning Works

Matsuo, R.

Japan Atomic Energy Research Institute, Mutsu Establishment, Mutsu, Aomori, Japan

Genshiryoku Kogyo (Nuclear Engineering) 42(2):24-28 (February 1996)

It was decided that Mutsu should be decommissioned immediately after the finish of the experimental voyage in the fundamental plan. Therefore, the Nuclear-powered Ship Decommissioning Department was organized in the Japan Atomic Energy Research Institute in 1992, and the investigation was begun on the measures to abolish the reactor facilities of Mutsu. The fundamental plan decided upon was to adopt the removal and isolation method for the reactor room including the reactor and shields, to use the ship as a conventional propulsion ocean research ship, and to exhibit the removed reactor chamber under proper control. The required technical assessment and safety examination were carried out based on this fundamental plan. Technical feasibility studies were carried out on the safety of placing Mutsu on a semisubmersible barge, the safety of the cutting works of the hull, the safety of a floating crane, and the safety at the time of accidents. Removal of fuel assemblies, of the machinery works and equipment in the reactor auxiliary machine room and others, the removal and transport of the reactor room as a complete unit, the construction work of the preservation building, and the safety controls on the decommissioning work are described. (This document is in Japanese).

837 V18/025831

New Techniques Available for Decontamination

Costes, J.R.; Cochaux, C.

Commissariat a l'Energie Atomique, Central Decommissioning Unit, Bagnols-sur-Ceze, France

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 115-120) (1996)

As decommissioning operations become increasingly widespread in the nuclear industry, specific requirements for decontamination techniques arise. This paper discusses two applications involving decategorization of dismantling waste. Decategorization consists in decontaminating waste to allow classification in a lower - less

expensive - waste category. The first application concerns the decontamination of mild steel pipes removed from the G2 and G3 gas-cooled reactors at Marcoule (France) during decommissioning to stage 2. A large quantity of pipes were contaminated by deposits and encrustation of cobalt 60 and cesium 137. The objective was to avoid having to place the material in surface disposal sites for 300 years by decontaminating them to a level that would allow reutilization of the metal. The other application involves small stainless steel waste scraps from stage 3 decommissioning of a radio-metallurgy laboratory (RM2) at Fontenay-aux-Roses. The waste was unacceptable for surface disposal because of the high levels of alpha contamination. A decategorization technique was developed on a fraction of the 13 tons of waste concerned, which avoids the need for disposal in a very costly geological repository.

838 V18/020945

Newly Developed Decontamination Technology for Non-Incinerable Radioactive Waste Based on Gaseous Reaction of Carbonylation and Fluorination

Tatenuma, K.

KAKEN Company, Mito-Institute, Ibaraki-ken, Japan
CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (20 pp.) (1996)

New gas-phase decontamination technology based on gaseous reactions utilizing volatile properties of carbonyl compounds of radioactive transition elements and fluorine compounds of actinides was developed. To determine the feasibility of this new technology, reacted under high CO pressure (50-200 atm) with heating (about 350 degrees C), non-radioactive (cobalt, chromium, nickel, rhodium, molybdenum, manganese, ruthenium, zinc) and radioactive nuclides (cobalt-60, nickel-63, ruthenium-103) transition elements were removed as gaseous forms. Experiments with uranium using fluorine gases were also done. Forms of these volatile compounds were predicted to be carbonyl compounds and fluorine compounds. In the case of radioactive nuclides existed in the hard oxide layer of stainless steel, by utilizing pretreatment with supercritical CO₂+I₂+H₂O, the hard oxide layer was removed completely and the gaseous reaction was promoted; cobalt-60 was mostly removed by 200 atm CO gas, and cobalt-60, ruthenium-103 and uranium were removed 30-35%, 49-57% and 55-60% respectively by 200 atm CO+COF₂ gases. From these experimental results using non-radioactive and radioactive nuclides, the feasibility of this new idea was determined. This decontamination technology based on gaseous reactions has the ability and possibility to decrease drastically the large volumes of non-incinerable radioactive wastes, which include ash, many kinds of used-metals, and equipment.

839 V18/020715

Novel Technique for the Decontamination of Concrete and Steel

Benson, J.; Eccles, H.

British Nuclear Fuels plc, Capenhurst, United Kingdom;
Institution of Mechanical Engineers, London, United Kingdom;
British Nuclear Energy Society, London, United Kingdom;
Institution of Electrical Engineers, London, United Kingdom

Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 363-369) (1995)

Nuclear facilities are constructed of a variety and diversity of materials. After the decommissioning of a facility, the majority of material will require disposal and may therefore warrant decontamination. Decontamination is an important procedure because it not only reduces radiation during the decommissioning operations, but also has the potential for the reclassification of wastes to achieve lower disposal costs. British Nuclear Fuels plc (BNFL) has identified a novel decontamination process which is based on a naturally occurring biological phenomenon.

840 V18/023986

Nuclear Decommissioning Recycling and Reuse of Scrap Metals

Organization for Economic Co-Operation and Development (OECD), Nuclear Energy Agency (NEA), Paris, France

Report; 60 pp. (1996)

Significant volumes of waste will be generated from decommissioning nuclear facilities throughout the world. Existing regulations throughout the world currently require most of this waste to be classified as "low-level" nuclear waste and be directed to regulated disposal facilities. However, currently operating waste facilities have limited capacities and are insufficient to accommodate the large volumes of waste that will be generated from decommissioning the world's nuclear facilities. Public opposition to the siting and licensing of new radioactive waste facilities makes the expansion of available waste capacity difficult and serves to increase already high disposal costs. Concrete, steel and other valuable materials comprise a large portion of the waste generated by decommissioning activities. The inherent value of these materials and the need to reduce waste directed to radioactive disposal facilities makes recovery through some form of decontamination a prudent, if not necessary, undertaking. Furthermore, recyclable materials sent to waste facilities must ultimately be replaced with new materials. Adverse health and environmental impacts from mining and milling processes associated with the replacement of these materials are significant considerations which should not be ignored by those who intend to adequately assess the merits of recycling metal, concrete and other recoverable materials.

841 V18/023689

Nuclear Decommissioning Update

Roff, D.

Deloitte & Touche, Toronto, Ontario, Canada

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (22 pp.) (1996)

This paper focused on liabilities for closure or removal of long-lived assets. The following issues were identified and discussed: (1) Liability recognition; (2) Measurement of obligation; (3)

Consideration of "near-term" advances in technology; (4) Discount rates; (5) Offsetting of trust funds; (6) Capitalization; and, (7) Disclosures

842 V18/020648

Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations

Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp. (1995)

This volume contains papers presented at the International Conference on Nuclear Decommissioning organised by the Institution of Mechanical Engineers and the British Nuclear Energy Society in 1995. The topics covered include: descriptions of the decommissioning of specific reactors; aspects of decommissioning of nuclear facilities in general; cyclotron and hot laboratory decommissioning, decontamination and dismantling; equipment; regulatory regimes; and nuclear liabilities management. Papers within the scope of this database have been indexed separately.

843 V18/021501

Nuclear Installations: Decommissioning and Dismantling

Nuclear Installations: Decommissioning and Dismantling, EUROFORUM, Paris, France, 293 pp. (1995)

This document is a compilation of seven talks given during the 1995 EUROFORUM conference about decommissioning and dismantling of nuclear installations in the European Community. The first two papers give a detailed description of the legal, financial and regulatory framework of decommissioning and dismantling of nuclear facilities in the European Union and a review of the currently available decommissioning techniques for inventory, disassembly, decontamination, remote operations and management of wastes. Other papers describe some legal and technical aspects of reactor and plants dismantling in the United Kingdom, Germany, Spain and France.

844 V18/022906

Nuclear Instrumentation Tools for Lower Cost and Higher Reliability Decommissioning of Buildings and Grounds

Bronson, F.L.

Canberra Industries, Inc., Meriden, CT

CONF-9606257; Top Seal '96, Proceedings of a European Nuclear Society Conference, Stockholm, Sweden, June 10-12, 1996; (pp. 1-8) (1996)

The two most expensive things in the decommissioning of buildings and grounds with radioactive contamination are the labor for the contamination assessment and for the decontamination, and the cost of radioactive waste disposal. There have been many studies

and papers presented on the decontamination techniques themselves, but these have been primarily about the contamination removal operation. In this paper, four new tools are presented to guide the implementation of the decontamination effort, to better characterize the radioactivity, and to reduce the volume and therefore the cost of radioactive waste disposal. A very important side benefit in this day of intense regulatory and public scrutiny is the resulting improved documentation of the radioactivity levels in the waste or other items leaving the site, and in the buildings and grounds left behind at the site. While these tools are new, the principles behind them are not. They have been in use in quality laboratories for years. What is new is modern detectors and electronics that have made practical the transition of these laboratory quality measurements to field instrumentation.

845 V18/024166

Nuclear Power Plant Decommissioning [Latest Citations from the NTIS Bibliographic Database]: Published Search

NERAC, Inc., Tolland, CT

Bibliography (January 1997)

The bibliography contains citations concerning the phase-out and decommissioning of nuclear power plants around the world. Among the subjects covered are: case studies of reactor dismantling, waste management, site monitoring, and the economics of phase-out. There are papers covering European, Chinese, Eastern European, and United States facilities.

846 V18/022405

Nuclear Science and Technology: Handbook on Decommissioning of Nuclear Installations

Huber, B.; Chapuis, A.M.; Bregani, I.F.; Lasch, M.; Bach, F.W.; Dufaud, J.M.; Lorin, C.; Bishop, T.; Geiser, H.; Graf, H.; Rankin, A.; Schrauben, M.; Watson, C.; Dubourg, M.

Commission of the European Communities, Brussels, Belgium; Commissariat a l'Energie Atomique, IPSN/DPEI/SERGD, Fontenay-aux-Roses, France; Ente Nazionale per l'Energia Elettrica, Centro Ricerca Ambiente e Materiali, Milan, Italy; Kernkraftwerke Gundremmingen Betriebsgesellschaft mbH, Gundremmingen, Germany; Hannover University, Hannover, Germany; Commissariat a l'Energie Atomique, Centre d'Etudes de la Vallée du Rhone, Bagnols-sur-Cèze, France; AEA Technology, Windscale, Seascale, Cumbria, United Kingdom; Gesellschaft fuer Nuklear-Service mbH, Essen, Germany; National Agency for Radioactive Waste and Enriched Fissile Materials (NIRAS/ONDRAF), Brussels, Belgium; AEA Technology, Harwell, United Kingdom; FRAMATOME, Paris-la-Defense, France

EUR-16211-EN; 578 pp. (1995)

This handbook has been prepared, within the framework of the European Atomic Energy Community's R&D programme, in the field of decommissioning in order to provide an authoritative, compact compilation of the technology used in this field. For R&D programme managers the handbook should be useful as a reference to appraise the degree of innovation and the advantages to be expected from new R&D proposals. To regulators it will provide

information on the state-of-the-art or the reasonably achievable in decommissioning. The main subject of the handbook, besides a summary of the basic engineering science in each area, is the detailed description of the state-of-the-art techniques. For each of these techniques, the following information is provided: range of applicable conditions, performance characteristics, by-product characteristics, radioprotection and safety aspects, cost data, existing specific equipment, examples of previous applications and other relevant information.

847 V18/020653

Nuclear Submarine Prototype Post Core Removal Decommissioning and Life Extension

Jones, G.D.; Lyall, D.J.

Rolls-Royce Limited, Bristol, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 119-126) (1995)

Decommissioning of a nuclear plant normally brings it to the end of its life. This paper describes how the initial decommissioning of a nuclear submarine prototype was undertaken, how it was modified and its useful life extended. The Dounreay Submarine Prototype came to the end of critical operation in 1984. This was followed by defuel, decontamination and modification to convert the plant into a facility for the investigation of loss of coolant accidents. Following completion of this investigation, the plant has been used as a primary coolant pump test facility.

848 V18/022534

Nuclear Technology '96: Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996

Deutsches Atomforum e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp. (June 1996)

The themes of the four papers of this session are: (1) legal and technical consequences resulting from the license issued for decommissioning and dismantling of the Lubmin/Greifswald nuclear power station; (2) the decommissioning guideline - a device for enhanced harmonization of the nuclear licensing procedure; (3) decommissioning of the Wuergrass nuclear power plant, a commercial challenge; and (4) some basic insights relating to nuclear power plant decommissioning. (This document is in German).

849 V18/023517

OECD/NEA Co-Operative Program on Decommissioning: Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996

OECD/NEA Co-Operative Program on Decommissioning,

Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp. (1996)

The 20th meeting of the Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA) Technical Advisory Group (TAG) on Decommissioning of Nuclear Facilities, was held in Stockholm, Sweden, in May 1996. A good exchange of information on the Technical Status of the various projects occurred at this meeting of the TAG. Final review comments were given to the programme coordinator for the 10-Year Status Report of the Decommissioning Group. In addition to the individual project presentations, tours were made of the following facilities: (1) the Studsvik Facilities at Nyköping, (2) the Forsmark Waste Management Facilities near Forsmark, and (3) the Oskarshamn Centralized Interim Spent Fuel Storage (CLAB) facility.

850 V18/023543

OECD/NEA Decommissioning Program, "Proposal for Future Programme Organisation

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (10 pp.) (1996)

The Nuclear Energy Agency (NEA) Co-operative Program for the Exchange of Scientific and Technical Information Concerning Nuclear Installations Decommissioning Projects was initiated in 1985, and has completed its second five-year term on 18th September 1995. The Liaison Committee (LC), at its meeting of 2nd - 3rd November 1994, discussed the experiences and results to date with the Program and considered its possible extension to a third term of operation. There was unanimous consensus on the usefulness of the Technical Advisory Group (TAG) and LC work and the positive results achieved for the improvement of decommissioning technology. The Committee, therefore, decided that the Program should be continued for another term of five years.

851 V18/021174

ORNL Contribution to the IAEA Benchmark Problem on Fission Reactor Decommissioning

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CONF-960415; Proceedings of an American Nuclear Society (ANS) Radiation Protection and Shielding Division Topical Meeting on Advancements and Applications in Radiation Protection and Shielding, Falmouth, MA, April 21-25, 1996. ANS, La Grange Park, IL, 400 pp.; (9 pp.) (1996)

Recently the International Atomic Energy Agency (IAEA) selected a benchmark problem for calculation of radioactivity inventories and dose estimates necessary for fission reactor decommissioning. Several researchers were invited to participate in the solution of this benchmark problem set. The contribution from Oak Ridge National Laboratory (ORNL) is presented in this paper.

852 V18/024230

Office of Nuclear Materials Safety and Safeguards (NMSS) Handbook for Decommissioning Fuel Cycle and Materials Licensees

Orlando, D.A.; Hogg, R.C.; Ramsey, K.M.; Harris, P.W.; Thonus, L.H.; Bellamy, R.R.; Roberts, M.C.; Henson, J.L.; McCormick-Barger, J.W.; Spitzberg, D.B.; O'Brien, T.J.

U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Washington, DC

NUREG/BR-0241; 316 pp. (March 1997)

The US Nuclear Regulatory Commission (NRC) amended its regulations to set forth the technical and financial criteria for decommissioning licensed nuclear facilities. These regulations were further amended to establish additional record keeping requirements for decommissioning; to establish time frames and schedules for the decommissioning; and to clarify that financial assurance requirements must be in place during operations and updated when licensed operations cease. Reviews of the Site Decommissioning Management Plan (SDMP) program found that, while the NRC staff was overseeing the decommissioning program at nuclear facilities in a manner that was protective of public health and safety, progress in decommissioning many sites was slow. As a result NRC determined that formal written procedures should be developed to facilitate the timely decommissioning of licensed nuclear facilities. This handbook was developed to aid NRC staff in achieving this goal. It is intended to be used as a reference document to, and in conjunction with, NRC Inspection Manual Chapter (IMC) 2605, Decommissioning Inspection Program for Fuel Cycle and Materials Licensees. The policies and procedures discussed in this handbook should be used by NRC staff overseeing the decommissioning program at licensed fuel cycle and materials sites; formerly licensed sites for which the licenses were terminated; sites involving source, special nuclear, or byproduct material subject to NRC regulation for which a license was never issued; and sites in the NRC's SDMP program. NRC staff overseeing the decommissioning program at nuclear reactor facilities subject to regulation under 10 CFR Part 50 are not required to use the procedures discussed in this handbook.

853 V18/025380

Operational Experience of Decommissioning the First Primary Separation Plant at Sellafield, U.K.

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British Nuclear Fuels plc, Sellafield, Cumbria, United Kingdom

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (11 pp.) (1997)

Decommissioning of the first primary separation plant at Sellafield, U.K., is one of a number of major projects within BNFL's overall decommissioning program covering all aspects of the nuclear fuel cycle. The project demonstrates that large scale, highly contaminated, complex nuclear reprocessing installations can be safely and cost effectively decommissioned utilizing today's technologies. In order to reduce costs an integrated dismantling strategy has been developed which utilizes a mixture of manual and remote decommissioning techniques in a structured, phased approach. Experience from early phases is reviewed and fed into later stages to constantly improve safety and operating performance, reduce technical uncertainty and financial risk. Where remote systems are required, the use of proprietary items for

manipulators, deployment systems, tooling and computer modeling reduces development costs and time scales while providing robust, reliable and easily maintainable equipment. This paper describes the operational experience of decommissioning the first primary separation plant at Sellafield. Construction of the 61m high facility commenced in 1947 and comprised two mirror image process lines to reprocess irradiated metal fuel from the Windscale piles. The facility operated between 1952 and 1964 until it was subsequently superseded by the current Magnox reprocessing facility. One of the original process line was converted to reprocess oxide fuels, operating from 1969 until 1973. The stage 2 decommissioning project commenced in 1990 and has been subdivided into 9 distinct decommissioning phases. The project is due to be complete in 2010 at an estimated cost of \$155 Million (low case). Three preparatory phases have been completed to date at a cost of 97% of the original estimate. Decommissioning operations are underway in the first of 8 major cell areas, decommissioning of a second area is due to commence in early 1997.

854 V18/022519

Optimized Nuclear Plant Decommissioning Economics Through Repowering

Demoss, D.; Charles, R.P.

Sargent and Lundy, Chicago, IL

CONF-960426; Proceedings of the 58th Annual Meeting of the American Power Conference, A.E. McBride (ed.), Chicago, IL, April 9-11, 1996. American Power Conference, Chicago, IL, Vol. 58-II, 886 pp.; (pp. 812-820) (1996)

Nuclear power has provided a significant portion of electricity produced in the US over the last 39 years. Since the first commercial nuclear plant at Shippingport, Pennsylvania, started producing power in 1957, 110 nuclear plants have been placed in service. This accounts for approximately 20% of the US electric power production. In some states the number is much higher: Illinois relies on nuclear power for approximately 70% of its electricity needs. The generation of electricity from nuclear power will start to decrease in the year 2005 due to a number of plants being taken out of service as they reach the end of their design life (EDL). As these nuclear plants approach their design basis life of 40 years, plant owners will be faced with strategic decisions concerning continued operation through license renewal, decommissioning, or repowering. Without license renewal 20 units totaling more than 14 gigawatts will reach EDL by the year 2010. Three basic options are available to nuclear utilities: (1) continued operation through nuclear license renewal beyond EDL; (2) shutdown and decommissioning at EDL; (3) continued operation through nonnuclear repowering. This paper briefly reviews license renewal and decommissioning issues. Its primary focus is on the feasibility of Option 3 by reviewing the conceptual technical requirements for nonnuclear repowering and its associated economics.

855 V18/021472

Organization of Work for Prevention of Propagation of Radioactive Contamination, for Decontamination of the Premise Surfaces and Individual Protective Means in Case of Radiation Accident

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Ministerstvo Zdravookhraneniya i Meditsinskoj Promyshlennosti, Moscow, Russian Federation; Vserossijskij Tsentr Meditsiny Katastrof Zashchita, Moscow, Russian Federation

INIS-RU-424; Medicine of Catastrophe, Eh.A. Nechaev (ed.), Zashchita, Moscow, Russian Federation, 248 pp.; (pp. 43-48) (1995)

Radiation accidents result in radioactive contamination of the surface, clothes and other property. Decontamination of surfaces is a complicated and tedious process. The paper examines the measures of organization and technical aspects of prevention of propagation of radioactive contamination. Methods of decontamination of internal surfaces of premises are demonstrated, and organization of the individual protective means is determined. (This document is in Russian).

856 V18/024198

Outline of the Japan Power Demonstration Reactor (JPDR) Decommissioning Project

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Genshiryoku Kogyo (Nuclear Engineering) 42(12):1-6 (December 1996)

The Japan Power Demonstration Reactor (JPDR) of the Japan Atomic Energy Research Institute (JAERI) is a light water reactor that carried out nuclear power generation in 1963 for the first time in Japan and has born an important role as the pioneer of nuclear power development till it finished operation in 1976. Thereafter, the policy of developing the technology required for the decommissioning of commercial reactors and carrying out the practical test of dismantling and removal by using the JPDR was decided. JAERI started the development of reactor-dismantling technology in 1981, and the dismantling of the JPDR in 1986. In the practical test of dismantling, various technologies have been verified, and the problems related to the dismantled radioactive waste have been solved. The work has been carried out safely, and the expected objectives were attained. All the work was completed by March, 1996. Tokai Power Station which has been operated smoothly for 30 years is expected to be stopped in March, 1998, and the decommissioning of a commercial power reactor has become a real problem. The course of construction, operation and reconstruction of the JPDR, the course of the dismantling project of the JPDR, the practical test of dismantling, and the results are described. (This document is in Japanese).

857 V18/024888

Outsider's View of Decommissioning

Wilkie, T.

The Independent Newspaper, London, United Kingdom
Nuclear Energy 35(5):345-347 (October 1996)

The point developed in this analysis is that decommissioning is not just a technical or even a financial issue. There is a deeper question, touching on the status of the nuclear industry as a whole, which underlies the particulars of decommissioning. There remain technical uncertainties which need addressing in the area of nuclear

decommissioning; but any engineering problem can be overcome if enough money is available. Waste disposal remains a key issue, as do financing and the credibility of financial forecasting. The British experience is presented as a case study in decommissioning issues.

858 V18/022868

Owners of Nuclear Power Plants

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Oak Ridge National Laboratory, Oak Ridge, TN

NUREG/CR-6500; ORNL/TM-13297; 65 pp. (November 1996)

Commercial nuclear power plants in this country can be owned by a number of separate entities, each with varying ownership proportions. Each of these owners may, in turn, have a parent/subsidiary relationship to other companies. In addition, the operator of the plant may be a different entity as well. This report provides a compilation on the owners/operators for all commercial power reactors in the United States. While the utility industry is currently experiencing changes in organizational structure which may affect nuclear plant ownership, the data in this report is current as of July 1996. The report is divided into sections representing different aspects of nuclear plant ownership.

859 V18/025346

Phase One Decommissioning of the Windscale Piles

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United Kingdom Atomic Energy Authority, Warrington,
Cheshire, United Kingdom

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (10 pp.) (1997)

The two Windscale Pile Reactors constructed between 1946 and 1950 operated as military and civil research reactors. Both operated until October 1957 when Pile One was shut down following a Core fire. These reactors are now being decommissioned by the United Kingdom Atomic Energy Agency with Department of Trade and Industry/Ministry of Defense funding. The current work plan encompasses the Phase One Decommissioning of both Piles One and Two. This is to enable a program of Phase Two dismantling of the Pile One reactor core and a fifty year care and maintenance regime for the Pile Two reactor to be put in place. This paper addresses Phase One decommissioning.

860 V18/024180

Physical Tasks in Preparation of Decommissioning and Dismantling of the Rossendorf Research Reactor

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 75-84) (November 1995)

The decommissioning of the WWER-M reactor facility is being prepared by the VKTA (Association for Nuclear Technology and Analytics). In this process, a series of questions in physics have to be clarified which are reported in this paper. These cover the calculation of the radioactivity inventory and the radiation doses which might be released in the disassembly of the facility from radioactive components. On the other hand, evidence must be given for the reactor facility's nuclear safety and radiation protection equipment, including its suitability for storing radioactive materials on site under all conditions, especially those of incidents and accidents. (This document is in German).

861 V18/022483

Pilot Dismantling of the BR3 Pressurized Water Reactor

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SCK/CEN, Mol, Belgium

Proceedings of the Fifth ASRR-V Asian Symposium on Research Reactors, Taejon, Korea, May 29-31, 1996; (pp. 651-659) (1996)

The BR3 reactor (Belgian Reactor number 3) is a small pilot PWR reactor with a thermal power output of 40 MW. It was started in 1962 and definitely shut down in June 1987. The reactor was originally used for training of operators of future power plant and then mainly used for research on new nuclear fuel types (e.g., MOX, Gadolinium containing fuel, high burnup, etc.) In 1989, the BR3 has been selected by the European Commission as one of the four pilot dismantling projects, in the framework of its five-year programme on decommissioning nuclear installations. The project started in 1989 and is still running now. The main operations performed were: the pre-dismantling full system decontamination by chemical process, the study and comparison of techniques for the dismantling of highly radioactive pieces and then the actual dismantling and evacuation of all the reactor internals, involving pieces with a specific activity as high as 4 Ci/kg. The project is also dealing with thorough decontamination of metallic pieces in view of their free release as non radioactive scrap metal and with the research on dismantling and decommissioning methods for activated and contaminated concrete. The evacuation ways of the irradiated exotic fuel of the reactor is also analysed and a solution for this fuel will be taken during the next few months. The paper will present the main results obtained during the first five years of the project; it includes the results and lessons drawn from the decontamination of the primary loop and from the remote underwater dismantling of highly radioactive internals. Important topics like the waste minimization, the dose uptake and the application of the ALARA principle will be highlighted. The research advances in the field of thorough decontamination processes and in the new dismantling methods for concrete will also be presented. This project dealing with a pilot reactor covers techniques and processes applicable for various kinds of research and small reactors. The paper will also present spinoffs of the project like the sampling of pressure vessel from a MTR reactor using methods and techniques developed for the dismantling of the internals. Future prospects of the project, like the remote dismantling of the pressure vessel will also be part

of the paper.

862 V18/025387

Plasma Arc Melting Treatment Process of Low Level Dry Active Waste

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Japan Atomic Power Company, Tsuruga Power Station, Fukui, Japan; Toyo Engineering Corporation, Chiba, Japan

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (10 pp.) (1997)

The Japan Atomic Power Company (JAPC) and Toyo Engineering Corporation (TEC) have developed an incinerating/melting process using the Plasma Arc Centrifugal Treatment process (PACT) for Low Level Dry Active (Miscellaneous Solid) Waste (DAW). We had supported tests of melting incombustible waste, tests treating organics which have high chlorine/sulfur content with controlling, together with incombustible waste, and tests certifying the proper characteristics of solidified slag and metal. JAPC placed an order with TEC for construction of an incinerating/melting facility using the Plasma Arc Centrifugal Treatment process (PACT developed by Retech, USA) in Tsuruga Nuclear Power Station because of its advantages in the progress of development and the highest treatment efficiency when compared with other plasma technologies in 1995. This paper shows the results of incineration/melting tests and explains the concept of our Plasma Arc Waste Volume Reduction Facility, for which engineering is on-going.

863 V18/022525

Possibility of Using HERV for Radioactive Contamination Mapping Before Decommissioning Research Reactors

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RECOM Limited of RSC Kurchatov Institute, Moscow, Russian Federation; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 654-657) (May 1996)

Short communication. No abstract available.

864 V18/024182

Possible Choice of Decommissioning Options for Reactor Compartments of Nuclear Submarines

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Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 67-73) (November 1995)

The important result of the dismantling of 132 Russian submarines is that the corrosion release of radionuclides in sea water in the worst case scenario of an accident is less than 10 Ci/year for the first year, and this value significantly decreases with time. The influx rate into the open sea environment is even less due to delay of nuclides in the primary circuit and some subsequent sorption of radionuclides. But even if one does not consider these effects, the water flux of 80 cu m/hour will be enough to dilute the nuclide concentrations to maximum permissible contamination (MPC) levels. Thus the radioecological danger, even in the worst case scenario, is practically absent. In this situation special chemical decontamination of the primary circuit is not needed. To reduce the levels of radionuclide release by several times as a result of decontamination is not necessary. Also not decontaminating will spare us the treatment of corresponding liquid radioactive wastes.

865 V18/025332

Post Operational Clean Out Success at BNFL Sellafield, United Kingdom

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

British Nuclear Fuels plc (BNFL) owns and operates the United Kingdom's nuclear fuel reprocessing facility at Sellafield on the West Coast of England. Several generations of plants have been operated to reprocess irradiated nuclear fuel over a period of time in excess of 40 years. Many of these early plants have now been taken out of service, but retain nuclear fuel and material inventory. This paper describes how BNFL developed and implemented strategies to clean out residual radioactive wastes from these obsolete plants in preparation for final decommissioning. The Magnox Fuel Storage and Decanning Plant is used as an example of how BNFL has applied an integrated strategy to the clean-up business. The objective is to carry out this work in a safe and economic manner within the overall site waste management program.

866 V18/022529

Post-Shutdown Inspections of Reactor Pressure Vessels of the Decommissioned Greifswald Nuclear Power Reactors: A Chance for Realistic Evaluation of Neutron Embrittlement Effects

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Forschungszentrum Rossendorf e.V., Institute fuer Sicherheitsforschung, Dresden, Germany; VTT

Manufacturing Technology, Espoo, Finland; Deutsches Atomforum e.V., Bonn, Germany; Kerntechnische Gesellschaft e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 734 pp.; (pp. 176-179) (May 1996)

Short communication. No abstract available. (This document is in German).

867

V18/024192

Potentials and Limits of Insitu Gamma Scanning Applied to Radiological Decontrolling Measurement of Soil and Concrete Structures

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 397-402) (November 1995)

Short communication. No abstract available. (This document is in German).

868

V18/025318

Practical Approach to the Unrestricted Release of Uncontaminated Waste Materials Arising from Nuclear Facilities

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BNFL Instruments Limited, Sellafield, Cumbria, United Kingdom

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

With current waste monitoring technology, it is reasonable to assume that much of the material designated as Low Level Waste (LLW), generated within nuclear facilities, is in fact uncontaminated. This may include operational wastes, soil and rubble, office wastes and discrete items for decommissioning or decontamination operations. The generation of a significant component of uncontaminated waste within the LLW stream represents a double penalty for the operator. Not only is disposal to a LLW repository considerably more expensive than to a municipal waste facility, but also the LLW repositories in all countries are limited in both volume and permissible radioactive inventory. By linking the skills of its operations, R&D and instrumentation teams, the British Nuclear Fuels Group is vigorously pursuing the elimination of much of this uncontaminated material from its LLW. Strategies for the identification and segregation of material suitable for unrestricted release are proposed in this paper. The

strategies are based on a multi stage monitoring process. Each set of circumstances is analyzed to establish the relevant mix of radionuclides and hence the appropriate monitoring technologies. Unrestricted release monitoring will be carried out at the final stage of the process and will be a confirmatory measurement on material which through earlier stages has shown a high probability of being uncontaminated.

869

V18/020657

Preparing a Decommissioning Plan for Reactors 1, 2, and 3 at Chernobyl

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AEA Technology, Harwell, United Kingdom; Commission of the European Communities, Brussels, Belgium; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 79-87) (1995)

The objectives of a CEC-TACIS project to prepare a decommissioning plan for reactors 1, 2 and 3 at Chernobyl are outlined. The resultant activities are then described by summarizing the description of the site, decommissioning considerations, work program, project management, and the structure of the decommissioning plan. Important interfaces are noted including Ukrainian organizations and liaison with two other CEC-TACIS projects relating to Chernobyl. The paper concludes with a brief comment on possible future activities arising from this project.

870

V18/023688

Price-Anderson and Indemnity Issues During Decommissioning - New Rulemaking

Markley, A.W.

U.S. Nuclear Regulatory Commission, Washington, DC

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (14 pp.) (1996)

This presentation discussed the following: (1) The indemnity issue: How much and what types for permanently shutdown reactors? (2) Price-Anderson indemnity requirements; (3) Status of Price-Anderson exemptions and relief; (4) Onsite indemnity requirements; (5) Status of onsite indemnity exemptions and relief; (6) Considerations for new rule requirements; (7) Scenarios for new rule requirements.

871

V18/020887

Proactive Decommissioning Control

Mingst, B.C.

Meta, Inc., Nevada City, CA

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL,

April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 282-286) (1996)

Nuclear facilities have watched decommissioning cost estimates go from \$30 million to over \$400 million in 20 years. Can the industry control decommissioning costs over the next 15 to 30 years? The only way to control future decommissioning costs is to look at significant contributors to decommissioning costs to find out what is most significant and most changeable. This paper examines the impact of various changes in waste generation, waste disposal, regulations, resource costs, technology, and shutdown timing. This kind of analysis allows individual utilities and the industry to take action to either modify or to prevent modification of the decommissioning process. Where do we focus our efforts and how much effort should we expend?

872

V18/024193

Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report, Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995

Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp. (November 1995)

The Federal Ministry of Education, Science, Research and Technology (BMBF) currently supports and supervises 10 large-scale projects in the field of nuclear installations decommissioning, as well as several small-scale projects for decommissioning of nuclear pilot plants or experimental facilities. The spectrum of work performed under these projects ranges from safe isolation of radioactive materials and plant components from the biosphere to complete dismantling of the plant and creation of a "green field" site. The papers of this colloquium discuss aspects and the current state of progress of these activities. The Niederaichbach project is the large-scale project that successfully has proven the feasibility of decommissioning strategies and methods covering the whole range of tasks involved, showing that conversion to "green field" site is achievable without adverse effects on man and the environment. The project likewise has been giving impetus to further development and new applications of decommissioning techniques, particularly relating to remote-controlled manipulators. The successful performance of the Niederaichbach project to a large extent is due to the excellent and focussed preparation of the legal basis for licensing of decommissioning activities under atomic energy law by the Bavarian State Government, which hopefully will set a good example to be followed by other State Governments. (This document is in German).

873

V18/024203

Process and Device for Dismantling and Removing the Irradiated Internal Equipment from a Nuclear Reactor

Jacquier, P.

FRAMATOME, Paris-la-Defense, France

French Patent FR 2724755; 38 pp. (March 22, 1996)

In order to dismantle and remove the internal equipment of a nuclear reactor for subsequent inspection, repair or replacement, a closed tight vessel is built in the pool around the internal equipment. The enclosure includes a cutting tool. The internal equipment is then cut into two or more pieces, which are subsequently placed in transfer containers, thus reducing the volume of polluting products produced during the dismantling phase, avoiding contaminating the reactor building atmosphere, and reducing the shutdown duration. (This document is in French).

874

V18/020818

Process for Dismantling Buried Unsheltered Equipment Which is at Risk of Contamination and Possibly is Irradiating, and a Vessel for Implementing this Process

Bodin, F.; Saublet, J.C.

Compagnie Generale des Matieres Nucleaires (COGEMA), Velizy-Villacoublay, France

U.S. Patent 0527887; 13 pp. (January 11, 1994)

This patent information describes a process for dismantling equipment that is buried, unsheltered, at risk of contamination and possibly is irradiating, and a vessel for implementing this process. According to the invention, buried equipment at risk of contamination, for example, an off-line effluent pipe, is dismantled in sections under cover of a movable vessel placed above the section to be dismantled. The invention also concerns a vessel that has a self-supporting structure built around a deck equipped with an elongated central opening giving access to the section to be dismantled.

875

V18/021176

Process for Dismantling an [sic] Used PWR Steam Generator

Dubourg, M.

FRAMATOME, Paris-la-Defense, France

French Patent FR 2710182 A; 22 pp. (September 16, 1993; March 24, 1995)

The dismantling process is comprised of three stages: (1) decontamination of the inner surface of the primary circuit by a strong acid containing Cerium-IV; (2) cutting at three positions to separate the steam dryers, the tubes, the tube plate and the water box; (3) recovering valuable decontaminated materials and then recycling these materials by melting. To facilitate cutting of the thin tubes, water is frozen just above the tube plate and a band saw cuts smoothly through the ice metal section. 5 figs. (This document is in French).

876

V18/021478

Progress Report 1994 [CEA-Directorate of Waste Management]

Commissariat a l'Energie Atomique, Centre d'Etudes de Fontenay-aux-Roses, Fontenay-aux-Roses, France

CEA-RA-1994; 101 pp. (1995)

This document is the 1994 annual progress report of the CEA-Directorate of Waste Management (DGD). It comprises four chapters. The first chapter is a general presentation of radioactive wastes, of the management of liquid effluents, solid wastes, sealed sources, of the relations with the ANDRA (The French Agency for the Management of Radioactive Wastes), and of the research and development studies in progress for the improvement of waste management. The second chapter concerns the spent fuels and their reprocessing, in particular AGR and PWR type reactor fuels, the "Caramel" fuel from Osiris reactor and the cover elements from the Rapsodie reactor core. The long time storage of ancient fuels is also discussed. The third chapter concerns the dismantling of decommissioned installations, the actions in progress and the planning of dismantling actions up to the year 2000. Chapter four is devoted to the management of wastes from the Directorate of Military Applications (DAM), the actions in progress in the different DAM centers and the cleansing projects at Marcoule plant. (This document is in French).

877

V18/024202

Progress in the Decommissioning of the AVR Experimental Nuclear Power Station

Wimmers, M.; Storch, S.

Arbeitsgemeinschaft Versuchs-Reaktor GmbH, Duesseldorf, Germany; Forschungszentrum Juelich GmbH, Juelich, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 97-108) (November 1995)

Disposal of spent fuel elements by interim storage in various facilities of the Juelich Research Centre (KFA) until they may be stored in CASTOR THTR/AVR containers is done by KFA within the framework of the corresponding contracts. In March 1994, the first fuel elements were unloaded during the first stages of decommissioning. In the meantime, up to approximately 35% of the reactor core has been unloaded. In September 1994, we were able to start with the work of decommissioning the reactor which was scheduled parallel to loading/unloading the fuel elements outside of the reactor building, primarily in the machine room. First of all, the parts of the facility which were to be disassembled were shut down and isolated. Disassembly work is continuing. (This document is in German).

878

V18/023989

Progress of JPDR Decommissioning Program: Fifteenth Progress Report (Final Issue) - April 1995-March 1996

Japan Atomic Energy Research Institute, Tokai Research Establishment, Ibaraki, Japan

Report; 30 pp. (August 1996)

This report, the fifteenth progress report for the Japan Power Demonstration Reactor (JPDR) decommissioning program, describes the JPDR dismantling progress and the related development of reactor decommissioning technology. The reporting period is April 1995 through March 1996. During this period, the reactor enclosure, auxiliary buildings, and the main stack were dismantled, and the site was landscaped. Chapter 2 of this report describes these activities and summarizes radiation control and waste management efforts. As an important activity related to the dismantling work, a safety demonstration test for near-surface disposal of very low-level concrete waste generated from the JPDR dismantling was begun. Chapter 3 outlines this demonstration test. Since the dismantling of JPDR has been completed, this will be the last progress report. Chapter 4 summarizes the entire JPDR decommissioning program, and the Appendix lists the titles of the topics reported in the past progress reports.

879

V18/024201

Progress of the Decommissioning Activities at the Karlsruhe Multipurpose Research Reactor (MZFR)

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 123-135) (November 1995)

The disassembly of contaminated facility components began with the 4th partial permit for decommissioning the Multipurpose Research Reactor, which was issued in May of 1994. The D2O tower building component with the D2O enrichment plant, was completely cleared out. In the cooling pond house, the facilities for fuel element handling and the cooling cycles were dismantled and disposed of. In order to reduce operating costs, the electric power supply was simplified. The 6 kV installation was dismantled including transformers and control boxes. The large-scale transformers and the concrete structures belonging to it have been removed or pulled down. The primary and secondary systems were decontaminated to reduce the dose rate for subsequent manual dismantling of the components. (This document is in German).

880

V18/020889

Projecting the Costs of Low Level Disposal for Decommissioning Waste

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Vance & Associates, Inc., Ruidoso, NM

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 289-294) (1996)

The cost for the disposal of plant construction materials from

nuclear plant decommissioning as low level waste represents a significant fraction of the estimated total decommissioning cost. For most plants, decommissioning is expected to take place several years in the future, thus requiring a projection of the disposal charge that is most likely to represent the actual disposal charge at the time of decommissioning. However, there is considerable uncertainty in the future availability of disposal capacity, and correspondingly, in the associated disposal charge. The existing disposal facility (Barnwell) currently available to most utilities has been closed, then re-opened and its future status is unpredictable. No new facilities have yet been licensed although considerable time, effort and money have been expended in an attempt to license six or seven new facilities in regional state compacts. There is considerable speculation on the magnitude of future disposal charges, however, most have no basis other than the fast held belief that disposal charges in the future will be greater than the current charges. There may be several approaches that could be used to project a reasonable disposal charge for the future disposal of decommissioning waste. However, the approach described in this paper provides a prudent and credible basis for the projections. It can be used to develop projections of disposal charges for a different number of new disposal facilities or a variety of state compacting configurations to investigate a range of likely future changes.

881 V18/021163

Proposed Radiation Hardened Mobile Vehicle for Chernobyl Dismantlement and Nuclear Accident Response

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UCRL-JC-119456; CONF-950232; Proceedings of the Sixth American Nuclear Society (ANS) Topical Meeting on Robotics and Remote Systems, Monterey, CA, February 5-10, 1995. ANS, La Grange Park, IL; (6 pp.) (January 1995)

Researchers are developing a radiation hardened, Telerobotic Dismantling System (TDS) to remediate the Chernobyl facility. To withstand the severe radiation fields, the robotic system will rely on electrical motors, actuators, and relays proven in the Chernobyl power station. Due to its dust suppression characteristics and ability to cut arbitrary materials the authors propose using a water knife as the principle tool to slice up the large fuel containing masses (FCMs). The front end of the robot will use a minimum number of moving parts by locating most of the susceptible and bulky components outside the work area. Hardened and shielded video cameras will be designed for remote control and viewing of the robotic functions. Operators will supervise and control robot movements based on feedback from a suite of sensory systems that would include vision systems, radiation detection and measurement systems and force reflection systems. A gripper will be instrumented with a variety of sensors (e.g. force, torque, or tactile), allowing varying debris surface properties to be grasped. The gripper will allow the operator to manipulate and segregate debris items without entering the radiologically and physically dangerous dismantlement operations area. The robots will initially size reduce the FCM's to

reduce the primary sources of the airborne radionuclides. The robot will then remove the high level waste for packaging or decontamination, and storage nearby.

882 V18/020720

Radiation Factors Specifying Safety in Reactor Compartments Handling in the Process of Decommissioning Nuclear-Powered Submarines

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Research and Development Institute of Power Engineering, Moscow, Russian Federation

CONF-960306 (Vol. 3); ICONE-4 (Vol. 3), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Safety and Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 3, 595 pp.; (pp. 21-26) (1996)

The main problems arising in decommissioning nuclear-powered submarines (NPS) relate to choosing a concept of handling reactor compartments followed by handling technology development. Reactor compartments (RC) are characterized by extremely space-saving or integral layout of large-size power equipment and systems, restricted access for dismantling, high radiation dose rates in a number of bays of RC. The above RC features pose a problem to find the optimum option of RC utilization, which on the one hand would be the most cost efficient, and the safest possible on the other; i.e., dose commitments of personnel involved should be minimum, and effect on population and environment should be negligible. The main radiation factors specifying safety in RC handling at any decommissioning stage are as follows: (1) total radioactivity integrated in reactor facility (RF); (2) distribution of this radioactivity through RF equipment and structures; (3) forms in which the radioactivity exists; (4) radionuclide composition and time decay of radioactivity integrated in RF; (5) radiation conditions at an NPS and dose commitments when performing work; (6) possible radioactive wastes; (7) influence of the technology chosen on population and environment. The radiation factors under consideration have been the basis to develop a RC handling concept for NPS decommissioning.

883 V18/021473

Radiation Safety of Dismantling When Nuclear Power Plant Decommissioning

Bylkin, B.K.; Tsypin, S.G.; Khrulev, A.A.

Atomnaya Tekhnika za Rubezhom 5:9-22 (May 1995)

Decommissioning NPPs and nuclear facilities is an inevitable finishing stage of their life cycle. The procedure of disassembling reactors and reactor equipment and management of radioactive wastes formed is the most dangerous one from the viewpoint of radiation impact on the personnel, population and environmental medium. Various versions of decommissioning and disassembling strategy applied in foreign countries, as well as classification, criteria and requirements of various methods of destruction and cutting used by disassembling nuclear facilities, are considered. Concrete examples of nuclear facility disassembling are discussed. (This document is in Russian).

884

V18/022985

Radiation Survey for Verification Inspection for Decommissioning Project for a Nuclear Facility

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Radiation Protection (Taiyuan) (Fushe Fanghu) 16(4):277,290-296 (July 1996)

Various aspects of radiation surveying for verification inspection are described for a decommissioning project for a nuclear facility. Included are the function and organization of verification inspection group and the standards and implementation of the verification inspection. The summary results of the radiation survey are also given. (This document is in Chinese).

885

V18/020724

Radical Approach to Decommissioning and Nuclear Liabilities Management

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CONF-9509314; Managing Nuclear Liabilities: Proceedings of a Conference, Manchester, United Kingdom, September 20-21, 1995; Nuclear Energy 35(2):123-128 (April 1996)

The United Kingdom Atomic Energy Agency (UKAEA) Government Division has been set up primarily to manage and eventually eliminate the nuclear liabilities left from the many national nuclear programs in which UKAEA has been involved. It is no longer primarily a nuclear plant or decommissioning operator but has developed a radical approach to decommissioning. It targets best value for money, alongside meeting safety and environmental requirements, by major use of contractors for its work, including using them as managing agents for big projects. In its first year of operation it made considerable progress in setting out the mission, goals, performance measures and operational principles for such an organization, as well as in reducing costs on a wide front from those expected, in increasing competition for future projects, and in keeping individual projects under good control. It also made major physical progress with specific decommissioning projects. For the future it has established a program of continuous performance improvement which will bring further benefits and provide a benchmark for all organizations in the business of liabilities management.

886

V18/022853

Radioactive Contamination in Concrete/Mortar, Metal-Pipe and Area-Soil of JPDR

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Journal of the RANDEC 15:59-69 (December 1996)

Radioactive contamination was measured to study the separation between contaminated and non-contaminated parts in structural materials of JPDR. The materials are the building concrete/mortar,

the metal-pipe, and the area-soil. In addition to the measurement, diffusion behavior in the concrete/mortar was also studied on two kinds of radioactive elements, Co-60 and Cs-134. It was known that the contamination in the concrete and the soil have penetration depths over which the radioactivity can not be detected any more. The metal-pipe was easily decontaminated by the electrical decomposition in phosphoric or sulfuric acid solution. The results obtained from the study indicate that the contaminated part in the decommissioning wastes of the reactor can be safely separated from the non-contaminated.

887

V18/024225

Radioactive Inventory in Structural Materials of ET-RR-1 Reactor and Its Implication on Decommissioning

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INIS-EG-001; CONF-9411323; Proceedings of the Second Arab Conference on the Peaceful Uses of Atomic Energy, Part II:A and B, M.F. Barakat and S.M. El-Mashri (eds.), Cairo, Egypt, November 5-9, 1994, 1199 pp.; (p. 135) (October 1995)

A plan for decommissioning of ET-RR-1 reactor should include estimation of radioactivity in structural materials. The inventory will help in assessing the radiological consequences of decommissioning. Conservative calculations have been made to evaluate the activity of the long lived isotopes which can be produced by neutron activation. The materials which are present in significant quantities in the reactor structural materials are aluminium, cast iron, graphite, ordinary and iron shot concrete. The radioactivity of each component is dependent not only upon the major elements, but also on the concentration of the trace elements. The main radioactive inventory are expected to be from Co-60 and Fe-55 which are present in aluminum as trace elements and in larger quantities in other construction materials.

888

V18/024179

Radioactivity Limits and Decontrolling Measurements and Monitoring in the Rehabilitation of an Area Contaminated by Natural Radionuclides

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 367-372) (November 1995)

Consistent implementation of the 10 uSv concept in the rehabilitation of ground contaminated by naturally occurring radioactive materials leads to release limits for specific activity which are below the natural content of these radionuclides in the soil. Therefore, a release limit was selected in the procedure presented in the paper which, in deviation from the 10 uSv concept, is guided by the natural background. In this case, a release limit of 25 Bq/kg was established for the specific activity of Th-232. The advantages and disadvantages of the procedure are described, as well as the measuring activities for decontrol and rehabilitation. (This document is in German).

889 V18/022119

Radiological Optimization: 1995 Scientific Report of the Belgian Nuclear Research Centre

Zeevaert, T.

Centre d'Etude de l'Energie Nucleaire, Mol, Belgium
INIS-mf-14878; 138 pp. (pp. 90-91) (1996)

Radiological optimization is one of the basic principles in a radiation-protection system and it is a basic requirement in the safety standards for radiation protection in the European Community. The objectives of the research performed in this field at the Belgian Nuclear Research Centre (SCK-CEN) are: (1) to implement the as low as reasonably achievable (ALARA) principles in activities with radiological consequences at the local SCK-CEN level and at the regional and international level; (2) to develop methodologies for optimization techniques in a decision-aiding framework; and (3) to investigate existing software programs in the domain of multi-criteria analysis. The main achievements for 1995 are given.

890 V18/021155

Radiometric Tools for Decommissioning

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Nuclear Europe Worldscan 16(3-4):51-52 (1996)

The family of radiometric tools described in this article have been an integral part of BNFL's plutonium facility decommissioning operations for several years. The information provided by these systems has allowed decommissioning managers and engineers to successfully plan and execute extensive programs within redundant plutonium facilities. Development work now continues to further enhance the capabilities of current systems, and new technologies are being developed to allow accurate and reliable assay of decommissioning waste for unrestricted release.

891 V18/020660

Radwaste Vault Clearance at Vandellos 1 Reactor (Spain)

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Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 237-243) (1995)

Vandellos 1 is a 480 MWe graphite moderated reactor which was closed in 1989 after a fire in the high pressure turbine. Prior to dismantling, defuelling and conditioning of the wastes produced during operation were required by the authorities. Defuelling has already been completed and some of the waste treated. The principal remaining wastes are: 200,000 graphite sleeves, with associated activated stainless steel components; drums of compactable waste in containers; and 492 absorbers. This waste is contained in concrete vaults with access through their roofs. A removal concept was devised which entails inserting a long-reach manipulator into the access hole of each vault and using this to fill a basket lowered into the vault through an adjacent hole. Once filled the basket is lifted up into a transport container and transferred by overhead crane to the waste conditioning unit at the end of the line of vaults. The implementation of this concept by the contractors, the design of the manipulator system and the waste processing plant, are described. Active commissioning of the system and plant is now under way.

892 V18/023365

Reactive Adsorption: A Cleaner Technology in Nuclear Power Plants

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CONF-960730 (Vol. 3); Technologies Critical to a Changing World, Volume III: Emerging Energy Technologies, Clean Technologies, Remediation and Emission Control Fuels, and Petrochemicals, Proceedings of the Fifth World Congress of Chemical Engineering, San Diego, CA, July 14-18, 1996. American Institute of Chemical Engineers, New York, NY, Vol. 3, 1118 pp.; (pp. 254-259) (1996)

Cleaner technology works with minimal loss, and the wastes cause less environmental damage. In the present paper reactive adsorption is investigated for the removal of radioactive nuclides from nuclear power plant decontamination solutions. During alkaline, oxidative decontamination of nuclear power plant equipment, a radioactive solution is produced. Owing to the difficulties of storing radioactive solutions it is necessary to develop a method for the in situ treatment of radioactive, alkaline, oxidative decontamination solutions, and for the concentration of radioactive components. Reactive adsorption seems to be promising for this purpose.

893 V18/024211

Reactor Cleanup Devices

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Hitachi Engineering Company Limited, Ibaraki, Japan;
Hitachi Limited, Tokyo, Japan

Japanese Patent 8-304587; 5 pp. (November 22, 1996)

The ratio of cation conductivity/anion conductivity is calculated based on data for conductivity and pH of reactor water as a measure

of the ion composition of the reactor water. Powdery or fibrous ion exchange resins corresponding to the ratio are pre-coated to a reactor water filtration desalting device. In addition, operation control, such as preparation of back wash, is rationalized by evaluating the water collecting lifetime of the pre-coated ion exchange resins. Namely, the ion exchange resins are pre-coated optimally to increase the water collecting amount per one pre-coating thereby reducing increase of radioactive wastes. Then, since appropriate filtration aid is provided depending on the characteristics of the reactor water, the pre-coating ratio namely, an ion:cation ratio can be determined to 1:8 or 8:1. Compared to a conventional 1:1 pre-coating ratio, and the water collecting life time can be extended by more than two times. As a result, the amount of wastes of relatively highly radioactive ion exchange resin after processing reactor water directly by the ion exchange resins can be reduced to less than 1/2. (This document is in Japanese).

894 V18/021021

Reactor Hall Decontamination at the A-1 Nuclear Power Plant, Bohunice, Slovakia

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (15 pp.) (1996)

The reactor hall at A-1 Nuclear Power Plant at Bohunice became contaminated as a result of incidents both before and after reactor closure in 1979. In particular, a recent spillage of corrosion inhibiting solution led to wide spread contamination in the hall. Liquid also seeped into storage holes, a trench, and into rooms below the hall. Radiation levels of up to 1 Sv/hr are present in some areas. A decontamination plan and safety case were prepared by AEA Technology (AEAT) on behalf of Slovenske Elektrarne (SE), the utility responsible for A-1. AEAT were also awarded the contract to manage the project including the supply of specialists and key decontamination and robotic equipment. SE are responsible for providing labor, materials and decontamination reagents. The work is divided into three tasks: (1) decontamination of the reactor hall where contamination levels are relatively low; (2) decontamination of a specific area in the reactor hall which is highly contaminated; and (3) decontamination of the rooms below the hall where contamination levels are very high. The aim of the project is to reduce contamination and radiation levels to permit decommissioning operations in the reactor hall to resume. Decontamination of the hall is now complete, together with three cranes and various fuel handling machines. Most work up to this point has been carried out manually, either by industrial mountaineers working from ropes, or reactor staff working from a cradle suspended from an overhead crane. Lower levels were decontaminated by hand from platforms. Reagents were applied by hand and a number of reagents were developed by SE and used with great success. High radiation and contamination levels in one area have necessitated local containment and remote decontamination methods. An area is now enclosed by a MODUCON temporary containment and decontamination is being carried out using an ARTISAN manipulator working through the containment wall.

MODUCON and ARTISAN units were supplied and installed by AEAT. Decontaminating such a large and complicated facility is a very demanding task, and the high radiation areas are particularly challenging. However, close co-operation between AEAT and SE has enabled the problems to be overcome and the project is now 1 year into the program.

895 V18/022472

Recent Development of Decontamination and Recycling Technologies for Decommissioning

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Cooperative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installations Decommissioning Projects, Proceedings of the 13th Meeting of the Liaison Committee, Paris, France, November 2-3, 1994. International Atomic Energy Agency, Vienna, Austria, 1994; (22 pp.) (1994)

The recent development of a regenerative low oxidation state metal ion (LOMI) decontamination technology at Korea Atomic Energy Research Institute (KAERI) is introduced. The regenerative LOMI decontamination technology development is in the final completion stage. Also the progress and prospects on recycling technologies for decommissioning are presented. The development of recycling technologies for decommissioning is in an initial stage in Korea. The regenerative LOMI decontamination is a state-of-art decontamination technology. The implementation of this technology is expected to result in a remarkable reduction of decontamination waste in comparison with that of the existing LOMI and thereby to have a great commercial applicability especially for the decontamination of primary coolant systems of Nuclear Power Plants (NPP). Recycling and reuse of radwastes are a very promising field for the improvement of the current practices in radwaste management, especially in decommissioning. Many efforts have been made recently to develop the technology further and to widen its application to non-nuclear fields, for example the Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA) Coordinate Project and a multinational decommissioning project of retired Russian nuclear submarines. The needs for decommissioning of nuclear facilities have been increased in recent years in this country. Two TRIGA type research reactors at KAERI are waiting for decommissioning. A decommissioning study has been ongoing since 1993 to establish the decommissioning policy for nuclear power plants in Korea and to develop a cost estimation computer code for NPP decommissioning.

896 V18/024175

Recent Developments Relating to Radioactivity Measurements on Buildings for Exemption from Regulatory Control

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 373-384) (November 1995)

Studies on the radiological evaluation of building rubble and structures of nuclear reactors for decontrolling purposes have been previously carried out. It is now possible to use the results and data obtained for establishing a reference guide for decontrolling practice. It is necessary to derive standard values which are backed by radiological measurement for the procedure of decontrolling measurements on a patchwork of building surfaces, if necessary on the basis of a larger average surface, in order take into account developments in the area of detectors as well as the fact that larger building surfaces are to be measured and evaluated. In the paper an overview is given on the methodology of deriving release limits and of implementing recommendations of the SSK (Radiation Protection Commission). Subsequently, a current research project is explained whose goal is to link the methodology of measuring with radiological evaluation. (This document is in German).

897

V18/025348

Recycling and Waste Management Related to Decommissioning: German Experiences and Concepts

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (11 pp.) (1997)

Completed and ongoing decommissioning projects in the Federal Republic of Germany are discussed from a regulatory point of view. Eighteen nuclear power plants, including prototype facilities as well as six research reactors and three fuel cycle facilities, have been shut down and are at different stages of decommissioning. Only recently the final "green field" stage of the Niederaichbach Nuclear Power Plant total dismantlement project has been achieved. For all decommissioning projects the existence of appropriate criteria for waste management as well as for recycling and reuse are essential. To achieve an optimized solution of the overall material management problem, options for radioactive waste management, options for recycling and reuse and, last but not least, options for disposal of the material as non-radioactive waste should be considered. Recent developments in this field are described. In addition, aspects of final disposal of radioactive waste relevant to decommissioning of nuclear installations are addressed in more detail.

898

V18/025307

Recycling of AECL's Contaminated Stainless Steel Fuel Baskets at Manufacturing Sciences Corporation

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Corporation, Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

The decommissioning of the NRX research reactor at Atomic Energy of Canada Ltd. (AECL) Chalk River Laboratories (CRL) included the removal of 200 stainless steel fuel transfer baskets from the spent fuel bays in late 1995. The baskets, which weighed approximately 8000 kg, were surface contaminated with both alpha- and beta/gamma-emitting radionuclides, but had not been activated or volumetrically contaminated. A decision matrix was used to evaluate the options for the storage and disposal of these baskets, including two proposals for the recycling of the baskets. The evaluation was based primarily upon potential for future cost avoidance, contamination, dose, cost, volume reduction, and generation of secondary wastes. Recycling at Manufacturing Sciences Corporation (MSC) was chosen as the preferred method for the disposition of the baskets. A radiological analysis of the baskets was conducted, and the inventory of radionuclides estimated. The baskets were shipped to MSC in Oak Ridge, Tennessee, in March 1996. The shipment was classified as Radioactive Materials, Class 7 Dangerous Goods, Surface Contaminated Objects (SCO-II). The shipment required two 72.5 cubic meter marine shipping containers. Based on external gamma dose rate, the shipment was classified as Radioactive Yellow. Regulatory approval for the shipment, including an export permit, was obtained from the Atomic Energy Control Board (AECB). After acceptance at MSC, the baskets were given an initial treatment in the chemical decontamination bath, and then sectioned using plasma cutting in the receiving area for special shipments. The sectioned baskets were then sent for chemical decontamination, and monitored to identify material that met the applicable criteria for free release to the open metals market. About 4% of the material was free released. The remaining contaminated stainless steel will be melted in MSC's vacuum induction furnace and formed into ingots. The ingots will be rolled and used to manufacture stainless steel drums. The volumetric contamination level of radionuclides in the manufactured drums will be determined. The containers will be returned to AECL prior to June of 1997.

899

V18/025393

Recycling of Decommissioning Waste - JAERI's Perspective After JPDR Decommissioning

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Dismantling of the Japan Power Demonstration Reactor (JPDR) generated about 3,770 tons of low level radioactive solid waste. After the completion of the JPDR decommissioning, future possibility of the recycling of a part of low-level waste (LLW) generated is being discussed, in conjunction with JAERI's recent activities on melting tests, feasibility study of the recycling system, and the development of new volume reduction facilities at the

Tokai site. Controlled recycling within the nuclear facility will be favored as a first step of realization of slightly contaminated materials, for demonstration of waste volume minimization and safe management of the waste. Equipment for waste management such as containers will be primary candidates for recycling of radioactive metallic materials to be used in JAERI.

900

V18/020932

**Recycling of Material from Nuclear Installations
Activities of the European Commission and the OECD
Nuclear Energy Agency**

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CONF-960212; Waste Management '96: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
February 25-29, 1996; (17 pp.) (1996)

The recycling of contaminated material could be a major means of reducing the quantities of low level waste produced by the decommissioning of nuclear facilities. Both the European Commission (EC) and the OECD Nuclear Energy Agency (NEA) have been working on this subject during the last few years. The European Commission has sponsored research and development on the reuse and recycling of low level solid waste materials originating from the decommissioning of nuclear installations, within the framework of three sequential five year research programs, the first of which started in 1979. A series of R & D projects were carried out on the reuse and recycling of various materials originating from the refurbishing/dismantling (steel, copper, aluminum and concrete). Particular progress was made for the recycling of LLW steel, using the melt technique not only for volume reduction but also for the production of specific items for the nuclear industry. The EC has also set up, under the terms of Article 31 of the Euratom Treaty, a group of experts to examine the implications for radiation protection of recycled materials from nuclear installations with a view to establish appropriate recommendations for clearance levels. First recommendations issued in 1988 (Radiation Protection Series No. 43) relate to the recycling of radioactive steel. Further recommendations for metals, including copper and aluminum are under preparation. A similar document for concrete is intended. A task group set up by the OECD/Nuclear Energy Agency's Co-operative Programme on Decommissioning has been studying recycling during the last three years. It has noted that considerable material is being released from regulatory control today, but mostly on a case-by-case basis, with widely varying release criteria in different countries. Both the EC recommendations for release criteria and those proposed by the International Atomic Energy Agency are essentially based on radiation protection considerations. The NEA task group has attempted to view recycling in a broader context, evaluating both radiological and non-radiological detriments as well as social, economic and environmental aspects. This is seen to be fully in harmony with the ICRP concept that the justification of a practice should take into account the total detriment and not only the radiation detriment. This approach has led to the consideration of a tiered system of clearance levels, allowing a more rational material management, where release levels

would depend on whether the materials were being released directly, sent for melting, melted in controlled facilities before release for remelting or reused for specific purposes etc. Both the EC and the NEA see the need for internationally agreed clearance standards, specially when much larger quantities of material become candidates for release, when today's operating reactors come to the end of their useful lifetimes.

901

V18/025309

Recycling of Metals in Practice: Commercial Experience

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National Waste Management Corporation, Farragut, TN

CONF-970335; Waste Management '97: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
March 2-6, 1997; (9 pp.) (1997)

The development of recycling techniques for radioactive scrap metals (RSM) has led to the availability of products for use by commercial companies and utilities. These products include shielding blocks, boxes and drums for radioactive materials and components for specialized applications. RSM is also recycled into non-nuclear applications for general recycling as scrap, particularly for high value metals like nickel, copper, aluminum, and stainless steel. The paper describes the commercial experience of nuclear utilities in the generation and management of RSM based on a 1997 survey of roughly half of the industry. Recommendations for future uses and potential applications of recycled metals will be discussed. The results of this study indicate that the industry has been recycling RSM to the scrap market for decades and that development of a commercial RSM products industry will be largely based on the cost of the RSM products.

902

V18/025849

**Recycling of Radioactive Scrap Metal by Producing
Concrete Shieldings with Steel Granules**

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Germany

CONF-961103; Decommissioning, Decontamination, and
Reutilization Worldwide Experience: DD&R, What Does It Mean,
M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of
an Embedded Topical Symposium of an American Nuclear Society
Winter Meeting, Washington, DC, November 10-14, 1996.
American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp.
249-254) (1996)

Decommissioning of nuclear facilities leads to increasing amounts of radioactively contaminated metals. Only a small portion of this material may be recycled for use in conventional applications due to its chemical composition. In particular, scrap with high chromium and/or nickel content is not suitable for the production of high-quality shielding containers, as these elements reduce material toughness. Alternatives for recycling have to be found. One method is based on the melting process which has been applied at Siempelkamp foundry for several years. Granules are produced from the molten metal scrap, which are then used for the production of

shielding components from steel granule concrete.

903 V18/024213

Reduction of Emission When Applying Thermal Separation Processes in the Dismantling of Nuclear Facilities - Oxy-Fuel Gas and Plasma Arc Cutting

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 251-264) (November 1995)

Plasma arc cutting and laser beam cutting were used for the studies with the goal of significantly reducing material emission by changing the operating and equipment parameters. Some separations using the oxy-fuel gas cutting process served the purpose of providing a guide for determining which factors can most effectively reduce emission. The separation experiments were carried out with specimens of R-St 37-2, 10 mm thick, as well as of X 6 CrNi 18-10 steel 5, 10, 15 and 20 mm thick. In all cases, lowering speed and the amount of gas proved to be effective measures to check material emission. It was also possible to achieve adherence of molten mass and slag on the flank of the joint with excessive icicling. When the plasma separates the CrNi steel, it is possible to increase emission reduction additionally by using an argon/hydrogen mixture instead of nitrogen as a cutting gas. (This document is in German).

904 V18/025366

Regulation of Groundwater Contamination at Decommissioning NRC-Licensed Facilities

Parrott, J.D.

U.S. Nuclear Regulatory Commission, Division of Waste Management, Washington, DC

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Radionuclides contaminate groundwater at certain U.S. Regulatory Commission-licensed facilities undergoing decommissioning. For these sites, NRC generally has only guidance (as opposed to regulations) for "decommissioning" contaminated groundwater. Recently, it has proposed new dose-based release limits for decommissioning sites as part of a rulemaking regarding decommissioning criteria. Because the proposed rulemaking specifically identifies groundwater as an exposure pathway of concern, groundwater contamination at NRC-licensed sites undergoing decommissioning will be specifically regulated once the rule becomes final. The specific regulation of contaminated

groundwater at decommissioning sites will help to clarify the requirements for decommissioning these sites.

905 V18/020651

Regulatory Experience in Nuclear Power Station Decommissioning

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Her Majesty's Nuclear Installations Inspectorate, Health and Safety Executive, London, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom
CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 159-168) (1995)

In the United Kingdom (UK), decommissioning of a licensed nuclear site is regulated and controlled by Her Majesty's Nuclear Installations Inspectorate on behalf of the Health and Safety Executive. The same legislative framework used for operating nuclear power stations is also applied to decommissioning activities and provides a continuous but flexible safety regime until there is no danger from ionizing radiations. The regulatory strategy is discussed, taking into account government policy and international guidance for decommissioning and the implications of the recent white paper reviewing radioactive waste management policy. Although each site is treated on a case by case basis as regulatory experience is gained from decommissioning commercial nuclear power stations in the UK, generic issues have been identified and current regulatory thinking on them is indicated. Overall it is concluded that decommissioning is an evolving process where dismantling and waste disposal should be carried out as soon as reasonably practicable. Waste stored on site should, where it is practical and cost effective, be in a state of passive safety.

906 V18/021491

Regulatory Issues in Decommissioning

Willby, C.R.

Her Majesty's Nuclear Installations Inspectorate, Health and Safety Executive, London, United Kingdom

CONF-9509314; Managing Nuclear Liabilities: Proceedings of a Conference, Manchester, United Kingdom, September 20-21, 1995; Nuclear Energy 35(3):187-191 (June 1996)

This paper describes the regulatory system in the United Kingdom with respect to decommissioning of facilities on nuclear licensed sites. In particular it stresses the flexible nature of the system which allows for continuity of regulation between operating and decommissioning phases without the need for new regulations. Some of the recent changes affecting the nuclear industry are briefly discussed in the light of regulating decommissioning with reference to the Government's review of radioactive waste management policy.

907 V18/023368

Remote Techniques for the Underwater Dismantling of

Reactor Internals at the Nuclear Power Plant Gundremmingen Unit A

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Kernkraftwerk RWE-Bayernwerk GmbH, Gundremmingen/Guenzburg, Germany; British Nuclear Energy Society, London, United Kingdom; International Atomic Energy Agency, Vienna, Austria; European Nuclear Society (ENS), Bern, Switzerland; Institution of Nuclear Engineers, London, United Kingdom

CONF-9604100; Remote Techniques for Hazardous Environments, Proceedings of an International Conference, Leicestershire, United Kingdom, April 29-30, 1996. Thomas Telford Publishing, London, United Kingdom, 322 pp.; (pp. 14-19) (1996)

The unit A of the nuclear power plant in Gundremmingen (KRB A) is a boiling water reactor with an electrical power of 250 MWe. It was shut down in 1977 after 11 years of operation. The actual decommissioning started in 1983. Meanwhile more than 5200 tons of contaminated components have been dismantled. Special cutting and handling tools were tested, developed and optimized for the purpose of working in radiation fields and under water. Due to the special design of KRB A, using a dual cycle system for additional steam generation, the experience gained is transferable to pressurized water reactors as well.

908 V18/022809

Remote Welding on the Pipe Assembly in the Large Cell

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CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1785-1791) (1996)

The concept of a large scale integrated remote handling cell has been introduced in the recent reprocessing and vitrification facilities. For the preplanned exchange of wear components and modules, the pipings of these components and modules are connected by the use of remote jumpers. As in the case of unplanned maintenance, welding joints are normally adopted in order to avoid the complexity of the daily observation of no leakage and the periodical exchange of packings on remote jumpers during the operation. For unplanned exchange, we have investigated the procedures of remote replacement of wear components, modules, and pipings where welding joints are used.

909 V18/022807

Remote-Controlled Dismantling of a Nuclear Power Plant Kernkraftwerk Niederaichbach (KKN)

Ebbinghaus, K.; Orantschke, D.

Preussag Noell, Wuerzburg, Germany

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1769-1777) (1996)

Bavaria was the first in Europe to completely decommission a nuclear power plant and return the site to a green field condition. KKN, the prototype in Niederaichbach (HWGR, 100 MWe), was constructed from 1966 to 1972. During trial runs in 1973 and 1974, the plant operated up to 40% of nominal power and subsequently closed due to problems with the steam generators. The first step of decommissioning, which took place in 1981, was the transfer of the plant into a "SAFE ENCLOSURE" (IAEA decommissioning stage 1/2) and then complete dismantlement in a federal project managed by the Karlsruhe research center, with decommissioning carried out under a "turnkey contract" by a consortium. The first license was applied for in 1980. The project was completed in August 1995 with the planting of a tree on the restored green field site. This paper presents an overview of the license process, dismantling technology development and application, preparation of remote dismantling process, remote-controlled decommissioning, waste flow, and, lessons learned.

910 V18/022716

Removal of Contaminated Asphalt Layers by Using Heat Generating Powder Metallic Systems

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Scientific and Industrial Association - Radon, Moscow, Russian Federation

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 104-106) (1996)

Heat generating systems on the base of powder metallic fuel were used for the removal of contaminated asphalt layers. Decontamination of spots which had complex geometric form was performed. Asphalt layers with deep contamination were removed with essentially all radionuclides being retained in asphalt residue. Only a small part (1-2%) of radionuclides could pass to combustion slag. No radionuclides were detected in aerosol-gas phase during the decontamination process.

911 V18/024219

Removing Device and Method for Radiation-Contaminated Concrete Surface Layer

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Mitsubishi Electric Corporation, Tokyo, Japan

Japanese Patent 8-304597; 6 pp. (November 22, 1996)

When a radiation-contaminated concrete surface layer is crushed, peeled or melted, and the products generated by the procedures are captured by sucking, the activity of the products is measured. It is judged whether the result is higher than a predetermined level or not. The radiation-contaminated concrete surface layer is successively removed until the target level is achieved. In the device of the present invention, microwave energy, millimeter wave energy, or AC arc plasma is used as an energy irradiation means. With such procedures, the contaminated concrete surface layer can be removed efficiently with neither more nor less than necessary removed. (This document is in Japanese).

- 912** V18/022468
Report on IAEA Activities in the Field of Decommissioning
 Laraia, M.
 International Atomic Energy Agency, Vienna, Austria
 NEA/CPD/DOC; Cooperative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installations Decommissioning Projects, Proceedings of the 13th Meeting of the Liaison Committee, Paris, France, November 2-3, 1994. International Atomic Energy Agency, Vienna, Austria, 1994; (12 pp.) (1994)
 This presentation is divided into three parts, the first concerns the outcome of IAEA 1993-94 activities, the second refers to the forthcoming 1995-96 Program. A separate section is devoted to IAEA activities being developed within the framework of the RADWASS Program. The same emphasis which was put early in the 1990's on the development of decommissioning-oriented regulations, standards and guides will continue through the 1995-96 Program; on the other hand, the technological area will be maintained, although at a reduced level of effort. Due emphasis is being given to Technical Co-operation (TC) Projects in the field of decommissioning.
- 913** V18/021471
Report on Waste Burial Charges: Escalation of Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities [Rev. 6]
 U.S. Nuclear Regulatory Commission, Division of Regulatory Applications, Washington, DC
 NUREG-1307 (Rev. 6); 64 pp. (September 1996)
 One of the requirements placed upon nuclear power reactor licensees by the U.S. Nuclear Regulatory Commission (NRC) is for the licensees to periodically adjust the estimate of the cost of decommissioning their plants, in dollars of the current year, as part of the process to provide reasonable assurance that adequate funds for decommissioning will be available when needed. This report, which is scheduled to be revised periodically, contains the development of a formula for escalating decommissioning cost estimates that is acceptable to the NRC, and contains values for the escalation of radioactive waste burial costs, by site and by year. The licensees may use the formula, the coefficients, and the burial escalation from this report in their escalation analyses, or they may use an escalation rate at least equal to the escalation approach presented herein.
- 914** V18/023568
Research and Development on Decommissioning of Nuclear Facilities in Japan
 Akiyama, M.
 Shibaura Institute of Technology, Saitama, Japan
 Nuclear Engineering and Design 165(3):307-319 (September 1996)
 This paper addresses the status of the preparation activities for future decommissioning in Japan. It focuses on the policies and technological developments currently being promoted.
- 915** V18/020654
Residual Radioactivity of Materials in Case of Fast Reactor Decommissioning
 Usanov, V.I.; Tsikunov, A.G.; Troyanov, M.F.
 Atomnaya Ehnergiya 78(6):417-424 (June 1994)
 Nuclear facility design operational indices and postoperational characteristics related to material residual radioactivity (e.g., the personnel and population collective dose, quantity of radioactive wastes, and expenditures on decommissioning) are discussed. The optimization of materials use enables their multiple repeated application, which makes it possible to create a new facility almost completely out previously used materials. (This document is in Russian).
- 916** V18/022981
Results and Outline of JPDR Dismantling Demonstration Project
 Miyasaka, Y.; Watanabe, M.; Tanaka, M.
 Japan Atomic Energy Research Institute, Tokyo, Japan
 Journal of the Atomic Energy Society 38(7):553-576 (July 1996)
 Ideally, decommissioning of nuclear reactors in Japan should involve dismantling and removal of reactors as soon as possible after operation, with the premise of ensuring the safety and promoting the cooperation of local society. In addition, it is important to effectively utilize the vacated site as the land for a nuclear power station. Based on this policy, Japan Atomic Energy Research Institute started the Japan Power Demonstration Reactor (JPDR) dismantling project in 1981, and in the first stage the development of various elementary technologies related to dismantling was carried out. Further from 1986, in order to verify that safe dismantling of a power reactor is feasible by applying developed technologies, a practical test of the JPDR dismantling was carried out and finished in March, 1996. In this way, the safe dismantling of a power reactor was verified, and the collection and preparation of the dismantling data, which are useful for the dismantling of commercial power reactors, were accomplished. The outline of the JPDR, the development of nuclear reactor dismantling technologies, and the practical test of the JPDR dismantling are reported. (This document is in Japanese).
- 917** V18/022122
Results for Revised Biological Shield Configuration
 Broadhead, B.L.; Childs, R.L.
 Oak Ridge National Laboratory, Oak Ridge, TN;
 International Atomic Energy Agency, International Nuclear Data Committee, Vienna, Austria
 INDC(NDS)-355; International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning, N.P. Kocherov (ed.) International Atomic Energy Agency (IAEA), Vienna, Austria, 98 pp.; (pp. 47-52) (April 1996)
 This paper updates previous work and reports the approach and results for the revised Japan Power Demonstration Reactor (JPDR) biological shield. The current results are again based on the utilization of the same SCALE utility modules, however, the new

procedure first determines a one dimensional (1-D) based spectrum in 199-groups then collapses the cross section library to 67-groups (effectively the BUGLE-93 structure with 20 additional thermal groups) and then performs a two-dimensional (2-D) calculation in 67 groups. These 2-D fluxes are then used in the activation calculations for both the pressure vessel and biological shield.

918 V18/024157

Reuse of Nuclear Byproducts, NaF and HF in Metal and Glass Industries

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (9 pp.) (1996)

A study has been performed to evaluate the radiological safety and feasibility associated with reuse of NaF (Sodium Fluoride) and HF (Hydrofluoric Acid) which are generated as byproducts from the nuclear fuel fabrication process. The investigation of overseas experience reveals that the byproduct materials are most often used in the metal and glass industries. For the radiological safety evaluation, the uranium radioactivities in the byproduct materials were examined and shown to be less than radioactivities in natural materials. The radiation doses to plant personnel and the general public were assessed to be very small and could be ignored. The Korea nuclear regulatory body permits the reuse of NaF in the metal industry on the basis of associated radioactivity being 'below regulatory concern'. HF is now under review for reuse acceptability in the steel and glass industries.

919 V18/022125

Review of Nuclear Electric's Proposed Decommissioning Strategy

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TGF Consultants Limited, Lymm, Cheshire, United Kingdom; Her Majesty's Nuclear Installations Inspectorate, Health and Safety Executive, London, United Kingdom

Report; 29 pp. (1995)

This report summarizes the results of a review of the strategy Nuclear Electric (NE) proposes to use for decommissioning their Nuclear Power Plant. The review was carried out in 1993 based on Commercial in Confidence information provided by Nuclear Electric, predominantly dated 1990. Nuclear Electric carried out a decision analysis to compare a number of new decommissioning options, using the concepts of SAFSTOR and in-situ decommissioning, with the current reference case. This report describes the new concepts introduced and the methodology NE used to determine the preferred option: Immediate Stage 1, deferred Stage 2 SAFSTOR, followed by dismantling at Stage 3, 135 years following power generation. A summary of the strategies being considered internationally is also given. The new concepts and the methodology used to determine the preferred option were reviewed and the comments made are summarised in this report. The report

concludes that, based on the assumptions made by NE, the selection of the preferred option is robust. Further investigation is required into these assumptions to confirm the conclusions.

920

V18/020876

Review of the French Experience in Dismantling

Lallement, R.

French Atomic Energy Commission, Fontenay-aux-Roses, France

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 186-191) (1996)

The French Commissariat à l'Energie Atomique was created in 1945, fifty years ago. During the five decades, the CEA has decommissioned and dismantled many facilities of all kinds. It is clear that many problems met in dismantling are the consequences of the design of the facilities and ongoing maintenance and cleaning activities during operation. D&D activities will be, in the near future, a very important industrial activity. The French past experience shows that dismantling is possible and less difficult than many people believe.

921

V18/022521

Risks, Costs, and Benefits Analysis for Exhumation of Buried Radioactive Materials at a Nuclear Fuel Fabrication Facility

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Nuclear Fuel Services, Inc., Erwin, TN

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):7-8 (June 1996)

A risks, costs, and benefits analysis provides a tool for selecting a cost-effective remedial action alternative. This analysis can help avoid transferring risks to other populations and can objectively measure the benefits of a specific remedial action project. This paper describes the methods and results of a risks, costs, and benefits analysis performed at a nuclear fuel fabrication facility. The analysis examined exhuming and transporting radioactive waste to an offsite disposal facility. Risks evaluated for the remedial action project were divided into two categories: risks posed to the worker and risks posed to public health. Risks to workers included exposure to radioactive contaminants during excavation and packaging of waste materials and the use of heavy machinery. Potential public health risks included exposure to radioactive materials during transport from the exhumation site to the disposal facility. Methods included use of site-specific and published data, and existing computer models. Occupational risks were quantified using data from similar onsite remedial action projects. Computer modeling was used to evaluate public health risks from transporting radioactive materials. The consequences or probability of traffic accidents and radiation exposure to potential inhabitants occupying the site were evaluated considering various land use scenarios. A cost analysis was based on data obtained from similar onsite remedial action projects. Scenarios used to identify benefits resulting from

the remedial action project included: (1) an evaluation of reduction in risks to human health; (2) cost reductions associated with the unrestricted release of the property; and (3) benefits identified by evaluating regulatory mandates applicable to decommissioning. This paper will provide an overview of the methods used and a discussion of the results of a risks, costs, and benefits analysis for a site-specific remedial action scenario.

922 V18/024062

Safe Enclosure of Shut Down Nuclear Installations

International Atomic Energy Agency, Vienna, Austria

IAEA Technical Reports Series No. 375; 112 pp. (1995)

Developing a strategy to decommission a given nuclear installation is not a straightforward exercise. A multitude of factors, concerns and constraints affect the decision making process. This publication describes and assesses safe enclosure as a precursor to dismantling. As the number of shut down installations increases, most of which, for various reasons, are not immediately dismantled, it is felt that now is the right time to evaluate in a systematic manner all the implications of a safe-enclosure-deferred dismantling strategy. Within the framework of this strategy, this publication reviews and comments on relevant safety, technical and economic factors.

923 V18/022852

Safety Demonstration Test for the Disposal of Very Low Level Concrete Waste

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Research Association for Nuclear Facility Decommissioning, Tokyo, Japan

Journal of the RANDEC 15:50-58 (December 1996)

Japan Atomic Energy Research Institute (JAERI), who conducted the demonstration test on a safe dismantling of Japan Power Demonstration Reactor (JPDR) in Tokai Research Establishment, has been performing the safe demonstration of near-surface disposal of very low level (VLL) concrete waste arising from JPDR dismantling. Approximately 1,700 tons of VLL concrete waste were placed in a simple disposal facility, of which dimensions are 45 m x 16 m and 3.5 m in depth without any engineered barrier, and covered with soil of 2.5 m thickness. Radionuclides contained in the VLL concrete waste are Co-60, Cs-137, Eu-152, 154, H-3, C-14, etc. Radiation monitoring data, such as radiation dose around the facility, radioactivity concentrations in groundwater, soil, etc. are being collected to analyse the dose to the public. This paper describes the outline of the demonstration test of VLL concrete waste disposal. (This document is in Japanese).

924 V18/024191

Safety Examinations for Decommissioning Planning - Strategies, Classification, and Documentation for Licensing

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ISE Ingenieurgesellschaft fuer Stilllegung und Entsorgung mbH, Roedermark, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektkraegerschaft Entsorgung, Karlsruhe,

Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 1-12) (November 1995)

As a rule, nuclear power plant decommissioning will not involve events inducing radiation exposure in excess of the limits specified in paragraph 28, sub-section 3 StrlSchV (Radiation Protection Ordinance). Disastrous radiological effects can be safely ruled out. There is no remaining risk to be considered. Based on this knowledge, the technical documentation to be submitted in the procedure for licensing of nuclear power plant decommissioning plans will not exceed the extent and scope of documentation available for operating permits, as analogous application of the preventive radiation protection and safety codes underlying operating licenses will suffice. The ZPI seems to be a useful source of reference and guidance in the preparation of documentation for the licensing of decommissioning work. (This document is in German).

925 V18/021162

Safety Requirements for the Design of Large Containers for Decommissioning Waste

Tunaboylu, K.

Colenco Power Consulting AG, Baden, Switzerland

Jahrestagung Kerntechnik '93, Proceedings of a Conference, Cologne, Germany, May 25-27, 1993; Nuclear Engineering and Design 159(2-3):189-195 (November 1995)

About 50% of the final total volume of conditioned radioactive waste from nuclear power generation will be contributed by the decommissioning of nuclear power plants (NPPs). Higher activated metallic waste from the core region of the reactors would, according to the International Transport Regulations (IAEA), require a type B container. This would, however, bring a significant increase in the costs of the management of such waste. A considerably cheaper solution to this problem can be achieved by separating the protection requirements for type B packaging for mechanical integrity and tightness. By using industrial packaging (IP) designed for a higher mechanical integrity, it is possible to cope with higher IAEA protection goals for the safe transport of dismantling waste without strictly following the extremely high and also expensive tightness requirements for type B packaging. This is because the radioactivity is bound in the metallic lattice of such activated decommissioning waste. The above mentioned strong IP for decommissioning waste can also be used for other highly activated waste from the core region (e.g. fuel element boxes, control rods or other activated equipment) during the operation of the NPPs.

926 V18/021280

Sampling Airborne Particles in Still Air

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Gilbert/Commonwealth, Inc., Knoxville, TN

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29,

1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:32-33 (1995)

Decontamination and restoration activities generate airborne radioactive particles of different sizes. The larger particles (greater than 10 µm) have the potential to be more radioactive than smaller particles and may be a greater risk. Health physics procedures require sampling ambient air near the working areas to determine the resulting potential exposure to personnel. For accurate evaluation, it is necessary that air samples be collected in a representative manner. Representative sampling in ventilation ducts using isokinetic techniques is a well-understood process. However, no clear technical guidance exists in industry standards or literature to design devices ensuring a representative sampling of particles in relatively still air.

927 V18/021281

Scientifically Insecure Criteria for DD&ER Radiation Exposure Guidelines

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Consultant, Bigfork, MT

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:33-34 (1995)

Contractors having the responsibility for the decontamination, decommissioning, and environmental restoration (DD&ER) at a nuclear facility, formerly used or active, must be prepared to administer their operation under radiation exposure guidelines established by the U.S. regulatory agencies. These organizations, the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Environmental Protection Agency (EPA), are very closely tied to each other in this arena. Current guidelines levels, based on the premise that all radiation is harmful to health, are unfounded scientifically. Leonard Sagan, chairman of an international panel on low-level health effects at the winter 1994 American Nuclear Society (ANS) meeting, stated that the linear nonthreshold model is based on "politics and social concerns, not science." In society's desire to live with no risk, this perhaps is the most simplistic approach. Unfortunately, the cost and burden of carrying out these safety guidelines can hinder progress and may lead to greater health risk.

928 V18/022221

Semiannual Report 1996 for the NKS Program 1994-1997: Nordic Cooperation in Nuclear Safety

Nordisk Kernesikkerhedsforskning, Roskilde, Denmark
NKS-96-6; 49 pp. (August 1996)

This is a summary of activities of the Nordic Cooperation in Nuclear Safety. Covered are nine parallel projects, encompassing reactor safety, radioactive waste safety, monitoring of radioactive releases, marine ecology, remediation of contaminated areas, emergency plans and public information. The budgets, however reduced as compared to 1995, have not been exceeded, and cooperation with neighboring countries has been financed by other sources. Administrative changes concerning project control have been implemented, cooperation with European Union (EU)

established.

929 V18/024190

Series of Nuclear Engineering Codes and Their Applicability to Nuclear Installations Decommissioning

Baumgaertel, G.

Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Karlsruhe, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 13-21) (November 1995)

As a rule, compliance with the provisions specified in paragraph 7, sub-section 2, No. 3 AtG (Atomic Energy Act) for precautionary measures to be taken in construction and operation of nuclear installations is shown by giving proof of observance and implementation of the nuclear engineering codes and safety guides. The same principle applies to decommissioning work which is licensed by analogous application and interpretation of paragraph 7, sub-section 3 AtG. As the applicable laws do not contain more precise definition of the term "analogously," the paper examines the available subordinate legislation and regulatory regime for their applicability to the problems involved in decommissioning activities. (This document is in German).

930 V18/023573

Shutdown and Degradation: Optimization of Thermal Cutting Processes for the Dismantling of Nuclear Facilities - Final Report

Schultz, H.; Hammer, G.; Hampe, A.; Homburg, A.

Industrieanlagen-Betriebsgesellschaft mbH, Ottobrunn, Germany

IABG-B-TA-3375; 130 pp. (June 12, 1996)

Cutting processes which emit only a minimum of contaminated material in the form of shavings, sparks, dust, steam concentrate, etc. and equipment which is easy to handle and can be remotely controlled are required for dismantling nuclear facilities. A check of the usual mechanical, thermal and thermo-mechanical cutting procedures showed to what varying extent they are suitable for these tasks. Laser beam cutting was able to reduce the material discharge by optimal joints. For the investigation, plasma cutting and laser beam cutting were used with the aim of reducing considerably the material discharge by changing the adjust and device setting data for these cases. The adapting of the speed and the amounts of gas turned out to be effective measures in reducing discharge. Adhesion of metal mass and slag in the joint edge could be achieved. The goals of the project could be fulfilled, and process parameters for pollutant-optimized cutting determined. (This document is in German).

931 V18/022536

Some Basic Insights into Nuclear Power Plant

Decommissioning

Eickelpasch, N.; Steiner, H.

Kernkraftwerke Gundremmingen Betriebsgesellschaft mbH, Gundremmingen, Germany; Deutsches Atomforum e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96: Technical Session on Decommissioning of Nuclear Installations, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum Verl, Bonn, Germany, 66 pp.; (pp. 54-66) (June 1996)

There are 14 projects currently operating in Germany for the decommissioning of nuclear power plants; 11 of them are performed under the responsibility of the state, and 3 are projects of industrial enterprises. The two most advanced projects are those for shutdown of unit A of the KRB Gundremmingen station, and the VAK project at Kahl (VAK experimental reactor station). Both plants are operated as subsidiaries of the utilities RWE and Bayernwerk. The conference paper gives some basic insights obtained in the course of these two projects and covers a period of several years. The results are: The two different disposal strategies allowed by the law, i.e. materials recycling and ultimate disposal, should be assessed and analysed by two separate studies. Quantities and qualities of the liquid wastes to be managed after final shutdown of a plant differ from those of the preceding phase and require specific waste management planning. Performing a radiologic analysis of the task of decontamination of the primary loop prior to dismantling work, as shown by the activities for VAK decommissioning, is recommended. (This document is in German).

932 V18/021494

Some Issues of Radiation Measurement in the Process of Decommissioning of Nuclear Facilities

Zhijian, H; Huijie, T.

Ministry of Nuclear Industry, Institute of Radiation Protection, Taiyuan, China

Radiation Protection (Taiyuan) (Fushe Fanghu) 16(2):103-108 (March 1996)

The paper describes the division of the decommissioning phase of nuclear facilities and some issues of radiation measurements concerned. It mainly covers the purpose and requirements of radiation measurements in the source term investigation before decommissioning of nuclear facilities, operating radiation monitoring during decommissioning operation and termination radiation surveys and termination radiation verification surveys after decommissioning operation. (This document is in Chinese).

933 V18/024228

Spent Fuel and Decommissioning Waste Management from the Greifswald and Rheinsberg Nuclear Power Plants

Rittscher, D.

Deutsches Atomforum e.V., Bonn, Germany

CONF-960532; Nuclear Technology '96: Technical Session on Radioactive Waste Disposal, K.G. Bauer (ed.), Proceedings of an Annual Meeting, Mannheim, Germany, May 21-23, 1996. Inforum

Verl, Bonn, Germany, 105 pp.; (pp. 56-78) (August 1996)

The licenses for decommissioning and dismantling of the two reactor stations were issued on 28 April 1995 for the Rheinsberg KKR, and on 30 June 1995 for the Greifswald KGR. At the KKR site, the turbine building is currently cleared and prepared for the option of establishing there a transport preparation hall for materials awaiting transfer into the ERAM or ZLN storage facilities. At the KGR site since October 1995 the turbine buildings of units 1-5 and the instrument building of unit 5 are cleared. Plant components and equipment parts were removed in pieces as large as possible for transfer to the ZLN, where hall 7 is completed and will soon be commissioned. One steam generating unit has already been placed there for storage in March 1996. The paper discusses waste management activities performed including spent fuel elements, operating wastes, solid residual materials from decommissioning, as well as the ZLN facility. (This document is in German).

934 V18/020655

Stage 1 Decommissioning of the Steam Generating Heavy Water Reactor - Current Achievements (Winfrith)

Andrews, P.J.; McAndrew, M.; Barents, M.S.

AEA Technology, Winfrith, United Kingdom; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Organization for Economic Co-Operation and Development (OECD), High Temperature Reactor Project, Winfrith, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 305-314) (1995)

The Steam Generating Heavy Water Reactor (SGHWR) is located at Winfrith, Dorset, UK. It was a nuclear power plant rated at 100MW(e) and operated successfully from 1968 to 1990. Decommissioning is funded by the Department of Trade and Industry and is the responsibility of the United Kingdom Atomic Energy Authority, which has contracted AEA Technology to manage the project. Decommissioning is now well advanced in accordance with a cost-effective three stage strategy. This paper introduces SGHWR, outlines the economic basis of the decommissioning strategy, summarizes the practical achievements and uses the containment strategy to provide an example of environmental considerations.

935 V18/022469

Status Report and Recommendations of the Task Group for Recycle and Reuse

Cooperative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installations Decommissioning Projects, Proceedings of the 13th Meeting of the Liaison Committee, Paris, France, November 2-3, 1994. International Atomic Energy Agency, Vienna, Austria, 1994; (13 pp.) (1994)

The Task Group for Recycle and Reuse was established in 1992

under the technical advisory group for decommissioning with the objective of examining regulatory requirements and impacts for scrap metal decontamination, reuse, and recycle from a decommissioner's perspective. This presentation offers highlights from a report and includes: Report topics, Other related studies and regulatory approaches, Comparison of related studies, Report findings, Areas of concern, and Recommendations.

936

V18/024189

Strategy and Status of the Licensing Procedures for Decommissioning and Dismantling of the Greifswald Nuclear Power Stations (KGR): A Report on Experience Gathered

Schmidt, H.; Leushacke, D.; Rittscher, D.

Energiewerke Nord GmbH, Rubenow, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 23-51) (November 1995)

For the first time a licensing strategy for reactor decommissioning/dismantling was successfully practiced with the specific example of a nuclear power station of Russian design, from submitting the application to issuing the license, under the general conditions and requirements of German atomic energy and administrative law, which is extremely restrictive in comparison to others. The documents submitted initiated intensive discussion on the basis of the legal regulations of AtG (Atomic Energy Act) and StrlSchV (Radiation Protection Ordinance), as well as the approach for evaluating a facility which was not built in accordance with the nuclear engineering codes (KTA codes), and which now was to be decommissioned/dismantled. The license for decommissioning of the total facility and for dismantling parts of the facility was issued on June 30, 1995, for immediate execution. The license was not appealed. Dismantling work at unit 5, control area, has already begun. Steam generator 1 of unit 5 will be removed as a complete component this year and stored on site in Hall 7 of the northern interim storage area, which has already been completed. (This document is in German).

937

V18/020618

Strategy, the Achievements, and the Prospects for Decommissioning in EDF and CEA

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Electricite de France (EDF), Paris, France; Commissariat a l'Energie Atomique, Direction of Waste Management and Decommissioning, France; Institution of Mechanical Engineers, London, United Kingdom; British Nuclear Energy Society, London, United Kingdom; Institution of Electrical Engineers, London, United Kingdom

CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International

Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 49-59) (1995)

French experience in the field of decommissioning and dismantling consists of partial or total dismantling of various categories of facilities organized under the supervision of the facility owner [i.e., Electricite de France (EDF), Commissariat a l'Energie Atomique (CEA), or the French Fuel Enrichment and Processing Corporation (COGEMA)]. These facilities encompass fuel cycle facilities, hot laboratories, research reactors, and power reactors. The dismantling of high-capacity nuclear power stations is not yet on the agenda in France; the final shutdown of the first PWR 900 units being planned for 2015 at the earliest. However, in view of the large number of nuclear power stations in France, EDF is already starting to make preparations. The present report provides an overview of the major legal, technical, economic and socio-political aspects of this topic. It outlines CEA and EDF's current policy, the reasons for the choices made so far, and the main available sources of experience in France.

938

V18/020718

Stripping Demolition of Concrete by Applying Electric Current Through Reinforcing Bars

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Journal of the RANDEC 13:30-40 (November 1995)

The presence of reinforcing bars in reinforced concrete structures is an obstruction hindering the smooth progress of demolition work. The electric heating method is, on the other hand, a demolition technique that adopts the bars to help the demolition of reinforced concrete structures. This technique has the following advantages for demolition: (1) the more densely a structure is reinforced with bars, the greater is the effect of the electric heating; (2) demolition after heating produces little dust; and (3) electric heating of reinforcing bars causes no damage to the portions of concrete not subjected to the electric current. The present paper describes the procedures and results of a series of experiments conducted to verify the efficiency of the electric heating method. In this method, low-voltage high-current is run through reinforcing bars existing in a concrete structure, inducing intense heat in the bars which in turn cracks the surrounding concrete mass, facilitating secondary demolition by hammer picks or other means. The experiments were performed on full-scale biological shield wall mock-ups of a Boiling Water Reactor (BWR) and a small nuclear reactor. The experiments revealed that these excellent features of the electric heating method are worth utilizing in stripping demolition of radioactivated regions of biological shield walls in nuclear power plants. The electric heating method is currently being adopted and shows effective results in partial demolition works in diaphragm wall shafts where starting/arriving holes are to be fixed for shield machines without damaging surrounding portions. (This document is in Japanese).

939

V18/022810

Structure of Decommissioning Plan for VVR-S Research Reactor

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Nuclear Engineering, Bucharest, Romania

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1792-1795) (1996)

This paper presents our activity in preparing the decommissioning plan for the VVR-S research reactor taking into account that there is no experience in this field in our country. The VVR-S research reactor will be permanently withdrawn because of: uneconomic operation; technical obsolescence; conclusion of research programs; and, safety considerations. In light of the particulars concerning the VVR-S research reactor, two options have been identified and are discussed in this paper.

940 V18/020947

Study of Airborne Radioactivity Generated During the Preparation of Concrete Waste from Reactors Undergoing Decommissioning

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Purdue University, School of Health Sciences, West Lafayette, IN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (12 pp.) (1996)

The demolition of activated concrete waste from reactor biological shields undergoing decommissioning produces the potential for worker exposure to radioactive aerosols. The determination of appropriate derived air concentrations (DAC) for worker protection during routine and accidental situations depends on a knowledge of the particle size distribution of the aerosol. Measurements are described which were used to evaluate the mass median aerodynamic diameter (MMAD) and the activity median aerodynamic diameter (AMAD) for aerosols generated by cutting two types of activated reactor concrete under laboratory conditions using a sawing device and a coring tool. Samples were also taken during the actual demolition of the biological shield at the Experimental Boiling Water Reactor (EBWR). In the laboratory study, twelve sample collection experiments were performed as part of a 2x2 factorial statistically designed experiment with three replications. The results indicated that the type of cutting tool used significantly affected the MMAD and the AMAD with coring values being much larger than sawing values. The numerical value of the ^{60}Co AMAD for sawing was found to be more than an order of magnitude greater than the ICRP recommended default AMAD of 1 μm . These results suggest that DAC values used at the worksite should be based on experimental data instead of regulatory assumptions, or that larger default values should be used in practice. The results also showed that particle size distribution was not significantly different for the two types of concrete studied. Also, the MMAD and the AMAD were found to be not statistically different for the various samples. In contrast to this, one of the field samples taken during the demolition of the concrete reactor shield by an air-hammer under wet conditions at the EBWR had an AMAD much smaller than the MMAD and also smaller than the 1 μm default value. One possible explanation is that ^{60}Co is being leached from the concrete dust by

the water spray resulting in smaller aerosol droplets. Further research with other types of concrete and other cutting devices is needed, and the author is seeking such samples from other reactors being decommissioned.

941 V18/020731

Study on Methods for Decontaminating Concrete Surfaces by Laser Treatment

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Taisei Corporation, Tokyo, Japan

Reza Kenkyu (Review of Laser Engineering) 24(2):182-190 (February 1996)

Unlike the deep radioactive contamination of the biological shield concrete of nuclear power reactors, the concrete surfaces at JRTF (JAERI's Reprocessing Test Facility) are contaminated by radioactive material, including alpha-emitting nuclides, up to a depth of about 10 mm from the top surface. Two methods of decontamination of such concrete are described here. In the first method, laser irradiation at high energy density and low scanning speed is made to cause instantaneous melting of the elements of the concrete (mainly oxides of silicon, aluminum, and calcium) by intense heat, resulting in the formation of a glass layer, which is then removed easily and collected by appropriate means. In the second method, using lower energy density and higher scanning speeds, instantaneous evaporation of the water in the concrete is induced and rapid build-up pressure occurs without surface melting. This phenomenon causes spalling of the contaminated surface layer. Debris is collected by appropriate means. (This document is in Japanese).

942 V18/022430

Summary and Results of the JPDR Dismantling Project

Miyasaka, Y.

Journal of the RANDEC 14:24-31 (August 1996)

The Japan Power Demonstration Reactor (JPDR) dismantling project was successfully completed in March 1996. This project had been conducted since 1981 under the guidance of the long-term program for nuclear energy research, development and utilization for issued by the Atomic Energy Commission (AEC). It consisted of two phases: research and development were performed on key technologies such as radioactive inventory estimation and remote dismantling in the Phase I program, then the developed techniques were applied to the actual dismantling of the JPDR in the Phase II program. Various know-how and data on the dismantling activities and developed techniques were obtained through the project. The implementation of remote dismantling procedures for site release provided particularly useful experiences for the future decommissioning of commercial nuclear power plants. This report describes the results and summary of the JPDR dismantling project. (This document is in Japanese).

943 V18/020898

Summary of Nuclear Decommissioning in New Hampshire

Patch, D.L.

New Hampshire Public Utilities Commission, Concord, NH

CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 53-58) (1996)

The New Hampshire law on Nuclear Decommissioning was originally enacted in 1981 to assure that adequate resources would be available to decommission the Seabrook Nuclear Power Plant. In enacting the statute the NH Legislature indicated that it was doing so "to ensure the safety and well-being of the public and of future generations" and out of a recognition that decommissioning costs "should not have to be borne by the state.." New Hampshire Revised Statutes Annotated (RSA), Chapter 162-F, Section 1. The General Court established the procedures included in the law to "provide assurance of adequate funding by utilities for the decommissioning of those nuclear electric generating facilities which complete their anticipated energy-producing lives." The law creates a Committee with the responsibility of establishing a decommissioning fund for each nuclear generating facility in the state, and it requires the Committee to hold public hearings to receive information on funding requirements for each fund. Once the fund has been established and the total decommissioning cost estimated, the Committee orders the owners of the facility to make scheduled payments into the fund over the life of the plant to assure that the amount is fully collected by the decommissioning date. The Public Utilities Commission then must permit the utility to charge its customers on a per-kilowatt-hour basis the amount the utility pays directly into the fund. There is a separate decommissioning charge on the customer's bill. Currently average residential customers pay about \$.23 a month as a decommissioning charge.

944 V18/023518

Swedish Nuclear Fuel and Waste Management Company (SKB) Manages Sweden's Radioactive Waste [Handout]

Swedish Nuclear Fuel and Waste Management Company, Stockholm, Sweden

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (12 pp.) (1996)

This handout material from the TAG 20 meeting consists of viewgraphs from a presentation by SKB. Topics covered included the role of SKB in administering government policies and regulations to private nuclear power plant owner utilities and a description of the Swedish system for radioactive waste management. The system consists of (1) a central interim storage facility for spent nuclear fuel (CLAB), (2) a final repository for radioactive operational waste (SFR) from nuclear power stations and medical industry research, and (3) a deep repository for spent nuclear fuel.

945 V18/022019

Swirl Flow Transferred Plasma Arc for Vitrification of Waste, Metal Recovery and Special Metal Refining

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Retech, Inc., Ukiah, CA

CONF-9510125 (Vol. 1); Plasma Systems and Applications, P.W. Mayne and J.A. Mulholland (eds.), Proceedings of an International Symposium on Environmental Technologies, Atlanta, GA, October 8-11, 1995. Georgia Institute of Technology, Atlanta, GA, Vol. 1, 335 pp.; (pp. 251-259) (1995)

This report will describe work with plasma torches at Retech since 1970. The first application was for remelting of iron and nickel-base alloys. Since then, applications in rotating grade aircraft parts, production of special metal powders, treatment of hazardous wastes and processing of metallurgical wastes have been demonstrated.

946

V18/021778

System and Method of Removing Contaminants from Solid Surfaces and Decontaminating Wastes

Brown, T.L.; Geiss, A.J.; Grieco, S.A.; Neubauer, E.D.; Rhea, J.R.

O'Brien & Gere Engineers, Inc., Syracuse, NY

U.S. Patent 05520571; 3 pp. (May 28, 1996)

This invention relates to systems and methods for removing radioactive and/or hazardous materials from steel, concrete, or other solid surfaces and thereafter treating the generated waste to reduce the volume material for disposal. This patent describes the method and system for removing a surface layer contaminated with radioactive and/or hazardous material and subsequently treating the waste to remove contaminants and provide an essentially contaminant-free final effluent. The contaminated material is removed by blasting the surface with a pressurized stream of air and sodium bicarbonate abrasive media, and the media is dissolved in water subsequent to the blasting operation. The resulting waste is treated in a sequence of steps including adjustment of pH, aeration and separation into primarily solid and liquid phases by precipitation of solids, which are removed for appropriate disposal. The primarily liquid phase is successively passed through a particle filter, a granulated activated carbon filter and a polishing unit to produce the clean final effluent.

947

V18/021798

Taking Sellafield Apart

Nuclear Engineering International 41(500):22-24 (March 1996)

Sellafield, British Nuclear Fuel's site on the coast of Cumbria, is slowly dismantling itself. Among the plants being decommissioned are the early plutonium facilities that began life in the 1950s. These decommissioning activities have begun to attract considerable attention from overseas, particularly the US. The US has already spent hugely yet has very little to show. What Sellafield is confidently telling its visitors is that nuclear decommissioning costs are not the black hole industry critics allege. It has skills and experience to estimate accurately, and keep to time and budget. This paper highlights some of the decommissioning experiences at Sellafield and how BNFL is applying this expertise to win major contracts in the US.

948

V18/023542

Task Group on Recycling and Reuse: Status Report

OECD/NEA Co-Operative Program on Decommissioning,

Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (7 pp.) (1996)

This paper summarizes the meeting of the Task Group held in London, November 27-28, 1995. The status of the final report as it goes through the final review process was reviewed. The logistics of organizing the data for distribution was discussed. The Task Group also discussed areas for continued work which included: The need for global optimism and not just optimism from the radiological viewpoint; The recycling of non-metallic materials, such as concrete; Comparisons of SS89 doses with natural background as doses from exempted material; Aspects of conservation, risk analysis and modelling; Collection of case histories showing trade-off between disposal and recycling including cost benefit aspects; and, Measurement methods and instrumentation for clearance.

949

V18/024210

Techniques Applied and Experience Gathered from Dismantling Unit A of Gundremmingen Nuclear Power Station

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Kernkraftwerke Gundremmingen Betriebsgesellschaft mbH, Gundremmingen, Germany; Bundesministerium fuer Bildung, Wissenschaft, Forschung und Technologie, Bonn, Germany; Forschungszentrum Karlsruhe GmbH Technik und Umwelt, Projektktraegerschaft Entsorgung, Karlsruhe, Germany; Hannover University, Institute fuer Werkstoffkunde, Hannover, Germany

CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 179-189) (November 1995)

The experiences gathered with the decommissioned nuclear reactor unit A prove that dismantling is possible with nuclear power stations with reasonable economic input, low personnel radiation exposure, negligible release of radioactivity, and low waste accumulation. To achieve these conditions, it is necessary to prepare the proper dismantling and disassembly techniques and decontamination processes as well as suitable decontrolling measuring techniques and instruments. (This document is in German).

950

V18/020873

Techniques for the Dismantling of the NPP's Gundremmingen, Unit A (KRB) and Versuchsatomkraftwerk Kahl (VAK)

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CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 200-206) (1996)

The first generation of nuclear reactors in Germany is represented by the Unit A of the nuclear power plant in Gundremmingen (KRB

A) and the VAK plant in Kahl. VAK had to serve mainly scientific purposes, whereas KRB A was the first commercial reactor in Germany. Referring to their size and construction, they are rather different to each other. Although they are boiling water reactors, both also have typical features of a pressurized water type, so that the results of decommissioning can be transferred to a wide range of future projects. KRB A has been undergoing dismantling since 1983, VAK since 1988. Special cutting and handling tools were tested, developed and optimized for the purpose of working in radiation fields and under water. The experiences made in both projects are not limited on dismantling work only, but also include know-how on effective decontamination and scrap recycling. The actual work is focused on the dismantling of highly contaminated components inside the reactor buildings and the underwater cutting of activated internals of the reactor pressure vessels (RPV).

951

V18/022835

Technology Assessment for Improved Structural Demolition and Dust Suppression Techniques

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Florida International University, Hemispheric Center for Environmental Technology, Miami, FL

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1962-1965) (1996)

As nuclear research facility buildings are deconstructed, many nonnuclear technologies are being adapted to the nuclear decontamination and decommissioning (D&D) industry, particularly in the case of final building demolition. Final building demolition technologies include implosion, the pull-over technique, explosive cutting, piece-by-piece dismantlement, and a combination of the three technologies. These technologies all have the potential of generating dust particles. As these technologies are proposed for application at individual sites, a review process is conducted to gather information related to health and safety, dust generation, and final material form. However, in many cases, this review does not provide the details needed to perform a comprehensive evaluation. This lack of data requires many conservative measures to be taken to implement the technology or may eliminate the technology from consideration because of this lack of comprehensive data. This paper will target the problem of dust generation during demolition and contribute to the compilation of a comprehensive source of information that will assist in the evaluation of the technologies used during building demolition. Three building types and the different demolition techniques will be simulated in the Hemispheric Center for Environmental Technology (HCET) laboratory setup located on the campus of Florida International University (FIU) with various dust suppression techniques. The three simulated conditions include a poured concrete wall, a block wall, and a built-up roof. The main parameters controlled to minimize dust suppression during demolition activities are the moisture content and the fraction of the surface that is easily dispersed into air. Moisture content can be increased by the use of water sprays, mists, fogs, or foams. On the other hand, crusting agents have the potential of reducing the surface that is easily dispersed into air. Both these dust suppression techniques will be applied to determine

the effectiveness of decreasing dust generation.

952 V18/022522

Theoretical vs. Measured Risk Estimates for the External Exposure to Ionizing Radiation Pathway: A Case Study of a Major Industrial Site

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International Technology Corporation, Itasca, IL

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):8b (June 1996)

Two methods of estimating the risk to industrial receptors to ionizing radiation are presented here. The first method relies on the use of the U.S. Environmental Protection Agency (EPA) external exposure slope factor combined with default exposure parameters for industrial land uses. The second method employs measured exposure rate data and site-specific exposure durations combined with the (biological effects of ionizing radiation) BEIR V radiological risk coefficient to estimate occupational risk. The uncertainties in each method are described qualitatively. Site-specific information was available for the exposure duration and the exposure frequency as well as historic dosimetry information. Risk estimates were also generated for the current regulatory cleanup level (removal risks included) and for a no action scenario. The study showed that uncertainties for risks calculated using measured exposure rates and site-specific exposure parameters were much lower and defensible than using EPA slope factors combined with default exposure parameters. The findings call into question the use of a uniform cleanup standard for depleted uranium that does not account for site-specific land uses and relies on theoretical models rather than measured exposure rate information.

953 V18/025396

Thermochemical Decontamination of Metallic Surfaces

Sobolev, I.A.; Tivansky, V.M.; Petrov, A.G.; Karlina, O.K.; Ojovan, M.I.

Scientific and Industrial Association - Radon, Moscow, Russian Federation

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

Exothermic metallic compositions (EMC) were used in order to decontaminate radionuclide contaminated metal surfaces. Experiments were carried out with samples of carbon and stainless steel which were contaminated by Cs-137. Radionuclide distribution and aerosol releases were measured during the process of decontamination. High efficiency of the applied technique was found as well as absence of environmental contamination.

954 V18/022800

Thorough Decontamination of Metallic Pieces with the Cerium Process

Klein, M.; Rahier, A.

SCK/CEN, Mol, Belgium

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1728-1734) (1996)

The decontamination experience gained during the BR3 dismantling project is presented. This started with the full system decontamination of the primary loop and was followed by R&D on thorough decontamination projects. First, a wet abrasive installation has been installed and is now in operation for the thorough cleaning of metallic pieces of simple geometry. The decontamination of stainless steel pieces contaminated with PWR deposits was also extensively tested with the Cerium Process using the strong oxidative power of the Cerium(4+) at its highest oxidation state. In order to minimize the amount of secondary waste, the consumed cerium had to be regenerated. The results of laboratory studies on the regeneration with ozone and with electrochemistry are presented in detail.

955 V18/022131

Thorough Decontamination of Metallic Pieces: 1995 Scientific Report of the Belgian Nuclear Research Centre

Klein, M.

Centre d'Etude de l'Energie Nucleaire, Mol, Belgium

INIS-mf-14878; 138 pp. (pp. 38-39) (1996)

The dismantling of nuclear installations generates large quantities of metallic radioactive waste. The decontamination of an important fraction of this waste can contribute to reduce the overall dismantling costs of nuclear installations. The research program consists of laboratory-scale and semi-pilot-scale experiments with contaminated pieces. The objectives and the achievements in this research area at the Belgian Nuclear Research Centre SCK-CEN are summarized.

956 V18/025388

Tritium Behavior During Underwater Cutting and Further Processing of Highly Irradiated Control Rods

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Ministry of Environmental Affairs, Munich, Germany; RWE Energie AG, Essen, Germany; Technical University of Munich, Munich, Germany

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

The control rods of BWRs consist of stainless steel tubes filled with vibrocompacted boron carbide (B4C). In order to dispose of irradiated control rods, it is necessary to cut them into small pieces. Of significant interest is the release of tritium during the shearing process in the fuel storage pool and during further processing. An extensive measurement programme carried out during the treatment of 22 highly irradiated control rods of the Kahl nuclear power plant (VAK) proved that only a very small portion of the total tritium inventory (less than 0.1%) was released during on-site shearing, packaging, and drying. From the radiological and environmental

point of view this procedure is feasible without reservation. This experience is taken as a basis for the disposal of 100 control rods of the Gundremmingen nuclear power plant, unit A (KRB A).

957

V18/023370

Tunney's Pasture Decommissioning Project

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Atomic Energy of Canada Limited, CANDU Operations, Montreal, Quebec, Canada; Canadian Nuclear Association, Toronto, Ontario, Canada; Canadian Nuclear Society, Toronto, Ontario, Canada

INIS-mf-14987 (Vols. 1, 2); CONF-940631; Proceedings of the Canadian Nuclear Society 15th and the Canadian Nuclear Association 34th Annual Conference, H.M. Huynh (ed.), Montreal, Quebec, Canada, June 5-8, 1994. Canadian Nuclear Association, Toronto, Ontario, Canada, 1000 pp.; (7 pp.) (1994)

Atomic Energy of Canada Limited's (AECL) Tunney's Pasture facility located in Ottawa was used for research, production and worldwide shipping of radioisotopes. After thirty years of operation it was shutdown in 1984 and decommissioned in two phases. During the first phase, which began in 1985 and lasted until 1987, staff moving to the new Kanata facility, now the property of Nordion International, removed the bulk of the equipment. After a three year period of storage under surveillance, AECL initiated, in 1990, the second phase of decommissioning, which was completed in August 1993. In January 1994 the Atomic Energy Control Board (AECB) unconditionally released the facility for unrestricted use. The paper provides an overview of the second phase of the decommissioning project and a summary of a few lessons learned for the benefit of future endeavors of the same kind.

958

V18/025385

U.K. Privatization of Decommissioning and Radioactive Waste Management Services

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WasteChem Limited, Risley, Warrington, United Kingdom; United Kingdom Atomic Energy Authority, Didcot, United Kingdom

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

The United Kingdom Atomic Energy Authority, UKAEA, was established to undertake nuclear research and development. Fusion R&D apart, the original mission has now been largely completed. Across its sites some 80% of UKAEA's facilities are redundant and in various stages of closure. UKAEA has now turned its attention to discharging its decommissioning liabilities. Procurement of services through fixed-price competitive tendering dominates UKAEA's contract strategy. To help develop the supply base and thereby increase competition, UKAEA has undertaken a strategy of skill transfer through the divestment of operational teams and associated contracts. This is also seen as the way to secure the best possible long term futures for the staff involved.

959

V18/022121

UMass-Lowell Results of the IAEA Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning

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University of Massachusetts, Chemical and Nuclear Engineering Department, Lowell, MA; International Atomic Energy Agency, International Nuclear Data Committee, Vienna, Austria

INDC(NDS)-355; International Benchmark Calculations of Radioactive Inventory for Fission Reactor Decommissioning, N.P. Kocherov (ed.) International Atomic Energy Agency (IAEA), Vienna, Austria, 98 pp.; (pp. 53-87) (April 1996)

The purpose of this report is to document the University of Massachusetts-Lowell results for the Japan Power Demonstration Reactor (JPDR) activation analysis benchmark. The report first documents the data and methods incorporated within the actual codes utilized in the analysis, highlighting the new ACTTV code and its integration within an existing code system for performing ex-core and ex-vessel transport theory computations. The details of our specific RZ geometric models of the JPDR configuration within the context of the discrete ordinates transport (DORT) code are also reviewed, as well as the development of the absolute UMass-Lowell results for JPDR Activation Benchmark normalization of the neutron source distribution used to drive the DORT fixed-source computations.

960

V18/020709

US Decommissioning Strategy in Today's Regulatory, Technical, Political, and Economic Environments

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CONF-951133; Nuclear Decommissioning: The Strategic, Practical, and Environmental Considerations, Proceedings of an International Conference, London, United Kingdom, November 29-30, 1995. Mechanical Engineering Publications, London, United Kingdom, 392 pp.; (pp. 333-342) (1995)

The United States commercial nuclear power industry is nearly forty years old. Soon after the turn of the century, the United States expects to see a significant rise in the number of plants requiring decommissioning. This, coupled with recent economic pressures which are affecting the U.S. electrical generation industry and have resulted in the premature shutdown of some nuclear power plants, heightens the need for clear regulations and standards addressing facility closure and decommissioning. Since the issue of decommissioning involves public health and safety, technical, environmental and financial aspects, this complex regulatory environment poses a major challenge to the industry in this area. There are three fundamental issues facing utilities as they develop strategies for the eventual decommissioning of their nuclear power plants. These issues are: (1) the regulatory approach to decommissioning; (2) the question of the availability of adequate funding, including the uncertainty resulting from the uncertainty of waste disposal options; and (3) the need to meet environmental standards for the protection of health and safety. Furthermore,

these issues, in particular the economic-related issues, are magnified in the event of a prematurely shut down nuclear power plant.

961 V18/021480

Underwater Dismantling Thermal Cutting Tools Measurement of Secondary Wastes

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Commissariat a l'Energie Atomique, Centre d'Etudes de Saclay, Institute de Protection et de Surete Nucleaire, Gif-sur-Yvette, France; Commissariat a l'Energie Atomique, Centre d'Etudes de la Vallee du Rhone, Bagnols-sur-Ceze, France; Commissariat a l'Energie Atomique, Centre d'Etudes de Cadarache, St. Paul-lez-Durance, France

CONF-960306 (Vol. 5); ICON-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 163-172) (1996)

The general aim of this study was to examine the underwater cutting of thick steel plates and the cutting of radioactive parts from dismantling operations. The three tools tested in the Pegase facility of the nuclear center of Cadarache were the plasma torch (1,000 A), the consumable electrode which is a tool in which a wire is continuously unwound from a coil into the kerf and an arc is ignited by a short circuit between the wire and the workpiece, and the Contact Arc Metal Cutting (CAMC) which is a technique in which an electrode of graphite and the workpiece are connected in short circuit with a high current. Ten experiments were carried out (seven non-radioactive plates and three radioactive plates were cut) in a 7.7 cubic meter tank located in a 32 cubic meter cell. For each experiment, a lot of measurements about secondary wastes were done: (1) the balance of the solid (sedimented dross, suspended particles, attached slag, aerosols) and gaseous (NO, NO(x), CO, O₃, H₂) emissions; (2) the characterization of the aerosols (particle size distribution, chemical analyses), of the suspended particles (particle size distribution, concentration in different water levels, chemical analyses) and of the sedimented dross (particle size distribution); (3) the balance of the radioactive distributions; and (4) the water quality (pH, turbidity, conductivity).

962 V18/024214

Underwater Fastening Techniques for Dismantling Components in Decommissioning Nuclear Facility

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp.

239-250) (November 1995)

The results of the studies carried out show that arc-stud welding with lift ignition, mechanical drilling and thermal drilling can be modified by Contact Arc Metal Cutting (CAMC) with subsequent mechanical cramping as a process for mounting fastening elements by remote control under water. The process technology necessary for that has been developed. The HUCK-BOM type of blind rivets are particularly suited for openings with circular cross-sections and the combined CAMC electrodes/cramping elements for rectangular cross-sections which we have developed ourselves as fastening elements which are to be cramped mechanically. Both head studs and blind rivets as well as the combined fastening technique meet the mechanical strength requirements. (This document is in German).

963 V18/023326

Underwater Shear Compactor

Biver, E.; Sims, J.

GRADEL S.A., Steinfort, Luxembourg; Golder Associates Limited, Nottingham, United Kingdom

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (15 pp.) (1996)

This paper describes the concept for a specialized decommissioning tool designed to operate underwater and to reduce the volume of radioactive components by shearing and compacting. The shear compactor was originally conceived to manage the size reduction of a variety of decommissioned stainless steel tubes stored within a reactor fuel cooling pond and which were consuming a substantial area of the pond. The main objective of this tool was to cut the long tubes into shorter lengths and to compact them into a flat rectangular form which could be stacked on the pond floor, thus saving valuable space. The development program undertaken on this project investigated a wide range of factors which could contribute to an extended cutting blade performance, i.e.: materials of construction, cutting blade shape and cutting loads required, shock effects, etc. The second phase of this project was to review other aspects of the design, such as radiological protection, cutting blade replacement, general maintenance, pond installation and resultant wall loads, water hydraulics, collection of products of shearing/compacting operation, corrosion of the equipment, control system, operational safety and the ability of the equipment to operate in a dry environment. The results of the development and study phase provided the confidence to justify proceeding to a fully detailed design, supported by all the necessary calculations. The paper summarizes the extended work program involved with this shear compactor tool.

964 V18/021944

Unsitng Nuclear Power Plants: Decommissioning Risks and Their Land Use Context

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Professional Geographer 48(1):57-69 (1996)

Nuclear power plants siting provided the first significant public

opportunity to examine nuclear safety and to affect nuclear policy. These discussions were prompted and fueled by perceptions of nuclear risk. Now, as we begin the process of nuclear decommissioning, we are finding that power plant removal-unsiting-is also likely to attract public interest. This paper presents a preliminary survey of how we are likely to react to this emerging theme, applying these findings within a land use context to see if it is likely to produce issues salient to the public. In so doing it also examines how these issues could affect decommissioning timing and type. It suggests that the most likely prospect is that power plants will remain on the landscape long after they are closed.

965

V18/024204

Use of Data Processing Tools in Decommissioning Nuclear Facilities

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CONF-9511278; Proceedings of the Fourth Hannover Decommissioning Colloquium and Third Status Report on Decommissioning and Dismantling of Nuclear Plants, Bad Buerkheim, Germany, November 8-10, 1995, 460 pp.; (pp. 157-167) (November 1995)

With the present level of electronic data processing technology, no project of the scale of nuclear reactor decommissioning could be carried out without the use of data processing systems. A reactor decommissioning project requires essential support not only for the technical but also for the economic side of the process through the use of proper data processing programs. These programs include not only general applications in the area of personal computers, such as MS-EXCEL or MS Project, but also special data processing systems designed for the reactor decommissioning tasks. (This document is in German).

966

V18/023713

Use of Robotics in Decontamination and Decommissioning

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RedZone Robotics, Inc., Pittsburgh, PA

CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (7 pp.) (1996)

This series of viewgraphs explains some of the misperceptions on robots and remote systems versus human manpower for decommissioning and decontamination activities. It describes the DOE robotics program, the technology development cycle, and the demonstration programs.

967

V18/025333

Use of the RadScan 600 in the Decommissioning of a Highly Active Cell

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

BNFL Instruments' RadScan 600 has been developed to survey gamma radiation remotely in a wide variety of environments. The device is based on a CsI spectrometer located in a highly collimating tungsten shield. This spectrometer can detect gamma rays with energies between 100 keV and 10 MeV. A color charge-coupled device (CCD) camera produces a visual image of the area being surveyed. This device has been used to monitor the location of contamination contained within a cell at a nuclear site in England. The cell, which during its operational life had been used for post irradiation examination of spent nuclear fuel, had already undergone a level of decommissioning. The clean-up operations performed had failed to reduce dose rates in the cell to a level which would allow man entry. In an effort to resolve this problem, the RadScan 600 was used to perform a full survey of the cell. This was accomplished, confirming that the dose rates in the cell were originating from Cs-137. The survey established the location of a number of hotspots. The information provided by the RadScan 600, which would not have been available with existing health physics instrumentation, has been key to allowing the Decommissioning Team to develop their plans for further decontamination of the cell.

968

V18/025835

Using Probabilistic Analysis Tools to Simulate Alternative Decommissioning Strategies

Voss, C.F.; Keizur, A.

Golder Associates, Inc., Richmond, VA

CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 147-151) (1996)

Complex decommissioning projects require a structured methodology and appropriate software tools to properly analyze the performance of different options. This paper summarizes the approach that Golder Associates has taken to help various clients evaluate strategy options, and provides two case studies for illustration. The first case study describes the evaluation of closure options for a uranium mill tailings impoundment in Germany, and the second describes the evaluation of strategy options for opening a radioactive waste repository in the United States.

969

V18/024167

Utilization of Reactor Bays of Decommissioned Submarines

Lugavtsov, O.V.; Malakhov, A.G.; Popkov, K.K.

Atomic Energy 76(5):415-417 (November 1994)

Radiation concerns regarding dismantling and storage of decommissioned reactors and reactor bays from nuclear submarines are briefly summarized. Calculation results are presented for gamma dose rates, contamination density, and the expected location of maximum exposure dose rate on the submarine hull. However, it is noted that radiation measurements must be obtained for each ship due to differences in operating conditions. Long-term storage options for containerized reactors and reactor bays are very briefly outlined; these include placing them in concrete-lined trenches shielded from the atmosphere or in underground tunnels shielded from water.

970

V18/022470

Vandellos 1 Nuclear Power Plant Dismantling and Decommissioning Plan

Rodriguez, A.; Morcillo, R.

Cooperative Programme for the Exchange of Scientific and Technical Information Concerning Nuclear Installations Decommissioning Projects, Proceedings of the 13th Meeting of the Liaison Committee, Paris, France, November 2-3, 1994. International Atomic Energy Agency, Vienna, Austria, 1994; (9 pp.) (1994)

The Dismantling and Decommissioning Plan (DDP) for Vandellos I Nuclear Power Plant presented by ENRESA was drawn up in response to a request issued by the General Directorate for Energy (resolution of 31st July, 1991), which included the definitive withdrawal of the Plant's operating license, in the wake of the incident that occurred in October 1990 and which led to definitive shutdown of the facility. In response to this requirement, ENRESA carried out a series of preliminary studies and, in June 1991, presented to the Ministry of Industry a document analysing the different dismantling options available for decommissioning of the plant, along with proposals regarding the most feasible of these alternatives, taking into account all the aspects conditioning the dismantling process (radiological, availability of waste disposal facilities, technologies to be applied, economic issues, etc.).

971

V18/023531

Vandellos NPP Decommissioning Project

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Empresa Nacional de Residuos Radiactivos S.A., Madrid, Spain

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (30 pp.) (1996)

Vandellos I NPP is a 1,670 Mwt, 500 Mwe Natural Uranium Graphite Gas unit which was in commercial operation from 1972 until October 1989, when as a result of a major fire in the turbine building that caused serious damage to the conventional installations, it was taken out of service. Definitive shutdown of the plant for dismantling was decreed in July 1990. On November 27, 1992, the Ministry of Industry accepted the alternative for dismantling and decommissioning proposed by ENRESA, this consisting basically of partial dismantling to Level 2, which would not include the nuclear reactor (pile), which will remain confined for a period of 30 years during which the remaining installation will be kept under surveillance. On May 27, 1994, ENRESA submitted

the Decommissioning Plan (DP), which is currently being evaluated by the competent authorities. During the period of interest covered by this report the detailed engineering work has been completed and specifications have been drawn up for ENRESA to undertake contracting of the dismantling tasks. As regards the plant itself, the fuel has been removed from the site and sent to France for reprocessing. The operator (HIFRENSA) is currently conditioning the operating wastes (filters, resins, sludges, etc.), a process to be carried out prior to initiation of dismantling work under the responsibility of ENRESA. These operating wastes include the graphite sleeves that previously supported the fuel elements in the core. These were originally stored on site in 3 silos and are now being processed. Depending on the completion date of the aforementioned processes, the dismantling tasks to be undertaken by ENRESA are expected to begin during the last quarter of this year.

972

V18/025836

Verification Test of Radioactivity Distribution Measurement Techniques on the Surface of Buildings

Sakai, H.; Yamanaka, T.; Makino, S.; Goto, T.; Onozawa, T.; Ishikura, T.; Yoshimura, Y.; Nakazawa, M.

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CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; (pp. 152-155) (1996)

Measurement and assessment of low level residual radioactivity on buildings would be required before the dismantling of a commercial nuclear power plant. Fast and correct radioactivity measurement techniques are necessary for this purpose. Two types of measurement method for residual radioactivity distribution measurement were tested using small-scale apparatus. A 35 second measuring time was obtained at 0.1 Bq/square centimeters detection limit by the scanning measurement method using a 21 X 21 centimeter detector. Two point sources 20 centimeters apart were resolved by the whole distribution measurement with two-dimensional detector. The results of this fundamental testing are summarized in this paper.

973

V18/022490

Verification Tests for Techniques of Decommissioning Waste Processing

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Nuclear Power Engineering Corporation, Tokyo, Japan; University of Tokyo, Tokyo, Japan; Toshiba Corporation, Kawasaki, Kanagawa, Japan

Report; 8 pp. (1995)

Large amounts of radioactive waste are generated during the dismantling of a nuclear power plant. It is essential to reduce the

amount of radioactive waste by adequate processing. Improvement of radioactivity measurement and decontamination techniques is especially important for this purpose. The verification tests have been under development since FY1987 and will finish in FY1996. A part of the result has already been reported in SPECTRUM '90, '92, and '94. This paper describes the progress of this verification testing.

974

V18/021488

Verification Tests of Residual Radioactivity Measurement and Assessment Techniques for Buildings and Soils

Onozawa, T.; Ishikura, T.; Yoshimura, Y.; Nakazawa, M.; Makino, S.; Urayama, K.; Kawasaki, S.

CONF-960306 (Vol. 5); ICONE-4 (Vol. 5), Proceedings of an American Society of Mechanical Engineers/Japanese Society of Mechanical Engineers (ASME/JSME) International Conference - Nuclear Engineering, Radioactive Waste Disposal, Decontamination and Decommissioning, Aging Assessment and License Renewals, Global Advances in Nuclear Codes and Standards, Major Component Reliability, A.S. Rao, R.B. Duffey and D. Elias (eds.), New Orleans, LA, March 10-13, 1996. ASME, New York, NY, Vol. 5, 525 pp.; (pp. 137-143) (1996)

According to the standard procedure for decommissioning a commercial nuclear power plant (CNPP) in Japan, controlled areas will be released for unrestricted use before the dismantling of a reactor building. If manual survey and sampling techniques were applied to measurement for unrestricted release on and in the extensive surface of the building, much time and specialized labor would be required to assess the appropriateness of releasing the site. Therefore the authors selected the following three techniques for demonstrating reliability and applicability of the techniques for CNPPs: (1) technique for assessing radioactive concentration distribution on the surface of buildings (ADB); (2) technique for assessing radioactive permeation distribution in the concrete structure of buildings (APB); and (3) technique for assessing radioactive concentration distribution in soil (ADS). These tests include the techniques for measuring and assessing very low radioactive concentration distribution on the extensive surfaces of buildings and the soil surrounding of a plant with automatic devices. Technical investigations and preliminary studies of the verification tests were started in 1990. In the study, preconditions were clarified for each technique and the performance requirements were set up. Moreover, simulation models have been constructed for several feasible measurement methods to assess their performance in terms of both measurement test and simulation analysis. Fundamental tests have been under way using small-scale apparatuses since 1994.

975

V18/023532

WAGR Decommissioning Project: Progress Report

United Kingdom Atomic Energy Authority, Windscale, United Kingdom

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (3 pp.) (1996)

Progress in the WAGR decommissioning program involved the removal of the heat exchangers. Cranes removed the exchangers

and placed them on high technology transporters for the 10 mile journey on public roads to Drigg. Each was escorted by police, health physics staff, telephone and electricity board staff (to deal with overhead utility lines) and the transporter support crew. During the night time movement of the first exchanger a party atmosphere prevailed along the whole route with large crowds in attendance. At the Drigg disposal site each heat exchanger was unloaded from the transporter and placed in a concrete vault. The four were fully grouted, internally and externally without any difficulties. Since the removal of the four heat exchangers and their transportation to the disposal site at Drigg, work has been concerned with the resealing of the WAGR building, closing the 4 apertures through which each heat exchanger was removed. The remote dismantling machine control cables which had to be removed for the heat exchanger lift out are being reconnected.

976

V18/022806

WAK Decommissioning and Dismantling Program [August 1996]

Eiben, K.; Fritz, P.

Wiederaufarbeitungsanlage Karlsruhe Betriebsgesellschaft mbH, Eggenstein-Leopoldshafen, Germany

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1765-1768) (1996)

The decommissioning and dismantling of the German pilot plant for reprocessing of nuclear fuel (WAK) is performed in six steps with the task of remediating the site at the Research Centre in Karlsruhe to become a green meadow. Since 70 cubic meters of high active waste concentrate (HAWC) are still stored on the site, presently all dismantling measures are concentrated on the former reprocessing building.

977

V18/021264

WAK Decommissioning and Dismantling Program [September 1995]

Eiben, K.; Fritz, P.

Wiederaufarbeitungsanlage Karlsruhe Betriebsgesellschaft mbH, Eggenstein-Leopoldshafen, Germany

CONF-950917 (Vol. 2); ICEM '95, Proceedings of the Fifth International Conference on Radioactive Waste Management and Environmental Remediation, Vol. 2: Management of Low-Level Waste and Remediation of Contaminated Sites and Facilities, S. Slate, R. Baker and G. Benda (eds.), Berlin, Germany, September 3-7, 1995. American Society of Mechanical Engineers, New York, NY, 913 pp.; (pp. 1654-1655) (1995)

After an extensive rinsing of the reprocessing equipment, the WAK-Plant operation was terminated in 1991 in accordance with a political decision to abolish reprocessing of nuclear fuel in Germany. Since July 1991, only the relevant safety units have been in operation, including the waste storage facilities for 80 cubic meters of high active waste concentrate (HAWC). The Plant decommissioning and dismantling will be achieved in six steps, taking into account that some of the reprocessing equipment can be

dismantled before and the rest only after the HAWC has been vitrified, approximately by mid 2000. So far two licenses for decommissioning have been granted. An application for the dismantling of twelve systems in the process building, including headend and tailend facilities, will be licensed in 1995. The remote dismantling of equipment from the hot cells in the process building is being planned and will be executed between 1998-2001. New remote handling equipment will be cold tested in a test facility scheduled to start in the middle of this year. The final task is the "green meadow" after demolishing the building and remediating the site, scheduled for 2005.

978

V18/023684

Waste Generation Comparison: Fossil Versus Nuclear Power Plants

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CONF-961032; Proceedings of the 1996 TLG Decommissioning Conference, Captiva Island, FL, October 13-16, 1996. TLG Services, Inc., Bridgewater, CT, 478 pp.; (4 pp.) (1996)

Low-Level Radioactive Waste (LLRW) generation and disposal always seems to attract a great deal of attention from anti-nuclear intervenors and some regulators. It is important to put the entire waste generation and disposal issue in perspective relative to other current forms of energy production. To accomplish this objective, a comparison is made of the quantities of wastes generated by a typical 1150 MWe coal-fired power plant to that of a comparably sized Pressurized Water Reactor (PWR). The fossil power plant information contained in this comparison was obtained from the book, "Steam," by Babcock & Wilcox, 40th Edition, 1992.

979

V18/021020

What Makes Decommissioning So Complicated?

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Technischer Ueberwachungsverein Suedwest e.V., Mannheim, Germany

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (7 pp.) (1996)

In Germany decommissioning has become a long lasting process connected with considerable costs. The decommissioning process is governed by the atomic energy laws and is therefore subject to authorization. These legal parameters demand a special licensing procedure. To fulfill the legal requirements and depending on the nature of decommissioning process, a great number of separate technical measures has to be considered and laid down in documents. These legal as well as technical conditions must be taken into account to avoid time making mistakes. A time saving strategy in the decommissioning procedure could be the package solution, whereby the whole range of decommissioning is divided into several packages. Within the package solution there is an optimizing potential, the black box solution, in which the number of points of intersection is minimized, while the volume of the system or room which is to dismantled is at a maximum. If a decommissioner takes this strategy - the package and the black box solution - into account

before he starts, he can avoid time making mistakes and can reduce the costs.

980

V18/021799

Why Not Do It Now?

Pohl, P.

Arbeitsgemeinschaft Versuchs-Reaktor GmbH, Juelich, Germany

Nuclear Engineering International 41(500):18-19 (March 1996)

Since the shutdown of AVR was first planned in the mid-1980s, delayed dismantling has been the accepted route. Now, new evaluations suggest that immediate dismantling to a green field would be cheaper and easier. Studies on how to dismantle the reactor, including the techniques to be used, costs, and waste management, have been performed for two different concepts. The choice, it turns out, is of little influence on the decision on whether green field decommissioning should be pursued. Both concepts are feasible and are similar in cost and time scale. However, they both show that immediate decommissioning to green field has clear cost advantages.

981

V18/023541

Working Group on Decontamination: Status Report

OECD/NEA Co-Operative Program on Decommissioning, Proceedings of the 20th Meeting of the Technical Advisory Group, Stockholm, Sweden, May 6-10, 1996, 512 pp.; (12 pp.) (1996)

This report contains an update on the questionnaires sent to Task Force members to gather information on decontamination techniques being utilized in their facilities. A copy of the questionnaire and a completed sample is included. The questionnaire focuses on these areas of interest: Process description, Description of the application, Expected results - recorded results, Waste quantities produced, Costs, Experiences to date, and Recommendations.

**U.S. DEPARTMENT OF ENERGY (DOE)
FORMERLY UTILIZED SITES REMEDIAL
ACTION PROGRAM**

982

V18/020734

Estimation of Uranium and Cobalt-60 Distribution Coefficients and Uranium-235 Enrichment at the Combustion Engineering Company Site in Windsor, Connecticut

Wang, Y.Y.; Orlandini, K.A.; Yu, C.

Argonne National Laboratory, Argonne, IL

ANL/EAD/TM-59; 23 pp. (May 1996)

Site-specific distribution coefficients for uranium isotopes and cobalt-60 (Co-60) and the fraction of uranium-235 (U-235) enrichment by mass were estimated for environmental samples collected from the Combustion Engineering Company site in Windsor, Connecticut. This site has been identified for remedial action under the U.S. Department of Energy's (DOE) Formerly Utilized Sites Remedial Action Program. The authority of DOE at the Combustion Engineering site is limited to (1) Building 3; (2) other activities or areas associated exclusively with Building 3 (such as sewer lines); or (3) contamination that is exclusively highly enriched uranium. In this study, 16 samples were collected from the Combustion Engineering site, including 8 soil, 4 sediment, 3 water, and 1 water plus sludge sample. These samples were analyzed for isotopic uranium by alpha spectrometry and for Co-60 by gamma spectrometry. The site-specific distribution coefficient for each isotope was estimated as the ratio of extractable radionuclide activity in the solid phase to the activity in the contact solution following a 19-day equilibration. The uranium activity measurements indicate that uranium-234 (U-234) and uranium-238 (U-238) were in secular equilibrium in two soil samples and that soil and sediment samples collected from other sampling locations had higher U-234 activity than U-238 activity in both the solid and solution phases. The site-specific distribution coefficient (K_d) ranged from 82 to 44,600 mL/g for U-238 and from 102 to 65,900 mL/g for U-234. Calculation of U-235 enrichment by mass indicated that four soil samples had values greater than 0.20; these values were 0.37, 0.38, 0.46, and 0.68. Cobalt-60 activity was detected in only three sediment samples. The measured Co-60 activity in the solid phase ranged from 0.15 to 0.45 pCi/g and that in the water phase of all three samples combined was 4 pCi/L. The K_d value for Co-60 in the site brook sediment was calculated to be 70 mL/g.

983

V18/024057

Surveillance of Site A and Plot M: Report for 1996

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Argonne National Laboratory, Argonne, IL

ANL-97/5; 105 pp. (May 1997)

The results of the environmental surveillance program conducted at Site A/Plot M in the Palos Forest Preserve area for 1996 are presented. The surveillance program is the ongoing remedial action that resulted from the 1976-1978 radiological characterization of the site. That study determined that very low levels of hydrogen-3 (as tritiated water) had migrated from the burial ground and were present in two nearby hand-pumped picnic wells. The current program consists of sample collection and analysis of air, surface and subsurface water, and bottom sediment. The results of the analyses are used to: (1) monitor the migration pathway of water

from the burial ground (Plot M) to the hand-pumped picnic wells, (2) establish if buried radionuclides other than hydrogen-3 have migrated, and (3) generally characterize the radiological environment of the area. Hydrogen-3 in the Red Gate Woods picnic wells was still detected this year, but the average and maximum concentrations were significantly less than found earlier. Tritiated water continues to be detected in a number of wells, boreholes, dolomite holes, and a surface stream. For many years, it was the only radionuclide found to have migrated in measurable quantities. Analyses since 1984 have indicated the presence of low levels of strontium-90 in water from a number of boreholes next to Plot M. The available data does not allow a firm conclusion as to whether the presence of this nuclide represents recent migration or movement that may have occurred before Plot M was capped. The results of the surveillance program continue to indicate that the radioactivity remaining at Site A/Plot M does not endanger the health or safety of the public visiting the site, using the picnic area, or living in the vicinity.

984

V18/022843

Innovative Method Used for Radiological Survey at FUSRAP Site

Keller, M.R.

Bechtel National, Inc., Oak Ridge, TN

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 2009-2010) (1996)

A pneumatically deployed membrane system was used to conduct radiological surveys of the pipes and drains at a Department of Energy (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP) site in Adrian, Michigan. Remedial action consisted of the removal of residual radioactive sludge and oil. The innovative technology was used to transport a high-sensitivity probe specifically designed for this application, through designated pipes and drains. Use of this system made it possible to survey over 1,000 linear feet of underground drain line in one week, with no significant safety hazards. This was the first time this technology had been field tested at a site, resulting in cost savings of more than \$1.5 million.

985

V18/021382

Environmental Surveillance Results for 1995 for the Hazelwood Interim Storage Site: FUSRAP Technical Memorandum [Rev. 0]

McCague, J.C.

Bechtel National, Inc., Oak Ridge, TN

FUSRAP Technical Memorandum 140-96-005 (Rev. 0); 65 pp. (June 1, 1996)

This memorandum presents and interprets analytical results and measurements obtained as part of the 1995 environmental surveillance program for the Hazelwood Interim Storage Site (HISS) under the Formerly Utilized Remedial Action Program (FUSRAP). The discussion provides a comparative analysis of average historical background conditions and applicable regulatory criteria to the 1995

results reported for external gamma radiation and for samples from the media investigated (air, surface water, sediment, groundwater, and stormwater). Results from the 1995 environmental surveillance program at HISS indicate that, with the exception of thorium-230 in streambed sediment, applicable U.S. Department of Energy (DOE) guidelines were not exceeded for any measured parameter or for any dose calculated for potentially exposed members of the general public. In the absence of sediment guidelines, DOE soil guidelines serve as a standard of comparison for data obtained from streambed sediment; two samples from downstream locations contained concentrations of thorium-230 that exceeded DOE soil guidelines. All stormwater sample results were in compliance with permit-specified limits. Other radioactive materials include radium 226 and natural uranium.

986 V18/024072

Environmental Surveillance Results for 1996 for the Hazelwood Interim Storage Site: FUSRAP Technical Memorandum [Rev. 0]

Redmon, M.E.

U.S. Department of Energy, Oak Ridge Operations Office, Formerly Utilized Sites Remedial Action Program, Oak Ridge, TN

FUSRAP Technical Memorandum 140-97-005 (Rev. 0); 62 pp. (May 20, 1997)

This memorandum presents and interprets analytical results and measurements obtained as part of the 1996 environmental surveillance program for the Hazelwood Interim Storage Site (HISS) under the U.S. Department of Energy (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP). In the early history of the site, uranium ore and uranium- and radium-bearing process residues were stored on the property, resulting in low-level radioactive contamination of soil. The environmental surveillance program for HISS includes sampling of air, surface water, stormwater runoff, groundwater, and streambed sediment to aid in evaluating potential effects on the offsite population from these materials. The discussion below provides a comparative analysis of average historical background conditions and regulatory criteria to the 1996 results reported for external gamma radiation and for samples from the media investigated. Data tables and figures referenced in the text are included at the end of this document. Results from the 1996 environmental surveillance program at HISS indicate that, except for thorium-230 in streambed sediment, no measured parameter exceeded applicable DOE guidelines, and no dose calculated for potentially exposed members of the general public exceeded DOE limits.

987 V18/021545

Surface Horizontal Logging for Radon at a Superfund Site

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Halliburton Energy Services, Houston, TX

CONF-9510773; IEEE Nuclear Science Symposium and Medical Imaging Conference, San Francisco, October 23-28, 1995; IEEE Transactions on Nuclear Science 43(3-Pt2):1842-1845 (June 1996)

The Department of Energy sponsored an Expedited Site

Characterization study performed by Ames Laboratory at the St. Louis (Missouri) Airport Site during August-September, 1994. Uranium processing occurred there during the Cold War and significant residual radioactive contamination now exists on site. This paper reports on continuous gamma ray spectroscopy measurements to identify the emitting isotopes and to quantify the amount of radioactivity present for each. An oilfield wireline gamma ray spectrometry sonde (the Compensated Spectral Natural Gamma instrument) was adapted to perform horizontal measurements with the detector section 3 ft above the soil surface. The results of the gamma ray spectroscopy measurements will be discussed.

988 V18/022547

Uncertainty Analyses for Radiological Assessments of St. Louis FUSRAP Sites

Miller, L.F.; Spencer, K.M.; White, D.E.

University of Tennessee, Knoxville, TN

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):64a (June 1996)

Uncertainty analyses were performed in conjunction with radiological assessments of the Formerly Utilized Site Remedial Action Program (FUSRAP) St. Louis Downtown Site (SLDS), the Airport Site (SLAPS), and the Ball Field Site (SLBFS). Contaminants of concern at each location are natural uranium, radium, Th-232, and Th-230. The SLDS was used for uranium and thorium ore processing and includes an area of 45 acres. The SLAPS covers 22 acres and was used as a staging area for materials from the SLDS. Contaminants on the SLBFS were dispersed from the SLAPS, which involves an area of 80 acres. Significant levels of uranium contamination range from near zero to several thousand pCi/g and extend to about 20 feet in depth in a few locations at SLAPS and SLDS. Significant areas of peak radium and thorium concentrations are several hundred pCi/g with similar ranges in depth. Peak concentrations correspond to high grade ore. Radium and thorium constitute a greater radiological hazard than does uranium at all three locations. In order to satisfy the Environmental Protection Agency guideline for a lifetime risk of less than $10(E-4)$, the maximally exposed individual must receive less than about 4 mrem/yr if one assumes a risk of 5% per Sv. Based on the plant ingestion pathway, residual U-238, Ra-226, Th-232, and Th-230, concentrations of 400, 2, 4, and 40 pCi/g at SLDS result in a $10(E-4)$ lifetime risk with a 95% confidence level. Slightly different results were obtained for SLAPS and SLBFS. If more pathways are considered, such as radon, these values are even lower. Residual contamination levels could be increased by a factor of 25 if the historical Department of Energy limit of 100 mrem/y is acceptable. The volume of contaminated soil that presents a $10(E-4)$ lifetime risk is about 500,000 cu yd. The volume of soil contaminated to greater than 15 pCi/g of each radionuclide is about a factor of ten less.

989 V18/021766

Results of the Independent Radiological Verification Survey at 108 Avenue E, Lodi, New Jersey (LJ084V)

Rodriguez, R.E.; Johnson, C.A.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/RASA-96/4; 25 pp. (September 1996)

Thorium ores were processed by the Maywood Chemical Works until the property was sold to Stepan Chemical Company in 1959. Wastes were stored at what is now called Maywood Interim Storage Site (MISS), owned by the U.S. Department of Energy (DOE). Because of the migration of residuals off site into the surrounding areas, the Stepan property and several vicinity properties were designated for remedial action under the 1984 Energy and Water Development Appropriations Act. The DOE conducted radiological surveys of these sites to evaluate current radiological conditions as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP). In 1988, radiological surveys of some private residential properties on Avenue E in Lodi, New Jersey were conducted by members of an ORNL radiological survey team. Results of this survey indicated radiological contamination in excess of the DOE criteria for surface contamination at this vicinity property (108 Avenue E), and it was recommended for remediation. In the fall of 1995, a verification survey of this vicinity property was conducted by ORNL, the independent verification contractor for this effort, in conjunction with decontamination operations conducted under the supervision of Bechtel National Incorporated. The verification survey included complete surface gamma scans of the grounds and the collection of soil samples for radionuclide analysis. This report describes the radiological verification survey of this residential property. Based on the remedial action and verification survey data reported in this document, all radiological measurements fall below the limits prescribed by DOE radiological guidelines established for this site, and the property at 108 Avenue E, Lodi, New Jersey successfully meets the DOE radiological guidelines for unrestricted use.

990

V18/021765

Results of the Independent Radiological Verification Survey at 112 Avenue E, Lodi, New Jersey (LJ082V)

Rodriguez, R.E.; Johnson, C.A.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/RASA-96/3; 25 pp. (September 1996)

Thorium ores were processed by the Maywood Chemical Works until the property was sold to Stepan Chemical Company in 1959. Wastes were stored at what is now called Maywood Interim Storage Site (MISS), owned by the U.S. Department of Energy (DOE). Because of the migration of residuals off site into the surrounding areas, the Stepan property and several vicinity properties were designated for remedial action under the 1984 Energy and Water Development Appropriations Act. The DOE conducted radiological surveys of these sites to evaluate current radiological conditions as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP). In 1988, radiological surveys of some private residential properties on Avenue E in Lodi, New Jersey were conducted by members of an ORNL radiological survey team. Results of this survey indicated radiological contamination in excess of the DOE criteria for surface contamination at this vicinity property (112 Avenue E), and it was recommended for remediation. In the fall of 1995, a verification survey of this vicinity property was conducted by ORNL, the independent verification contractor for this effort, in conjunction with decontamination operations conducted under the

supervision of Bechtel National Incorporated. The verification survey included complete surface gamma scans of the grounds and the collection of soil samples for radionuclide analysis. This report describes the radiological verification survey of this residential property. Based on the remedial action and verification survey data reported in this document, all radiological measurements fall below the limits prescribed by DOE radiological guidelines established for this site, and the property at 112 Avenue E, Lodi, New Jersey successfully meets the DOE radiological guidelines for unrestricted use.

991

V18/021764

Results of the Independent Radiological Verification Survey at 113 Avenue E, Lodi, New Jersey (LJ081V)

Rodriguez, R.E.; Johnson, C.A.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/RASA-96/2; 25 pp. (September 1996)

Thorium ores were processed by the Maywood Chemical Works until the property was sold to Stepan Chemical Company in 1959. Wastes were stored at what is now called Maywood Interim Storage Site (MISS), owned by the U.S. Department of Energy (DOE). Because of the migration of residuals off site into the surrounding areas, the Stepan property and several vicinity properties were designated for remedial action under the 1984 Energy and Water Development Appropriations Act. The DOE conducted radiological surveys of these sites to evaluate current radiological conditions as part of the Formerly Utilized Sites Remedial Action Program (FUSRAP). In 1988, radiological surveys of some private residential properties on Avenue E in Lodi, New Jersey were conducted by members of an ORNL radiological survey team. Results of this survey indicated radiological contamination in excess of the DOE criteria for surface contamination at this vicinity property (113 Avenue E), and it was recommended for remediation. In the fall of 1995, a verification survey of this vicinity property was conducted by ORNL, the independent verification contractor for this effort, in conjunction with decontamination operations conducted under the supervision of Bechtel National Incorporated. The verification survey included complete surface gamma scans of the grounds and the collection of soil samples for radionuclide analysis. This report describes the radiological verification survey of this residential property. Based on the remedial action and verification survey data reported in this document, all radiological measurements fall below the limits prescribed by DOE radiological guidelines established for this site, and the property at 113 Avenue E, Lodi, New Jersey successfully meets the DOE radiological guidelines for unrestricted use.

992

V18/021762

Results of the Independent Radiological Verification Survey at 79 Avenue B, Lodi, New Jersey (LJ091V)

Rodriguez, R.E.; Uziel, M.S.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/RASA-96/6; 25 pp. (September 1996)

Prior to remediation, thorium residues in excess of DOE applicable guidelines were found in the eastern corner of the backyard on property at 79 Avenue B, Lodi, New Jersey. Decontamination,

which consisted of excavation and removal of contaminated soil, was performed by subcontractors under the direction of Bechtel National, Inc. The independent radiological survey described in this report was performed by the Measurement Applications and Development Group at Oak Ridge National Laboratory to verify that the final remedial action had reduced contamination levels to within authorized limits. The property at 79 Avenue B, Lodi, New Jersey, was thoroughly investigated outdoors for radionuclide residues. Surface gamma exposure rates were below guideline levels and comparable to typical background values for the area. The results of soil radionuclide analysis for U-238, Ra-226, and Th-232 indicated that all soil concentration measurements were below limits prescribed by DOE applicable guidelines for protection against radiation. Analysis of data contained in the post-remedial action report (DOE/OR/21949-405) and results of this independent radiological survey by ORNL confirm that all radiological measurements fall below the limits prescribed by DOE guidelines established for this site. The property at 79 Avenue B successfully meets the DOE remedial action objectives.

993

V18/021763

Results of the Independent Radiological Verification Survey of the Final Remediation at 90 Avenue C, Lodi, New Jersey (LJ079V)

Rodriguez, R.E.; Uziel, M.S.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/RASA-96/5; 25 pp. (September 1996)

Prior to remediation, thorium residues in excess of DOE applicable guidelines were found outdoors on the rear half of the property at 90 Avenue C, Lodi, New Jersey. (The front half of the property outdoors and areas indoors had previously been remediated and verified.) Decontamination, which consisted of excavation and removal of contaminated soil, was performed by subcontractors under the direction of Bechtel National, Inc. The independent radiological survey described in this report was performed by the Measurement Applications and Development Group at Oak Ridge National Laboratory to verify that the final remedial action had reduced contamination levels to within authorized limits. The property at 90 Avenue C, Lodi, New Jersey, was thoroughly investigated outdoors for radionuclide residues. Surface gamma exposure rates were below guideline levels and comparable to typical background values for the area. The results of soil radionuclide analysis for ²³⁸U, ²²⁶Ra, and ²³²Th indicated that all soil concentration measurements were below limits prescribed by DOE applicable guidelines for protection against radiation. Analysis of data contained in the post-remedial action report (DOE/OR/21949-405) and results of this final independent radiological survey by ORNL confirm that all radiological measurements fall below the limits prescribed by DOE guidelines established for this site. The property at 90 Avenue C successfully meets the DOE remedial action objectives.

994

V18/021134

Pilot Scale Testing of Soil Washing on Low Level Radioactively Contaminated Soils

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Energy, Oak Ridge Operations Office, Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (11 pp.) (1996)

Several sites in the Formerly Utilized Sites Remedial Action Program (FUSRAP) have shown, in laboratory studies, to be amenable to volume reduction treatment by particle size separation. This treatment using water as a carrier media is often called soil washing. The current practice, at FUSRAP sites, of excavation and hauling to a disposal facility is both expensive and produces a large volume of soil that is potentially clean but is handled with the contaminated soil. Bechtel National Inc. (BNI) has performed pilot-scale soil washing on select FUSRAP soil to demonstrate treatment/volume reduction. The soils examined for soil washing were from the New Jersey sites, and each had undergone a laboratory characterization study that had shown that radiological contaminants were concentrated in the fine silt and clay fractions of the soil. The characterization treatment goal was 5 pCi/g for residential areas, and 15 pCi/g for industrial area. Removal of those fine fractions could produce coarse fractions of soil well below the 5/15 criteria with volume reductions of 50-80%. To demonstrate scale-up and potential full-scale remediation, a pilot-plant study was performed using a soil washing pilot-plant originally designed by the Environmental Protection Agency (EPA) for testing on Montclair and Glenridge, New Jersey soils. This pilot plant named VORCE (Volume Reduction/Chemical Extraction) was modified to meet the specific requirements for treatment of the FUSRAP soils. After a series of tests on clean soils to develop operating parameters and system performance the machine was used to treat Maywood, New Jersey Interim Storage Site (MISS) pile soils. All tests performed to date indicate soil washing is very promising for treatment. Further tests are continuing on soils from other sites and locations.

995

V18/022493

Colonie Condition: A Case Study in Managing Small Quantities of Mixed Wastes

Newberry, E.T., Jr.; Kaye, M.E.; Borden, G.J.

Bechtel National, Inc., Oak Ridge, TN

CONF-950877; Mixed Waste, A.A. Moghissi, B.R. Love and R.K. Blauvelt (eds.), Proceedings of the Third Biennial Symposium, Baltimore, MD, August 7-10, 1995, 545 pp.; (pp. 1.4.1-1.4.16) (1995)

The Colonie Interim Storage Site is a U.S. Department of Energy-owned site near Albany, New York. Until 1984, the site was used for fabricating materials from depleted uranium and natural thorium. These operations resulted in widespread chemical and radioactive contamination of the site building and created numerous radioactive mixed waste streams and waste streams regulated by the Resource Conservation and Recovery Act (RCRA). The management of these mixed wastes is complicated by the number and diversity of waste streams containing relatively small volumes of material. Additionally, the wastes occur in matrixes that make treatment very difficult (e.g., waste oils and sludges). The facility is undergoing a Part A RCRA permit closure action, and a decontamination and demolition effort is in progress. This paper describes the systematic approaches developed for managing these

waste streams, including the process used to identify, evaluate, and test waste streams; the waste management activities conducted at the site, including storage, transport, minimization, and disposal of mixed waste; the treatment technologies used (e.g., cyanide destruction, thermal treatment, chemical oxidation, and solidification/stabilization); environmental compliance activities and issues associated with closure of the current RCRA Part A permit at the facility; and lessons learned through the management of these mixed wastes.

996

V18/021012

Derivation of Guidelines for Uranium Residual Radioactive Material in Soil at the Colonie Site, Colonie, New York

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ANL/EAD/TM-57; 25 pp. (May 1996)

Residual radioactive material guidelines for uranium in soil were derived for the Colonie site located in Colonie New York. This site has been designated for remedial action under the Formerly Utilized Sites Remedial Action Program (FUSRAP) of the U.S. Department of Energy (DOE). The site became contaminated with radioactive material as a result of operations conducted by National Lead (NL) Industries from 1958 to 1984; these activities included brass foundry operations, electroplating of metal products, machining of various components using depleted uranium, and limited work with small amounts of enriched uranium and thorium. The Colonie site comprises the former NL Industries property, now designated the Colonie Interim Storage Site (CISS), and 56 vicinity properties contaminated by fallout from airborne emissions; 53 of the vicinity properties were previously remediated between 1984 and 1988. In 1984, DOE accepted ownership of the CISS property from NL Industries. Residual radioactive material guidelines for individual radionuclides and total uranium were derived on the basis of the requirement that the 50-year committed effective dose equivalent to a hypothetical individual who lives or works in the immediate vicinity of the site should not exceed a dose of 30 mrem/yr following remedial action for the current use and likely future use scenarios or a dose of 100 mrem/yr for less likely future use scenarios. The DOE residual radioactive material guideline computer code, RESRAD, was used in this evaluation; RESRAD implements the methodology described in the DOE manual for establishing residual radioactive material guidelines.

997

V18/022087

Designing a Solidification/Stabilization Process for a Fine Powder Mixed Radioactive Waste

Artates, L.M.

Bechtel National, Inc., Oak Ridge, TN

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 362-368) (1994)

During cleanup of the Department of Energy's Colonie Interim Storage Site, high-efficiency particulate air-filtered vacuum dust was generated that contained low levels of radioactivity. This waste must be treated to pass the toxicity characteristic leaching procedure test for lead and cadmium in order to meet land disposal restrictions. Portland cement, portland cement with silica fume, portland cement with soluble silicate, Envirostone [R] gypsum cement, Fluid Tech [R] materials, sulfur cement, and vinyl ester resin were all examined and tested as potential solidification/stabilization agents. Bench scale test results are presented, and a process design using portland cement with silica fume and water-reducing admixtures is recommended for a small-scale application.

998

V18/022067

Volume Reduction by Segregation and Treatment of Low-Level Radioactive Waste at the Colonie Interim Storage Site

Ramachandran, N.; Snider, P.M.; Bengel, M.M.

Bechtel National, Inc., Oak Ridge, TN

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 369-373) (1994)

The Department of Energy is conducting a phased cleanup of the Colonie Interim Storage Site under its Formerly Utilized Sites Remedial Action Program. The removal and disposal of mixed radioactive and chemical waste stored in the building, asbestos-containing materials, process equipment, and nonstructural building appurtenances began in 1992. This paper discusses waste segregation and its combination with other treatment methods to achieve volume reduction of the wastes from process equipment and nonstructural building appurtenances. Wastes are manually segregated according to potential disposal options, and some of these wastes are then treated to reduce volume. Carbon steel, wood, paper, plastics, personal protective equipment, oils, fluorescent light ballasts, uranium, and asbestos are segregated for volume reduction, if practicable, and appropriate disposal. Volume reduction methods include segmenting, shredding, and compacting. As a result of volume reduction, significant savings have been realized in transportation and container costs. Additional savings can be realized when burial or smelting is chosen as a disposal method.

999

V18/021760

Town of Colonie Sanitary Landfill Leachate Management System: Final Report for 1992 and 1993 Spraying Seasons

Harmon, D.J.; Stockbridge, F.J.

J. Kenneth Fraser and Associates, Rensselaer, NY; Town of Colonie, Newtonville, NY

NYSERDA-96-10; 55 pp. (August 1996)

This project was designed to study the viability of on-site treatment of leachate at a municipal solid waste landfill. The treatment

method consisted of spraying leachate over the closed landfill's surface to facilitate evaporation and transpiration into the native vegetation. Other facts of the project included evaluating environmental impacts on the soil and air, vegetative uptake of pollutants, and resultant soil moisture. The project demonstrated the viability of using spray evapotranspiration as a means of treating leachate, as well as the economic limitations of constructing and operating a leachate-spraying system. The greatest value of this system may be the identification of myriad operational problems associated with a fully operational and automated spray system. Many improvements were made in the field during operation, while some improvements, such as better control software and system communication, can easily be incorporated into future versions of this project.

1000 V18/021168

Confirmatory/Release Survey of the Property at 71 Pearce Avenue (Former EAD Building) in Tonawanda, New York

Salame-Alfie, A.; Alibozek, R.

New York State Department of Health, Albany, NY

CONF-951209; Proceedings of the 17th Annual U.S. Department of Energy Low-Level Radioactive Waste Management Conference, D. Lake (ed.), Phoenix, AZ, December 12-14, 1995, 480 pp.; (11 pp.) (1995)

EAD Metallurgical, Inc., operated a facility in Tonawanda, New York, in which it utilized Americium 241 (Am-241) for the production of foil sources for use in smoke detectors. EAD was in operation between 1977 and 1983. By 1983, the company started losing money, and decided to relocate to Mexico. Before closing down its Tonawanda operation, however, it was required by the New York State Department of Labor (DOL) to decontaminate its facility to limits specified by DOL. No records of discharges to the sewer system were kept during this decontamination effort. Unsuccessful decontamination efforts by several EAD employees and contractors left the building contaminated, in particular the concrete floors and walls. To determine the scope of work for the decontamination project, staff from the New York State Departments of Health (DOH) and Environmental Conservation (DEC) conducted a Characterization Survey of the facility in 1993. This survey identified contamination levels of Am-241 in excess of release limits throughout the building, in the soil outside the facility, in pipes for sewage and interior drainage, and in an 8 x 8 x 11 foot sump pit in the building. DOH issued a request for proposals in early 1994 for the decontamination and subsequent decommissioning of the former EAD building, and NES/IES Inc. (NES) was awarded the contract to perform the remediation. DOH's assignment was to provide an on-site presence to insure the completion of all agreed upon tasks, according to the terms of the contract and work plans submitted by NES. Additionally, the DOH staff acted as a liaison between NES, DOH, DEC and DOL central offices to review, comment and approve all changes or modifications to NES's approach to the decontamination efforts. The assigned staff was also responsible for conducting confirmatory sampling and surveys of all areas deemed releasable to DOL and DEC criteria by NES. At the conclusion of the project, the property at 71 Pearce Avenue, including the building and outside grounds was released for unrestricted use.

1001

V18/020965

Characterization Study of Radioactively Contaminated Soils from the Tonawanda FUSRAP Site

Phillips, C.R.; Burchett, R.T.; Neiheisel, J.; Richardson, W.S., III; Cox, C.; Lloyd, V.D.

Sanford Cohen & Associates, Inc., Montgomery, AL; Auburn University, Montgomery, AL; U.S. Environmental Protection Agency, Washington, DC

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (20 pp.) (1996)

The National Air and Radiation Environmental Laboratory (NAREL) received eight whole soil samples from four individual sites collectively referred to as the Tonawanda FUSRAP Site. The four sites are Ashland I, Ashland II, Linde, and Seaway. The primary radioactive contaminants in the soils are uranium-235, uranium-238, radium-226, thorium-230, and their decay products. Two samples were received from each site, one sample collected to represent the maximum levels of radioactivity (Bias) and one to represent the average levels (Systematic). The samples were designated as Ash I Bias, Ash I Systematic, Ash II Bias, Ash II Systematic, Linde Bias, Linde Systematic, Seaway Bias, and Seaway Systematic. The primary objectives of this initial characterization of the samples were to: (1) Determine if particle-size separation techniques could be effective in reducing the volume of contaminated soil, (2) Identify any radiominerals present, (3) Determine the presence and magnitude of contamination associated with particles of high density and ferromagnetism, and (4) determine if chemical scout extraction tests are effective in reducing the volume of contaminated soil in these samples. Particle-size separation by wet sieving and hydroclassification was performed after the samples were subjected to particle liberation by vigorous washing. Fractions were analyzed for radionuclides, and select fractions were subjected to petrographic analysis after density separation at 2.89 g/cc. Magnetic separations, using a hand-held magnet, were also performed on the heavy-mineral fractions to separate the ferromagnetic particles. The heavy-mineral nonmagnetic and magnetic fractions were analyzed for select radionuclides. Scout chemical extractions were performed with hot nitric acid on the samples that were judged to be amenable to contaminant reduction by the technology: four Systematic Tonawanda samples, the +50 and -50-mesh portions of the Linde Bias sample, and the +50-mesh fractions of the Linde Systematic sample. Analysis of data from the eight Tonawanda samples examined in this study demonstrates that particle-size separation alone will not provide a successful remediation solution for any of the sites. Although significant concentrations of the radionuclides were identified in the heavy-mineral fractions of materials from the eight samples, there were insufficient quantities to affect the overall radionuclide concentrations by their removal. Ferromagnetic materials separated from the heavy-mineral fractions also contained elevated concentrations of radionuclides; but these were, likewise, insufficient in quantity to affect the remediation potential by their removal. The results of the 3M nitric acid extraction indicate that the Linde +50-mesh material, particularly the Bias soil, shows promise for meeting cleanup criteria with additional chemical

extraction.

1002 V18/021169

Radiological Characterization Survey Results for Gaskill Hall, Miami University, Oxford, Ohio (OXO015)

Kleinhans, K.R.; Murray, M.E.; Carrier, R.F.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/RASA-95/12; 25 pp. (April 1996)

Between October 1952 and February 1957, National Lead of Ohio (NLO), a primary contractor for the Atomic Energy Commission (AEC), subcontracted certain uranium machining operations to Alba Craft Laboratory, Incorporated, located at 10-14 West Rose Avenue, Oxford, Ohio. In 1992, personnel from Oak Ridge National Laboratory (ORNL) confirmed the presence of residual radioactive materials from the AEC-related operations in and around the facility in amounts exceeding the applicable Department of Energy (DOE) guidelines. Although the amount of uranium found on the property posed little health hazard if left undisturbed, the levels were sufficient to require remediation to bring radiological conditions into compliance with current guidelines, thus ensuring that the public and the environment are protected. Because it was suspected that uranium may have been used in the past in the immediate vicinity of Alba Craft in a Miami University building, a team from ORNL performed a radiological characterization survey of that structure in January 1994. The survey was conducted at the request of DOE as a precautionary measure to ensure that no radioactive residuals were present at levels exceeding guidelines. The survey included the determination of directly measured radiation levels and the collection of smear samples to detect possible removable alpha and beta-gamma activity levels, and comparison of these data to the guidelines. Results of the survey showed that all measurements were below the applicable guideline limits set by DOE.

1003 V18/025342

Controlling Moisture Content in FUSRAP Radioactive Waste Shipments

Rogers, B.; McDaniel, P.W.; Strassburger, E.

Bechtel National, Inc., Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

The Department of Energy's Formerly Utilized Sites Remedial Action Program has developed a moisture control plan to prevent free-standing liquid from collecting in waste shipments. Site waste conditions are assessed, waste moisture content is measured before loading, waste containers are examined for integrity, and moisture reduction methods are applied as required. To determine the potential for excessive moisture in waste shipments, several laboratory tests were evaluated to find a suitable method of identifying the moisture-holding capability of soil at the anticipated shipping density. As a result of this evaluation, the vibratory free liquid test was devised and validated through field testing.

1004

V18/024232

Crushing Leads to Waste Disposal Savings for FUSRAP

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (28 pp.) (February 1997)

In this article the author discusses the application of a rock crusher as a means of implementing cost savings in the remediation of FUSRAP sites. Transportation and offsite disposal costs are at present the biggest cost items in the remediation of FUSRAP sites.

If these debris disposal problems can be handled in different manners, then remediation savings are available. Crushing can result in the ability to handle some wastes as soil disposal problems, which have different disposal regulations, thereby permitting cost savings.

1005

V18/022546

Effect of the Distribution Coefficient, the Contaminated Area, and the Depth of Contamination on the Guidelines for Uranium Residual Radioactive Material in Soils

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CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):64b (June 1996)

U.S. Department of Energy (DOE) cleanup guidelines for uranium applicable to remedial actions at Formerly Utilized Sites Remedial Action Program (FUSRAP) sites are derived on a site-specific basis. The DOE residual radioactive material guideline computer code, RESRAD, is used in these evaluations. This analysis investigates the effect of site-specific parameters on the guideline values (specifically distribution coefficient, depth of contamination, and area of contamination) for 17 FUSRAP sites. On the basis of site-specific parameters, guideline values for a subsistence farmer scenario in RESRAD varied by as much as a factor of 40. For a high distribution coefficient (greater than 100 cu cm/g) and a thick source (thickness greater than 100 cm), radon and plant ingestion pathways are very important. For these sites, maximum dose/source ratios would occur at 1,000 years or more following remediation. For low distribution coefficients, water dependent pathways become important because of the leaching of radionuclides. Maximum dose/source ratios would occur at different times depending on the travel times of the radionuclides through the unsaturated/saturated zones. For intermediate distribution coefficients (normally between 40-200 cu cm/g) and small contamination depths, dust inhalation and external exposure are important pathways, while for larger contamination depths, the plant ingestion pathway becomes very important. The maximum dose/source ratios would occur immediately following remediation in both cases. For 17 FUSRAP sites, the size of most of the contaminated areas was greater than

3,000 sq m, and the guideline values were found to be insensitive to this parameter.

1006 V18/025404

Innovative Approaches to Environmental Restoration at FUSRAP Opportunity Sites

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U.S. Department of Energy, Oak Ridge Operations Office, Formerly Utilized Sites Remedial Action Program, Oak Ridge, TN; Argonne National Laboratory, Argonne, IL; Science Applications International Corporation, Oak Ridge, TN; Bechtel National, Inc., Formerly Utilized Sites Remedial Action Program, Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (10 pp.) (1997)

The Department of Energy (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP) is responsible for evaluating and conducting remedial actions at 46 sites located in 14 states. Twenty-four of these sites have been cleaned up to date. In many cases, remediation strategies for these sites have benefitted from innovative use of technology, partnerships with stakeholders, and waste minimization practices to generate significant savings in remediation costs and accelerate remediation schedules. Case studies are presented in this paper which summarize innovative remediation strategies at several FUSRAP sites. While each of these sites presented unique challenges, several elements of the remediation strategy were common to each case. These include: (1) use of multi-disciplinary management team to develop and evaluate alternative remediation strategies; (2) proactive communications with site owners, regulators, and other stakeholders to identify site-specific concerns and determine realistic future use scenarios; (3) development of risk-based remediation criteria based on the site-specific conditions and realistic future land use assumptions; and (4) innovative application of available technology.

1007 V18/023731

Reducing Waste Volumes and Costs During Environmental Remediation: The FUSRAP Experience

McDaniel, P.W.; Davis, M.W.; Darby, J.D.; Newberry, E.T., Jr.; Palau, G.L.

Bechtel National, Inc., Oak Ridge, TN; U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN

CONF-960741; DOE Pollution Prevention in the 21st Century, Proceedings of the Twelfth Annual DOE Pollution Conference, Chicago, IL, July 9-11, 1996; (7 pp.) (1996)

By applying new pollution prevention methods and well-known techniques in innovative ways, the U.S. Department of Energy's Formerly Utilized Sites Remedial Action Program has significantly reduced the volume of waste and cut costs. Supplemental cleanup criteria developed in site-specific hazard assessments have minimized waste and reduced cleanup costs by over \$2 million. Recycling efforts include the smelting and reuse of approximately 2 million lb of radioactively contaminated scrap metal and a

respirator cartridge conservation program that significantly reduced cartridge disposal and lowered annual costs by \$103,000. At several sites, a rock crusher reduced rubble and building debris to soil-like material that can be reused, resulting in \$4 million in program savings. An innovative in situ inspection instrument was used to verify that cleanup levels of underground piping met the cleanup criteria, reducing waste by 1,500 cubic yards.

1008 V18/025398

Reindustrialization, Reuse, and Recycling on FUSRAP Environmental Remediation Projects

Rogers, B.; McNutt, R.; McDaniel, P.W.; Darby, J.D.

Bechtel National, Inc., Oak Ridge, TN; U.S. Department of Energy, Oak Ridge Operations Office, Formerly Utilized Sites Remedial Action Program, Oak Ridge, TN

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

The Department of Energy's Formerly Utilized Sites Remedial Action Program (FUSRAP) has remediated 23 sites contaminated with low levels of radioactive materials. While cleaning up these sites for commercial reuse, the FUSRAP team has developed and applied cost-effective methods for working in operating facilities, reducing waste volumes, using supplemental cleanup criteria, and recycling waste materials. For example, to verify that cleanup levels of underground piping met the specified criteria, an innovative in situ inspection instrument was used that minimized the impact of the inspection on an operating commercial production facility. At several sites, a rock crusher reduced rubble and building debris to soil-like material that can be beneficially reused, for a program savings of more than \$4 million. Recycling efforts include the smelting and reuse of approximately 1 million kg of radioactively contaminated scrap metal and an aggressive program for reclaiming and recycling materials from building demolition.

1009 V18/022968

White Paper on Investigation-Derived Wastes for the Formerly Utilized Sites Remedial Action Program

Report; 9 pp. (October 1, 1992)

The objective of this paper is to describe how the Formerly Utilized Sites Remedial Action Program (FUSRAP) manages Investigation-Derived Wastes (IDW). FUSRAP is a multifaceted program, governed by several federal and state laws, with sites in 13 states. In addition, several federal, state, and local organizations oversee FUSRAP activities. The diversity of sites demands a flexible approach for the management of IDW. This white paper will be incorporated as an appendix into the FUSRAP Waste Management Program Plan and will lay the framework for site specific plans. FUSRAP intends to draft two to three page Site Specific Waste Management plans for specific site activities addressing IDW. The site specific plans will be tailored to local requirements.

**NORM — CONTAMINATED
SITE RESTORATION**

1010

V18/021330

Abandoned Mine Waste Working Group: 1994 Annual Report

Western Governors' Association, Denver, CO; Federal Advisory Committee to Develop Onsite Innovative Technologies, Washington, DC

Report; 50 pp. (December 1994)

The Abandoned Mine Waste Working Group (MWWG) was created by the Committee to Develop Onsite Innovative Technologies (DOIT) in May 1993. During the past year the MWWG has developed projects to test new approaches to address identified barriers surrounding the development, deployment, and commercialization of innovative remediation technologies for abandoned mine waste. This report presents the principal findings and new approaches to be tested to address identified barriers. The management plan and the membership roster are appended.

1011

V18/024371

CORPEX [R] NORM Decontamination Process

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CORPEX Technologies Inc., Research Triangle Park, NC

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (23 pp.) (1996)

The CORPEX [R] Norm Decon process has been broadly employed to free release a variety of metallic and non-metallic items heavily contaminated with NORM. CORPEX Technologies Inc. works with applicators or directly with the equipment owners to assure proper, effective use of this decontamination process. The chemicals are nonhazardous, nondestructive, and non RCRA regulated. The process is applicable where hydroblasting or mechanical decontamination are not effective because they cannot access the contaminated regions and/or because of the size and shape of the parts to be decontaminated. The CORPEX [R] products/processes are equally effective in removing fixed Radium 226 and 228, Lead 210 and Polonium 210 as well as removing these radionuclides embedded in a variety of scales, oxides and hydrocarbons.

1012

V18/021254

Comparison of Cleanup Criteria for Sites Contaminated with Radium, Uranium, and Thorium

Rogers, V.C.; Bernhardt, D.E.; Sandquist, G.M.

Rogers and Associates Engineering Corporation, Salt Lake City, UT

CONF-941148 (Vol. 1); DDER-'94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 233-235) (1994)

Site-specific criteria for the cleanup of sites contaminated with naturally-occurring radioactive material (NORM) have been

developed for many sites. Most the criteria are expressed as maximum concentration limits of NORM radionuclides in soil that allow for the unrestricted release of the site. The site-specific criteria for Ra-226 are generally 5 pCi/g, with some specific sites allowing for a 15 pCi/g residual radium concentration at depths below 15 cm, consistent with the cleanup criteria for inactive uranium mill tailing sites. The site-specific criteria in general are consistent with criteria established by many states, the difference being an allowance by some states for a 30 pCi/g residual soil concentration for Ra-226 if the radon emanation coefficient is sufficiently low. Remediation efforts at several sites generally have resulted in residual radioactive levels of a factor of two or more below the specified remedial criteria.

1013

V18/024233

ELIPGRID-PC and INRADS [C]: Tools for Reducing Costs and Optimizing Data Collection on Sites Contaminated with NORM

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Oak Ridge National Laboratory, Health Sciences Research Division, Grand Junction, CO

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (8 pp.) (1996)

Oak Ridge National Laboratory (ORNL), Environmental Technology Section (ETS), located in Grand Junction, Colorado has more than ten years experience in radiological surveying and more than twenty years as part of the ongoing Formerly Utilized Sites Remedial Action Project surveys conducted by ORNL Health Sciences Research Division. As part of our mission, ETS researchers develop and apply innovative technologies to share with private industry. The ELIPGRID-PC software and INRADS multidetector radiologic survey instrument, on which work is in progress, are discussed. ELIPGRID-PC is a tool that aids in survey design, and the INRADS system automates and increases the amount of data collected.

1014

V18/022137

Experience with Risk-Based Residual Soil Concentration Limits for Oil and Gas NORM

Rogers, V.C.; Bernhardt, D.E.

U.S. Department of Energy, Washington, DC; Amoco Production Company, Houston, TX; Conoco, Inc., Stamford, CT; Rogers and Associates Engineering Corporation, Salt Lake City, UT

CONF-9509296; Environmental Issues and Solutions in Petroleum Exploration, Production, and Refining, K.L. Sublette (ed.), Proceedings of the Second International Petroleum Environmental Conference, New Orleans, LA, September 25-27, 1995, 1078 pp.; (pp. 811-820) (1995)

The allowable residual concentration of radium in soils is one of the important parameters in remediating sites contaminated with naturally-occurring radioactive materials (NORM). While generally applicable standards of residual radium concentrations in NORM have been promulgated in a few states, several options of risk-based

soil radium cleanup criteria have been developed for specific projects. The cleanup criteria for unrestricted release are generally consistent with residual concentrations contained in state regulation, i.e., 5 to 30 pCi/g. However, the radium concentration limits for various options for conditional release or use of the sites are much higher. Unrestricted use conditions include a reclaimer that builds a dwelling on site and then lives in it, uses water from an onsite well, and grows a garden for some of his food. For oil and gas NORM in this scenario, indoor radon and external gamma radiation pathways are most restrictive. The stipulations of conditional release or restricted use can significantly reduce the potential impact from disposed NORM, so that residual radon concentrations can increase up to a few hundred pCi/g.

1015 V18/025339

Improved Cost Effectiveness of Remedial Action Plans at Historic Waste Sites in Canada Through the Use of Waste Segregation Approaches

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (11 pp.) (1997)

This paper discusses the application of waste segregation approaches at historic waste sites in Canada. At many sites, the original waste volume has been substantially increased due to contamination of soil by natural transport processes or by physical mixing from activities such as property development. This results in a heterogeneous distribution of the contaminants between the original wastes and the native soils contaminated by the wastes. Segregation of a large fraction of the contaminant inventory, but in a small fraction of the volume, may thus lead to significantly reduced interim storage and final disposal costs since each fraction of the waste can be treated in a manner appropriate to its potential hazard. More expensive treatments can be reserved for a relatively small volume of material with the highest contaminant concentrations, while less expensive methods can be applied to the remainder. Policy and regulatory considerations are discussed, and the cost-effectiveness of this approach is examined using five case histories. These demonstrate reduced costs at the two sites where remedial action plans based on waste segregation have been implemented and the potential for cost reductions for future work at the other sites.

1016 V18/024110

Long-Range Alpha Detector Applied to NORM

Los Alamos National Laboratory, Los Alamos, NM

LALP-94-15; 1 p. (1994)

The production of Natural Occurring Radioactive Materials (NORM) in the oil and gas industry have been known since the early 1800s but have only recently come under new legislation by both federal and state agencies. These materials plate out on the inside surfaces of pipes, tanks, and the exterior surfaces of equipment. Standard detection methods have lead to inadequate detection, which in turn can lead to soil contamination. The Long-Range

Alpha Detector (LRAD) can provide an alternate method of monitoring for these contaminants by detecting the alpha emitters that are prevalent in the NORM decay chain. The LRAD detects ion pairs created by an alpha particle in ambient air rather than the alpha particle directly. By using an airflow to transport these ion pairs to signal plane, we can monitor the interior and exterior surfaces of concern with good sensitivity and short count times. Our instrumentation is fully fieldable and "user friendly."

1017 V18/024369

Managing Liabilities for NORM

Simmons, C.T.; Bick, T.K.

Kilpatrick & Cody, L.L.P., Washington, DC

Environmental Claims Journal 9(1):41-64; CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (42 pp.) (1996)

Beginning in the mid-1950s, the primary focus of government regulation of radioactive materials has been on the control of exposures to nuclear fuel cycle materials (i.e., those radioactive materials that are generated during the course of mining, processing, and use of uranium to produce weapons and energy). The Nuclear Regulatory Commission (NRC) and its predecessor agency have had exclusive jurisdiction over such nuclear fuel cycle materials. The past five years, however, have seen a substantial increase in government interest in preventing the potentially harmful effects of human exposures to other forms of radioactive materials not regulated by the NRC (collectively referred to as naturally occurring radioactive materials, or NORM). As government warnings about the potential hazards of NORM have increased and regulations designed to control NORM have proliferated, the number of lawsuits alleging property damage or bodily injury from exposures to NORM-containing substances has also increased. This litigation, in turn, has generated disputes between insurers and policyholders over whether standard-form liability policies were meant to provide coverage for such claims.

1018 V18/024370

NORM Regulations

Gray, P.

Peter Gray & Associates, Tulsa, OK

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (10 pp.) (1996)

This presentation examined the status of state and federal regulations concerning NORM. Past practices implicated in the growing regulation of NORM include lack of survey data, use of broker systems, non-employee (contractor) involvement, and contaminated equipment sent to smelters, scrap yards, etc. Regulations need to address worker protection, exempt low risk materials, scrap recycling, remediations, and disposal options. In the Federal arena, there are no NRC or EPA rules concerning NORM. OSHA has radiation rules and DOT has regulations for the transportation of radioactive material. As of October 1, 1996 there were 8 states with NORM regulations and 9 states with regulations

under development. Even though most states do not have specific NORM regulations, these states do have regulations for the control of radiation.

1019 V18/022110

Naturally Occurring Radioactive Material (NORM) and Its Effects on the Casting Industry

Novotny, J.F.; Hale, D.W.; Cummins, G.P.

Blasland, Bouck & Lee, Inc., Syracuse, NY

CONF-951139 (Vol. 1); Superfund 16: Proceedings of a Hazardous Waste Conference and Exhibition, Washington, DC, November 6-8, 1995. E.J. Krause and Associates, Bethesda, MD, Vol. 1, 828 pp.; (pp. 265-270) (1994)

As a result of the recent heightened awareness of the use of naturally occurring radioactive material (NORM) in the casting and other industries, environmental regulations have become more stringent regarding the disposal of the material. Public perception is often skewed, however, because so few people understand radioactivity and perceive NORM waste as more "dangerous" than many hazardous wastes. In an effort to clarify some facts surrounding the NORM debate, this paper discusses the use, disposal, and regulation of NORM-containing zircon sands and zirconia in the casting industry.

1020 V18/024365

Naturally Occurring Radioactive Material (NORM): An Emerging Environmental Problem

Gray, P.

Peter Gray & Associates, Tulsa, OK

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (19 pp.) (1996)

The series of viewgraphs defines NORM and industrial processes that generate NORM contamination. Contamination in the petroleum industry specifically is addressed. Hazards are identified and the risks associated with them are discussed. Options for the disposal of NORM-contaminated wastes are examined along with concerns about the release of contaminated equipment. Management issues and programs to improve regulatory compliance are also discussed.

1021 V18/024372

Overview of NORM and Activities by a NORM Licensed Permanent Decontamination and Waste Processing Facility

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Growth Resources, Inc., New Orleans, LA

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (26 pp.) (1996)

This series of viewgraphs presents information on issues concerning NORM including NORM sources, problems, regulations and disposal option; potential NORM hazards, safety equipment and PPE; and

personnel protection requirements. The presentation then covers the NORM decontamination and waste management activities at the Black Bayou Facility in Lafayette, LA. Included is a description of the permanent facility, NORM Operations, specific radioactive material license, operating and safety procedures, equipment decontamination capabilities, NORM waste processing capabilities and offsite NORM services.

1022 V18/024366

Overview of Pennsylvania's Experience with NORM

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Pennsylvania Department of Environmental Protection, Southwest Regional Office, Pittsburgh, PA

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (13 pp.) (1996)

Although Pennsylvania may be thought of as the state who brought you indoor radon, courtesy of a discovery of a residence with radon concentration in excess of a few thousand picocuries per liter, this is not our only claim to NORM fame. However, with the exception of indoor radon, NORM is not a major problem in the Commonwealth of Pennsylvania. The radionuclide concentrations in the ash from coal fired electric generating stations is not too great. The radiation levels at the brine treatment facilities do not constitute a concern about worker exposure, the sludges are characterized by the treatment facilities, and those which are disposed are placed in double-lined, leachate monitored landfills. There have not been wide-spread elevated radiation levels around producing oil and gas wells. The roads spread with brines haven't shown increases in the ambient radiation levels. The state does not have major producers of phosphates for fertilizers or gypsum. The occasions in which there is generally higher than expected NORM concentrations or contamination is in metal recycling. The metal manufacturing mills and their feeder yards monitor for radioactivity to prevent exposure problems. In conclusion, there is no need to regulate a problem which isn't there.

1023 V18/024368

Proposed Changes for Part N of Suggested State Regulations

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CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (17 pp.) (1996)

The Conference of Radiation Control Program Directors (CRCPD) established a Commission on NORM to develop suggested state regulations for the regulation of NORM, and to perform a risk-based assessment and supporting rationale and justification for NORM standards, and a cost-benefit analysis on the degree of regulation needed. Major issues that the Commission addressed were contamination criteria, recycling, and disposal options. An Advisory Committee was then set up to provide the Commission

with the best available information on all possible issues regarding the regulation of NORM and to solicit support and "buy-in" to recommendation of the CRCPD from non-regulatory sectors. A number of key issues to resolve were identified and substantive changes to part N were outlined. Finally, a draft schedule for Part N approval was developed which leads to final approval by July 1, 1997.

1024 V18/022548

Radiological Criteria for Unrestricted Use of Sites Containing NORM

Bernhardt, D.E.; Rogers, V.C.; Nielson, K.K.

Rogers and Associates Engineering Corporation, Salt Lake City, UT

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):54a (June 1996)

Naturally occurring radioactive material (NORM) is redistributed in the environment as a result of many mineral recovery and processing industries. There are not federal regulations specifying criteria for NORM contaminated sites; however, several states have promulgated regulations. The regulations promulgated by the states generally focus on NORM from oil and gas production, the primary focus of the assessments for this paper. The criteria for residual NORM in soil are generally (1) 0.18 Bq/g in the surface 15 cm of soil and 0.6 Bq/g at depth or (2) 1.1 Bq/g, with a limitation on the radon flux. The primary radiation dose pathways for unrestricted use of land are external gamma exposure and exposure related to indoor radon. Radiation doses vary by over an order of magnitude based on different ratios of Ra-226 to Ra-228 concentrations, biological uptake parameters related to NORM, and the different radon emanation factors for oil field scale and sludge. A Ra-226 criterion of 1.1 Bq/g results in a dose of about 2 mSv/y from external gamma and about 3 mSv/y from radon for a general crawl-space type residence home scenario. The chemical and physical characteristics of the NORM and site-specific factors are important considerations in the assessments. The radon dose would be about 3 times higher for NORM in sludge vs. the assumption of pipe scale. The structural characteristics of residences (e.g., slab-on-grade, crawl-space, or trailer) also have a significant impact on the potential doses to residences.

1025 V18/024367

Regulation of NORM by the U.S. Department of Energy

Duvall, K.C.; Peterson, H.T., Jr.

U.S. Department of Energy, Air, Water and Radiation Division, Washington, DC

CONF-961089; Beneficial Reuse '96, Proceedings of the Fourth Annual Conference on the Recycle and Reuse of Radioactive Scrap Metal, Knoxville, TN, October 22-24, 1996, 450 pp.; (12 pp.) (1996)

This series of viewgraphs outlines DOE's major requirements for radiation standards for protection of the general public. These requirements are in Order DOE 5400.5 and 10 CFR Part 834 and include: basic dose limits for protection of the general public; radionuclide concentration guidelines for air and water; and, surface

contamination criteria for controlling the release of soil and equipment for restricted or unrestricted use. The following highlights of 10 CFR Part 834 are featured: Primary public dose limit; ALARA; Criteria for decontamination and decommissioning; Elements of DOE material release process; Guidelines for ALARA analysis; and, Surface activity guidelines.

1026 V18/025315

Relationships Between Contaminant Inventory and Contaminated Volume at Various Historic Low-Level Radioactive Waste Sites in Canada

Clement, C.H.; Huffman, C.H.

Atomic Energy of Canada Limited, Low-Level Radioactive Waste Management Office, Gloucester, Ontario, Canada

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (14 pp.) (1997)

This paper examines the volumetric inventory distribution of contaminated materials at various historic low-level radioactive waste (LLRW) sites in Canada. This distribution shows what fraction of the contaminant inventory is in what fraction of the waste volume irrespective of cleanup or segregation criteria. As well, the volumes of material at the sites are examined with respect to selected criteria. Five historic radioactive waste sites in Canada are examined in detail. In each case, a large fraction of the contaminant inventory is found in a relatively small fraction of the volume. As well, only a small fraction of the material, ranging from approximately 25% to less than 1% at the various sites, exceeds regulatory limits which would require a license (for radioactive contaminants) or disposal as hazardous waste (for chemical contaminants). Segregation of excavated material based on future disposal criteria may lead to significantly reduced interim storage and final disposal costs since each fraction of the waste can be treated in a manner appropriate to its potential hazard. The more expensive treatments can be reserved for a relatively small volume of the most contaminated material, while less expensive methods can be applied to the remainder.

1027 V18/022138

Remediation of Normally Occurring Radioactive Material (NORM): A Field Trial

Orum, J.; Baudoin, D.; Briscoe, O.

U.S. Department of Energy, Washington, DC; Amoco Production Company, Houston, TX; Conoco, Inc., Stamford, CT

CONF-9509296; Environmental Issues and Solutions in Petroleum Exploration, Production, and Refining, K.L. Sublette (ed.), Proceedings of the Second International Petroleum Environmental Conference, New Orleans, LA, September 25-27, 1995, 1078 pp.; (pp. 739-752) (1995)

This paper describes a case history where 200 barrels of NORM contaminated sands and sludges were remediated to below regulatory limits and subsequently disposed as Non-hazardous Oilfield Waste (NOW). The material treated initially registered as high as 180 pCi/g of Radium 226. Upon completion of the remediation process,

all materials were reduced to below 30 pCi/g with some samples registering as low as 3 pCi/g (background). The lower levels of radiation registered were a direct result of treating time. As a result, no by-products were generated which fall under NORM regulated levels. The resulting data from this remediation of NORM waste were scrutinized by applicable regulatory agencies and found to be an acceptable method of remediation.

1028

V18/021513

Surveys, Sampling, and Field Analysis of Radium 226 and Radium 228, Applications to Soil Remediation and Containerized NORM Waste

Blanchard, W.P., Jr.

Coastal Fluid Technologies, Inc., Lafayette, LA

CONF-960154; PETRO-SAFE '96, Proceedings of a Conference Held as Part of the Energy Week '96 Conference and Exhibition, Houston, TX, January 29-February 2, 1996. PennWell Conferences and Exhibitions, Houston, TX, 291 pp.; (pp. 135-139) (1996)

Historically, somewhat limited radiation surveys, limited sampling of soils and other solids, and minimal laboratory analysis have been utilized in addressing NORM during soil remediation, storage and disposition of containerized NORM waste. However, thorough radiation surveys determining both the horizontal and vertical extent of contamination, coupled with appropriate sampling and field analysis of Ra-226 and Ra-228 have been under-utilized. The results have varied depending on the perspective used. Some problems include too much or too little soil being remediated; insufficient labeling of containers; transport of waste with no known specific activity level; improper stacking of containers during storage; and decisions on disposal made without the correct activity levels of waste in pCi/g. These, and other project specific factors, can affect the cost of various NORM projects.

Consequently, with development of the NORM industry and evolution of disposal options, additional factors, particularly utilization of field-deployable instrumentation, should be considered with respect to NORM waste projects.

**U.S. DEPARTMENT OF ENERGY (DOE)
URANIUM MILL TAILINGS REMEDIAL
ACTION PROJECT**

1029

V18/021179

Baseline Risk Assessment of Groundwater Contamination at the Monument Valley Uranium Mill Tailings Site, Cane Valley, Arizona [Rev. 2]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-43 (Rev. 2); 148 pp. (March 1996)

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action (UMTRA) Project consists of the Surface Project (Phase I) and the Ground Water Project (Phase II). Under the UMTRA Surface Project, tailings, radioactive contaminated soil, equipment, and materials associated with the former uranium ore processing at UMTRA Project sites are placed into disposal cells. The cells are designed to reduce radon and other radiation emissions and to minimize further contamination of groundwater. Surface cleanup at the Monument Valley UMTRA Project site near Cane Valley, Arizona, was completed in 1994. The Ground Water Project evaluates the nature and extent of groundwater contamination that resulted from the uranium ore processing activities. The Ground Water Project is in its beginning stages. Human health may be at risk from exposure to groundwater contaminated by uranium ore processing. Exposure could occur by drinking water pumped out of a hypothetical well drilled in the contaminated areas. Adverse ecological and agricultural effects may also result from exposure to contaminated groundwater. For example, livestock should not be watered with contaminated groundwater. A risk assessment describes a source of contamination, how that contamination reaches people and the environment, the amount of contamination to which people or the ecological environment may be exposed, and the health or ecological effects that could result from that exposure. This risk assessment is a site-specific document that will be used to evaluate current and potential future impacts to the public and the environment from exposure to contaminated groundwater. The results of this evaluation and further site investigations will be used to determine a compliance strategy to comply with the UMTRA groundwater standards.

1030

V18/021562

Comment and Response Document for the Long-Term Surveillance Plan for the Bodo Canyon Disposal Site, Durango, Colorado [Rev. 0]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-233 (Rev. 0); 10 pp. (July 1996)

This document contains comments made by the US Nuclear Regulatory Commission upon their review of the Long-Term Surveillance Plan for the Bodo Canyon Disposal Site, Durango, Colorado. Responses to the comments are also included in the document.

1031

V18/024298

In situ Remediation of Uranium Contaminated Groundwater

Dwyer, B.P.; Marozas, D.C.

Sandia National Laboratories, Albuquerque, NM

SAND97-0337C; CONF-970208; Proceedings of an International Containment Technology Conference and Exhibition, St.

Petersburg, FL, February 9-12, 1997; (7 pp.) (1997)

In an effort to develop cost-efficient techniques for remediating uranium contaminated groundwater at DOE Uranium Mill Tailing Remedial Action (UMTRA) sites nationwide, Sandia National Laboratories (SNL) deployed a pilot scale research project at an UMTRA site in Durango, Colorado. Implementation included design, construction, and subsequent monitoring of an in situ passive reactive barrier to remove uranium from the tailings pile effluent. A reactive subsurface barrier is produced by emplacing a reactant material (in this experiment various forms of metallic iron) in the flow path of the contaminated groundwater. Conceptually the iron media reduces and/or adsorbs uranium in situ to acceptable regulatory levels. In addition, other metals such as Se, Mo, and As have been removed by the reductive/adsorptive process. The primary objective of the experiment was to eliminate the need for surface treatment of tailing pile effluent. Experimental design, and laboratory and field results are discussed with regard to other potential contaminated groundwater treatment applications.

1032

V18/025635

Laboratory and Field Scale Demonstration of Reactive Barrier Systems

Dwyer, B.P.; Marozas, D.C.; Cantrell, K.J.; Stewart, W.

Sandia National Laboratories, Albuquerque, NM; Pacific Northwest National Laboratory, Richland, WA; Applied Geotechnical Engineering and Construction, Inc., Richland, WA

SAND96-2500; CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1322-1328) (1996)

In an effort to devise a cost efficient technology for remediation of uranium contaminated groundwater, the Department of Energy's Uranium Mill Tailings Remedial Action (DOE-UMTRA) Program through Sandia National Laboratories (SNL) fabricated a pilot scale research project utilizing reactive subsurface barriers at an UMTRA site in Durango, Colorado. A reactive subsurface barrier is produced by emplacing a reactant material (in this experiment metallic iron) in the flow path of the contaminated groundwater. The reactive media then removes and/or transforms the contaminant(s) to regulatory acceptable levels. Experimental design and results are discussed with regard to other potential applications of reactive barrier remediation strategies at other sites with contaminated groundwater problems.

1033

V18/023092

Work Plan for Phase 1A Paleochannel Studies at the Cheney Disposal Cell, Grand Junction, Colorado [Draft, Rev. 0, Ver. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-238 (Rev. 0, Ver. 1); 200 pp. (November 1996)

This document will serve as a Work Plan for continuing paleochannel characterization activities at the Cheney disposal site near Grand Junction, Colorado. Elevated levels of nitrate were encountered in groundwater from two monitor wells installed in

alluvial paleochannels near the Cheney disposal cell in 1994. This triggered a series of investigations (Phase 1) designed to determine the source of nitrate and other chemical constituents in groundwater at the site. A comprehensive summary of the Phase 1 field investigations (limited to passive monitoring and modeling studies) conducted by the Remedial Action Contractor (RAC) and Technical Assistance Contractor (TAC) to date is provided in Section 2.0 of this document. Results of Phase 1 were inconclusive regarding the potential interaction between the disposal cell and the paleochannels, so additional Phase 1A investigations are planned. Recommendations for Phase 1A tasks and possible future activities are discussed in Section 3.0. Detailed information on the implementation of the proposed Phase 1A tasks appears in Section 4.0 and will provide the basis for Statements of Work (SOW) for each of these tasks. A detailed sampling plan is provided to ensure quality and a consistency with previous data collection efforts.

1034 V18/023165

1996 Monitoring Report for the Gunnison, Colorado, Wetlands Mitigation Plan

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-237 (Rev. 1, Ver. 2); 71 pp. (December 1996)

The US Department of Energy (DOE) administers the Uranium Mill Tailings Remedial Action (UMTRA) Project to clean up uranium mill tailings and other surface contamination at 24 abandoned uranium mill sites in 10 states. One of these abandoned mill sites was near the town of Gunnison, Colorado. Surface remediation was completed at the Gunnison site in December 1995. Remedial action resulted in the elimination of 4.3 acres of wetlands and mitigation of this loss is through the enhancement of 17.8 acres of riparian plant communities in six spring-fed areas on US Bureau of Land Management mitigation sites. A five-year monitoring program was then implemented to document the response of vegetation and wildlife to the exclusion of livestock. This report provides the results of the third year of the monitoring program.

1035 V18/021646

Baseline Risk Assessment of Groundwater Contamination at the Uranium Mill Tailings Site, near Gunnison, Colorado [Rev. 2]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-57 (Rev. 2); 156 pp. (June 1996)

This report is the second site-specific risk assessment document prepared for the Groundwater Project at the Gunnison site. A preliminary risk assessment was conducted in 1990 to determine whether long-term use of groundwater from private wells near the Gunnison site had the potential for adverse health effects. Due to the results of that preliminary risk assessment, the residents were provided bottled water on an interim basis. In July 1994, the residents and the nearby Valco cement/concrete plant were given the option to connect to a new alternate water supply system, eliminating the bottled water option. This document evaluates current and potential future impacts to the public and the environment from exposure to contaminated groundwater. The results of this evaluation and further site characterization will be used to determine whether more action is needed to protect human health and the environment and to comply with the EPA standards.

1036 V18/023161

Comment and Response Document for the Long-Term Surveillance Plan for the Gunnison Disposal Site, Gunnison, Colorado

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-239; 17 pp. (December 1996)

This report contains site inspection concerns and recommendations relating to the Uranium Mill Tailings Remedial Action (UMTRA) Project to clean up uranium mill tailings and other surface contamination at an abandoned uranium mill site in Gunnison, Colorado. Plans for implementation of these recommendations are also included.

1037 V18/025418

Long-Term Surveillance Plan for the Gunnison, Colorado, Disposal Site [Rev. 2, Ver. 3]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-222 (Rev. 2, Ver. 3); 60 pp. (April 10, 1997)

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Gunnison disposal site in Gunnison County, Colorado. The U.S. Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Gunnison disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the Gunnison site and the NRC formally accepts this LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Gunnison disposal site performs as designed. The program is based on two distinct activities: (1) site inspections to identify threats to disposal cell integrity and (2) groundwater monitoring to demonstrate disposal cell performance. The LTSP is based on the UMTRA Project long-term surveillance program guidance and meets the requirements of 10 CFR Section 40.27(b) and 40 CFR Section 192.03.

1038 V18/022864

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site Maybell, Colorado - Remedial Action Selection Report: Attachment 2 - Geology Report [Rev. 1, Ver. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-24F (Rev. 1, Ver. 1); 210 pp. (December 1996)

The Maybell uranium mill tailings site is 25 mi (40 km) west of the town of Craig, Colorado, in Moffat County, in the northwestern part of the state. The unincorporated town of Maybell is 5 road mi (8 km) southwest of the site. The designated site covers approximately 110 ac (45 ha) and consists of a concave-shaped

tailings pile and rubble from the demolition of the mill buildings buried in the former mill area. Contaminated materials at the Maybell processing site include the tailings pile, which has an average depth of 20 ft (6 m) and contains 2.8 million cu yd (2.1 million cu m) of tailings. The former mill processing area is on the north side of the site and contains 20,000 cu yd (15,000 cu m) of contaminated demolition debris. Off-pile contamination is present and includes areas adjacent to the tailings pile, as well as contamination dispersed by wind and surface water flow. The volume of off-pile contamination to be placed in the disposal cell is 550,000 cu yd (420,000 cu m). The total volume of contaminated materials to be disposed of as part of the remedial action is estimated to be 3.37 million cu yd (2.58 cu m). Information presented in this Final Remedial Action Plan (RAP) and referenced in supporting documents represents the current disposal cell design features and groundwater compliance strategy proposed by the U.S. Department of Energy (DOE) for the Maybell, Colorado, tailings site. Both the disposal cell design and the groundwater compliance strategy have changed from those proposed prior to the preliminary final RAP document as a result of prudent site-specific technical evaluations.

1039

V18/023483

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site Maybell, Colorado: Attachment 4 - Water Resources Protection Strategy [Rev. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-24F (Rev. 1, Att.4); 98 pp. (December 10, 1996)

The US Department of Energy (DOE) must provide a demonstration of compliance with the final US Environmental Protection Agency (EPA) groundwater protection standards for inactive mill sites pursuant to 40 CFR Part 192. This plan outlines the proposed strategy to demonstrate compliance with the groundwater standards at the Maybell, Colorado, Uranium Mill Tailings Remedial Action (UMTRA) Project site. This demonstration consists of: (1) the groundwater protection standard, (2) a performance assessment, (3) a closure performance demonstration, and (4) a performance monitoring and corrective action program.

1040

V18/023484

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site Maybell, Colorado: Attachment 3 - Groundwater Hydrology Report: Final [Rev. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-24F (Rev. 1, Att. 3); 55 pp. (December 1996)

This report presents groundwater hydrogeologic activities for the Maybell, Colorado, Uranium Mill Tailings Remedial Action Project site. The Department of Energy has characterized the hydrogeology, water quality, and water resources at the site and determined that the proposed remedial action would comply with the requirements of the EPA groundwater protection standards.

1041

V18/022701

DOE Responses to CDH October 1993 Comments on the

Remedial Action Plan for the Naturita, Colorado, UMTRA Site

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-T11; 17 pp. (October 1996)

This document includes the October 1993 comments provided by the Colorado Department of Health (CDH) on the Department of Energy (DOE) Preliminary Final Remedial Action Plan for the Naturita, Colorado, UMTRA Site. DOE's responses are included after each CDH comment.

1042

V18/022693

Naturita Rap Comment and Response Document

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-T14; 55 pp. (September 1996)

This report describes tasks associated with remedial action activities at the Naturita uranium mill tailings site. It includes comments on the Remedial Action Plan from the Nuclear Regulatory Agency and the Colorado Department of Health, as well as a brief review of the site risk assessment.

1043

V18/022696

Long-Term Surveillance Plan for the Rifle, Colorado, Disposal Site

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-235; 45 pp. (September 1996)

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Estes Gulch disposal site in Garfield County, Colorado. The U.S. Environmental Protection Agency (EPA) has developed regulations for the issuance of a general license by the U.S. Nuclear Regulatory Commission (NRC) for the custody and long-term care of UMTRA Project disposal Sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites, will be cared for in a manner that protects the public health and safety and the environment. For each disposal site to be licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Estes Gulch disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the Estes Gulch site and the NRC formally accepts this LTSP.

1044

V18/020778

Comment and Response Document for the Final Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Sites at Slick Rock, Colorado [Rev. 2]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-197 (Rev. 2); 103 pp. (May 1996)

This document for the final remedial action plan and site design has been prepared for U.S. Department of Energy Environmental Restoration Division as part of the Uranium Mill Tailings Remedial Action plan. Comments and responses are included for the site design for stabilization of the inactive uranium mill tailings sites at

Slick Rock, Colorado.

1045 V18/022695

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Sites at Slick Rock, Colorado: Final Report [Rev. 3, Ver. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-21F (Rev. 3, Ver. 1); 32 pp. (August 1996)

This document contains the page changes for Attachment 3, Ground Water Hydrology Report dated August, 1996 for the Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings at Slick Rock, Colorado. This portion of Attachment 3 contains the Table of Contents pages i and ii, and pages numbered 3-3 through 3-56 of the Ground Water Hydrology Report. Also included are the cover sheets for Appendix A, B, and C to Attachment 3.

1046 V18/025419

Long-Term Surveillance Plan for the Burro Canyon Disposal Cell, Slick Rock, Colorado [Rev. 0, Ver. 1-2]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-236 (Rev. 0, Ver. 1-2); 35 pp. (March 27, 1997)

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Burro Canyon disposal cell in San Miguel County, Colorado. The U.S. Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Burro Canyon disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the disposal site, and the NRC formally accepts this LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Burro Canyon disposal site performs as designed. The program is based on site inspections to identify threats to disposal cell integrity. Groundwater monitoring will not be required at Burro Canyon disposal cell because the groundwater protection strategy is supplemental standards based on low yield from the uppermost aquifer. The LTSP is based on the UMTRA Project long-term surveillance program guidance and meets the requirements of 10 CFR Section 40.27(b) and 40 CFR Section 192.03.

1047 V18/022813

Performance Requirements for Design of Landfill Covers for Long Term Protection

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CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear

Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1802-1808) (1996)

Performance requirements are presented for landfill covers designed for the Uranium Mill Tailings Remedial Action Project (UMTRAP) and the Weldon Spring Site Remedial Site Project (WSSRAP). Specialized design technology is discussed which addresses the issues of long term isolation of waste materials and integrity of cover components. The basis for the designs are given for UMTRAP and WSSRAP which resulted in the performance requirements established for each project. Performance requirements for each cover component are summarized, together with resulting cover components which meet the requirements.

1048 V18/022702

Long-Term Surveillance Plan for the Ambrosia Lake, New Mexico Disposal Site [Rev. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-211 (Rev. 1, Ver. 1); 130 pp. (July 1996)

This long-term surveillance plan (LTSP) for the Uranium Mill Tailings Remedial Action (UMTRA) Project Ambrosia Lake disposal site in McKinley County, New Mexico, describes the U.S. Department of Energy's (DOE) long-term care program for the disposal site. The DOE will carry out this program to ensure that the disposal cell continues to function as designed. This LTSP was prepared as a requirement for acceptance under the U.S. Nuclear Regulatory Commission (NRC) general license for custody and long-term care of residual radioactive materials.

1049 V18/023674

Applications of Permeable Barrier Technology to Groundwater Contamination at the Shiprock, NM, UMTRA Site

Thomson, B.M.; Henry, E.J.; Thombre, M.S.

University of New Mexico, Department of Civil Engineering, Albuquerque, NM

CONF-9605266; Proceedings of the 1996 Hazardous Substance Research Center/Waste-Management Education and Research Consortium Joint Conference on Environment, L.E. Erickson, S.C. Grant, D.L. Tillison and J.P. McDonald (eds.), Albuquerque, NM, May 21-23, 1996. Great Plains-Rocky Mountain Hazardous Substance Research Center, Kansas State University, Manhattan, KS, 706 pp.; (pp. 89-102) (1996)

The Shiprock uranium mill tailings pile in far northwestern New Mexico consists of approximately 1.5 million tons of uranium mill tailings from an acid leach mill which operated from 1954 to 1968. Located on land owned by the Navajo Nation, it was one of the first tailings piles stabilized under the Uranium Mill Tailings Remedial Action (UMTRA) project. Stabilization activities were completed in 1986 and consisted principally of consolidating the tailings, contouring the pile to achieve good drainage, and covering the pile with a multi-layer cap to control infiltration of water, radon emanation, and surface erosion. No groundwater protection or remediation measures were implemented other than limiting infiltration of water through the pile, although a significant groundwater contamination plume exists in the flood plain adjacent to the San Juan River. The major contaminants at the Shiprock site

include high concentrations of sulfate, nitrate, arsenic, and uranium. One alternative for remediation may be the use of a permeable barrier in the flood plain aquifer. As proposed for the Shiprock site, the permeable barrier would be a trench constructed in the flood plain that would be backfilled with a media that is permeable to groundwater, but would intercept or degrade the pollutants. Work to date has focused on use of a mixed microbial population of sulfate and nitrate reducing organisms. These organisms would produce strongly reducing conditions which would result in precipitation of the metal contaminants (i.e., Se(IV) and U(IV)) in the barrier. One of the first considerations in designing a permeable barrier is developing an understanding of groundwater flow at the site. Accordingly, a steady state numerical model of the groundwater flow at the site was developed using the MODFLOW code.

1050 V18/021180

Geophysical Surveys at the UMTRA Project Shiprock, New Mexico, Site [Rev. 0]

Wightman, E.; Smith, B.; Newlin, B.

Jacobs Engineering Group Inc., Albuquerque, NM; Geraghty & Miller, Inc., Denver, CO

DOE/AL/62350-231 (Rev. 0); 156 pp. (March 1996)

Geophysical surveys were performed at the Uranium Mill Tailings Remedial Action (UMTRA) Shiprock site in New Mexico during February 1996. The surveys were designed to locate areas of groundwater contamination, consisting largely of sulfate and nitrate salts and uranium. Electrical geophysical methods were used to locate areas of sulfate and nitrate concentrations since these products, when present in groundwater, increase its electrical conductivity. These contaminants also increase the density of water, making the water with the highest concentrations of these salts sink to the bottom of the water column. At the Shiprock site, where alluvium is underlain by the impervious Mancos Shale, the saline water will tend to rest in depressions on the shale surface. Seismic refraction surveys were conducted on the floodplain. The site comprises two areas, the terrace and the floodplain, separated by a steep scarp of some 70 feet (ft) (20 meters [m]). Measurements of electrical conductivity were taken over these two areas, searching for possible pockets of saline groundwater resting on top of the bedrock. Conductivity surveys were also run to identify fractures within the bedrock that may act as conduits for groundwater movement. Several areas of higher than normal conductivity were found on the terrace, including halos of higher conductivities on three sides of the tailings cell. The conductivity measurements searching for fractures found only a small number of minor fracture-like anomalies. These are not considered important. On the floodplain, both conductivity and seismic refraction measurements were taken. The conductivity measurements clearly show areas of high conductivity interpreted to result from groundwater contamination. The seismic refraction measurements identified bedrock depressions that may contain denser, and more saline groundwater lenses. Generally, the areas of high conductivity coincide with the bedrock depressions.

1051 V18/024325

Comment and Response Document for the Long-Term Surveillance Plan for the Falls City Disposal Site, Falls City, Texas

Jacobs Engineering Group Inc., Albuquerque, NM
DOE/AL/62350-187 (Comment); 10 pp. (November 1996)

This is the Comment and Response Document dated November 1996 for the Long-Term Surveillance Plan for the Falls City Disposal Site in Falls City, Texas. The site is part of the U.S. DOE's Uranium Mill Tailings Remedial Action Project (UMTRA). Several comments regarding the hydrology and surface erosion described in the Long-Term Surveillance Plan are addressed in this document.

1052 V18/023166

Long-Term Surveillance Plan for the Falls City Disposal Site, Falls City, Texas [Rev. 2, Ver. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-187 (Rev. 2, Ver. 1); 44 pp. (November 1996)

The need for groundwater monitoring at the Falls City disposal site was evaluated in accordance with NRC regulations and guidelines established by the DOE in Guidance for Implementing the Long-term Surveillance Program for UMTRA Project Title 1 Disposal Sites. Based on evaluation of site characterization data, it has been determined that a program to monitor groundwater for demonstration of disposal cell performance based on a set of concentration limits is not appropriate because groundwater in the uppermost aquifer is of limited use, and a narrative supplemental standard has been applied to the site that does not include numerical concentration limits or a point of compliance. The limited use designation is based on the fact that groundwater in the uppermost aquifer is not currently or potentially a source of drinking water in the area because it contains widespread ambient contamination that cannot be cleaned up using methods reasonably employed by public water supply systems. Background groundwater quality varies by orders of magnitude since the aquifer is in an area of redistribution of uranium mineralization derived from ore bodies. The DOE plans to perform post-closure groundwater monitoring in the uppermost aquifer as a best management practice (BMP) as requested by the state of Texas.

1053 V18/021650

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site at Falls City, Texas - Remedial Action Selection Report: Attachment 2 - Geology Report; Attachment 3 - Groundwater Hydrology Report; and Attachment 4 - Water Resources Protection Strategy: Final Report

DOE/AL-050520-0000; 736 pp. (September 1992)

The uranium processing site near Falls City, Texas, was one of 24 inactive uranium mill sites designated to be remediated by the U.S. Department of Energy (DOE) under Title I of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). The UMTRCA requires that the U.S. Nuclear Regulatory Commission (NRC) concur with the DOE's remedial action plan (RAP) and certify that the remedial action conducted at the site complies with the standards promulgated by the U.S. Environmental Protection Agency (EPA). The RAP, which includes this summary remedial action selection report (RAS), serves a two-fold purpose. First, it describes the activities proposed by the DOE to accomplish long-term stabilization and control of the residual radioactive

materials at the inactive uranium processing site near Falls City, Texas. Second, this document and the remainder of the RAP, upon concurrence and execution by the DOE, the State of Texas, and the NRC, becomes Appendix B of the Cooperative Agreement between the DOE and the State of Texas.

1054 V18/020780

Long-Term Surveillance Plan for the South Clive Disposal Site, Clive, Utah [Rev. 0]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-228 (Rev. 0); 39 pp. (March 1996)

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project South Clive disposal site in Clive, Utah. The US Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. For each disposal site to be licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the South Clive disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the South Clive site and the NRC formally accepts this LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the South Clive disposal site performs as designed. The program's primary activity is site inspections to identify threats to disposal cell integrity.

1055 V18/023164

Modification No. 2 to the Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site at Green River, Utah - Final [Rev. 5]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-050510-GRNO (Rev. 5); 360 pp. (March 1997)

Portions of the final Remedial Action Plan (RAP) for the Green River Site, Volumes 1 and 2, Appendix B of the Cooperative Agreement No. DE-FC04-81AL16257, March 1991 have been modified. The changes to the RAP are designated as RAP Modification No. 2. These changes have been placed in a three-ring binder that will supplement the original RAP and include the following: addendum to the Executive Summary; Section 3.5 (Ground Water part of the Site Characterization Summary); Section 4.0 (Site Design); Section 5.0 (Water Resources Protection Strategy Summary); Appendix D.5 (Ground Water Hydrology); and Appendix E (Ground Water Protection Strategy). In addition to these revisions, there have been editorial changes that clarify the text, but do not change the meaning. Also, certain sections of the document, which are included in the submittal for ease of review and continuity, have been updated to reflect the final groundwater protection standards and the current UMTRA Project format and content of RAPs.

1056 V18/025417

Long-Term Surveillance Plan for the Mexican Hat

Disposal Site, Mexican Hat, Utah [Rev. 2]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-207 (Rev. 2); 45 pp. (May 1997)

This long-term surveillance plan (LTSP) describes the U.S. Department of Energy's (DOE) long-term care program for the Uranium Mill Tailings Remedial Action (UMTRA) Project Mexican Hat, Utah, disposal site. The U.S. Nuclear Regulatory Commission (NRC) has developed regulations for the issuance of a general license for the custody and long-term care of UMTRA Project disposal sites in 10 CFR Part 40. The purpose of this general license is to ensure that the UMTRA Project disposal sites will be cared for in a manner that protects the public health and safety and the environment. Before each disposal site is licensed, the NRC requires the DOE to submit a site-specific LTSP. The DOE prepared this LTSP to meet this requirement for the Mexican Hat disposal site. The general license becomes effective when the NRC concurs with the DOE's determination of completion of remedial action for the disposal site and the NRC formally accepts this LTSP. This LTSP describes the long-term surveillance program the DOE will implement to ensure that the Mexican Hat disposal site performs as designed. The program is based on two distinct types of activities: (1) site inspections to identify potential threats to disposal cell integrity and (2) monitoring of selected seeps to observe changes in flow rates and water quality. The LTSP is based on the UMTRA Project long-term surveillance program guidance and meets the requirements of 10 CFR Section 40.27(b) and 40 CFR Section 192.03.

1057 V18/023666

Remedial Action Plan for the Codisposal and Stabilization of the Monument Valley and Mexican Hat Uranium Mill Tailings at Mexican Hat, Utah: Appendix F - Groundwater Hydrology Calculations

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL-050509(93) (App. F); 352 pp. (February 1993)

This document contains the groundwater hydrology calculations for the remedial action plan for the codisposal and stabilization of uranium mill tailings at Mexican Hat, Utah. Included are calculations for the following: slug test analyses for monitor wells, analyses of packer tests, hydraulic gradients and groundwater velocities, volume of released water, aquifer pumping test analysis, slug test analysis to determine hydraulic conductivity, and gradient calculations.

1058 V18/023670

Remedial Action Plan for the Codisposal and Stabilization of the Monument Valley and Mexican Hat Uranium Mill Tailings at Mexican Hat, Utah

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL-050509(93); 99 pp. (February 1993)

This document is a revision of the original Mexican Hat Remedial Action Plan (RAP) and RAP Modification submitted in July 1988 and January 1989, respectively, along with updated design documents. This RAP has been developed to serve a two-fold purpose. It presents the activities proposed by the Department of Energy (DOE) to accomplish long-term stabilization and control of

the residual radioactive materials (RRM) from Monument Valley, Arizona, and Mexican Hat, Utah, at the Mexican Hat disposal site. It also serves to document the concurrence of both the Navajo Nation and the Nuclear Regulatory Commission (NRC) in the remedial action. This agreement, upon execution by DOE and the Navajo Nation and concurrence by the NRC, becomes Appendix B of the Cooperative Agreement. This document has been structured to provide a comprehensive understanding of the remedial action proposed for the Monument Valley and Mexican Hat sites. It includes specific design and construction requirements for the remedial action. Pertinent information and data are included with reference given to the supporting documents. Section 2.0 presents the EPA standards, including a discussion of their objectives. Section 3.0 summarizes the present site characteristics and provides a definition of site-specific problems. Section 4.0 is the site design for the proposed action. Section 5.0 presents the water resources protection strategy. Section 6.0 summarizes the plan for ensuring health and safety protection for the surrounding community and the on-site workers. Section 7.0 lists the responsibilities of the project participants. Section 8.0 describes the features of the long-term surveillance and maintenance plan.

1059

V18/021651

Comparison of Risk for Pre- and Post-Remediation of Uranium Mill Tailings from Vicinity Properties in Monticello, Utah

Espgren, M.L.; Pierce, G.A.; Halford, D.K.

Oak Ridge National Laboratory, Oak Ridge, TN

Health Physics 70(4):556-558 (April 1996)

Pre- and post-remedial action dose rates were calculated on 101 Monticello, Utah, properties included in the Monticello Vicinity Property Remedial Action Project. Dose rates were calculated using the RESRAD computer code, which indicated that 98% of the effective dose equivalent was contributed by external gamma radiation and radon emanation. Radium concentrations in pCi/g were averaged for pre- and post-remedial action measurements: point sources were not included in the averages. The volume of the deposit was also used in the dose calculation. In all cases the dose was reduced, and at 77 properties the dose was reduced to 0.30 mSv/yr (Department of Energy ALARA recommendation). A paired t-test showed a significant reduction (p less than 0.05) between the pre- and post-remedial action dose rates. The average cost of remedial action, number of persons per household, number of properties remediated, and the reduction of cancer mortalities through remediation resulted in an approximate cost of \$11,000,000 per life saved by remediation of mill tailings.

1060

V18/021645

Radiological Decontamination, Survey, and Statistical Release Method for Vehicles

Goodwill, M.E.; Lively, J.W.; Morris, R.L.

Rust Geotech, Inc., Grand Junction, CO

DOE/ID/12584-271; 26 pp. (June 1996)

Earth-moving vehicles (e.g., dump trucks, belly dumps) commonly haul radiologically contaminated materials from a site being remediated to a disposal site. Traditionally, each vehicle must be

surveyed before being released. The logistical difficulties of implementing the traditional approach on a large scale demand that an alternative be devised. A statistical method for assessing product quality from a continuous process was adapted to the vehicle decontamination process. This method produced a sampling scheme that automatically compensates and accommodates fluctuating batch sizes and changing conditions without the need to modify or rectify the sampling scheme in the field. Vehicles are randomly selected (sampled) upon completion of the decontamination process to be surveyed for residual radioactive surface contamination. The frequency of sampling is based on the expected number of vehicles passing through the decontamination process in a given period and the confidence level desired. This process has been successfully used for 1 year at the former uranium mill site in Monticello, Utah (a cleanup site regulated under the Comprehensive Environmental Response, Compensation, and Liability Act). The method forces improvement in the quality of the decontamination process and results in a lower likelihood that vehicles exceeding the surface contamination standards are offered for survey. Implementation of this statistical sampling method on Monticello projects has resulted in more efficient processing of vehicles through decontamination and radiological release, saved hundreds of hours of processing time, provided a high level of confidence that release limits are met, and improved the radiological cleanliness of vehicles leaving the controlled site.

1061

V18/022700

Completion Report for the UMTRA Project Vitro Processing Site, Salt Lake City, Utah [Rev. 3]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-129 (Rev. 3, Ver. 3); 49 pp. (August 1996)

This completion report provides evidence that the final Salt Lake City, Utah, processing site property conditions are in accordance with the approval design and that all U.S. Environmental Protection Agency (EPA) standards have been satisfied. Included as appendixes to support the stated conclusions are the record drawings; a summary of grid test results; contract specifications and construction drawing and the EPA standards; the audit, inspection, and surveillance summary; the permit information; and project photographs. The principal objectives of remedial action at Salt Lake City were to remove the tailings from the former processing site, render the site free of contamination to EPA standards, and restore the site to the final design grade elevations. The final remedial action plan, which is approved by the U.S. Department of Energy and concurred upon by the U.S. Nuclear Regulator Commission and the state of Utah, contains the conceptual design used to develop the final approved design. During remedial action construction operations, conditions were encountered that required design features that differed from the conceptual design. These conditions and the associated design changes are noted in the record drawings. All remedial action activities were completed in conformance with the specifications and drawings. In the opinion of the state of Utah, the record drawings accurately reflect existing property conditions at the processing site.

1062

V18/025634

Environmental Assessment of Groundwater Compliance Activities at the Uranium Mill Tailings Site, Spook,

Wyoming

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO

DOE/EA-1155(2/97); 20 pp. (February 1997)

This report assesses the environmental impacts of the Uranium Mill Tailings Site at Spook, Wyoming on groundwater. DOE previously characterized the site, and monitoring data were collected during the surface remediation. The groundwater compliance strategy is to perform no further remediation at the site since the groundwater in the aquifer is neither a current nor potential source of drinking water. Under the no-action alternative, certain regulatory requirements would not be met.

1063

V18/022698

Annual Report on the U.S. Department of Energy's Cultural Resource Activities at Colorado UMTRA Project Sites for October 1995-September 1996 [Rev. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-167 (Rev. 1); 23 pp. (September 1996)

This report summarizes the results of cultural resource activities conducted by the U.S. Department of Energy (DOE) at Uranium Mill Tailings Remedial Action (UMTRA) Project sites in Colorado for the period of October 1, 1995 through September 30, 1996. The inactive uranium mill tailings sites in Colorado are at Durango, Grand Junction, Gunnison, Maybell, Naturita, Rifle, and Slick Rock. On December 6, 1984, the DOE, the Advisory Council on Historic Preservation, and the Colorado State Historic Preservation Officer (SHPO) entered into a programmatic memorandum of understanding (PMOU). This PMOU requires the DOE to fulfill its obligations under various state and federal regulations for the protection and preservation of cultural resources. This report provides the state of Colorado with an annual report on the cultural resource activities performed for all UMTRA Project sites in Colorado. Due to the completion of surface activities at the UMTRA Project sites, this will be the last annual report to the state of Colorado. Cultural resources activities subsequent to this report will be reported to the state through site-specific correspondence.

1064

V18/025314

Can a Large Environmental Restoration Project Really Follow All of the Rules? Exemptions and Variances in the UMTRA Project

Cornish, R.E.

U.S. Department of Energy, Albuquerque Operations Office, Environmental Restoration Division, Albuquerque, NM

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (4 pp.) (1997)

The Uranium Mill Tailings Remedial Action (UMTRA) Project, a 1.45 billion dollar project to stabilize uranium mill tailings and remediate structures built with them, is nearing completion. The successful completion of this project would not be possible without exemptions and variances from a number of federal regulations. The Department of Transportation provided an exemption from regulations which, if followed verbatim, would have precluded the

economical transportation of uranium mill tailings on public highways. The Department of Energy (DOE) provided exemptions from parts of 10 CFR 835 regarding radiation dose assessments for radon and radon daughters, and radiological controls on tailings in inaccessible spaces in vehicles. The Environmental Protection Agency has allowed a variance involving the measurement of radon flux to the atmosphere from completed tailings disposal cells. In addition, it was necessary to use liberal interpretations of certain DOE Orders (under the process called "graded approach"). This paper describes how these measures eliminated many costly and wasteful actions that would have been required by a literal interpretation of the regulations. Other remediation projects should avail themselves of opportunities to alter their regulatory environment.

1065

V18/021653

Derivation and Implementation of an Annual Limit on Intake and a Derived Air Concentration Value for Uranium Mill Tailings

Reif, R.H.; Andrews, D.W.

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM; Rust Federal Services, Inc., Albuquerque, NM

Health Physics 68(6):823-826 (June 1995)

Monitoring workers and work areas at the Department of Energy Uranium Mill Tailings Remedial Action Project sites is complex because all radionuclides in the U-238 and U-235 decay chains may be present in an airborne uranium mill tailings matrix. Previous monitoring practices involved isotopic analysis of the air filter to determine the activity of each radionuclide of concern and comparing the results to the specified derived air concentration. The annual limit on intake and derived air concentration values have been derived here for the uranium mill tailings matrix to simplify the procedure for evaluation of air monitoring results and assessment of the need for individual monitoring. Implementation of the derived air concentration for uranium mill tailings involves analyzing air samples for long-lived gross alpha activity and comparing the activity concentration to the derived air concentration. Health physics decisions regarding assessment of airborne concentrations is more cost-effective because isotopic analysis of air samples is not necessary.

1066

V18/022692

Evaluation of In Vitro Dissolution Rates of Thorium in Uranium Mill Tailings

Reif, R.G.

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):85b (June 1996)

Dissolution rates of thorium from the uranium mill tailings piles at two Department of Energy Uranium Mill Tailings Remedial Action Project (UMTRAP) sites have been evaluated. The thorium dissolution rates were evaluated in vitro using simulated lung fluid. The former uranium mills at the UMTRAP sites employed different

chemical processes (acid leach and alkaline pressure leach) to extract the uranium from the ore, and the thorium dissolution rates at these sites were found to be markedly different. A site specific annual limit on intake (ALI) value for Th-230 was calculated for the UMRAP Site that was associated with a multiple component dissolution curve.

1067

V18/021643

Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Groundwater Project: Volume 1 [04/96]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/EIS-0198 (Vol. 1 04/96); 285 pp. (April 1996)

The first step in the UMTRA Groundwater Project is the preparation of this programmatic environmental impact statement (PEIS). This document analyzes the potential impacts of four alternatives for conducting the Groundwater Project. One of these alternatives is the proposed action. These alternatives do not address site-specific groundwater compliance strategies because the PEIS is a planning document only. It assesses the potential programmatic impacts of conducting the Groundwater Project, provides a method for determining the site-specific groundwater compliance strategies, and provides data and information that can be used to prepare site-specific environmental impacts analyses more efficiently. This PEIS differs substantially from a site-specific environmental impact statement because multiple groundwater compliance strategies, each with its own set of potential impacts, could be used to implement all the alternatives except the no action alternative. In a traditional environmental impact statement, an impacts analysis leads directly to the defined alternatives. The impacts analysis for implementing alternatives in this PEIS first involves evaluating a groundwater compliance strategy or strategies, the use of which will result in site-specific impacts. This PEIS impacts analysis assesses only the potential impacts of the various groundwater compliance strategies, then relates them to the alternatives to provide a comparison of impacts.

1068

V18/021644

Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Groundwater Project: Volume 2 [04/96]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/EIS-0198 (Vol. 2 04/96); 293 pp. (April 1996)

The first step in the UMTRA Groundwater Project is the preparation of a programmatic environmental impact statement. It assesses the potential programmatic impacts of conducting the Groundwater Project, provides a method for determining the site-specific groundwater compliance strategies, and provides data and information that can be used to prepare site-specific environmental impacts analyses more efficiently. This volume of the programmatic environmental impact statement (PEIS) is a comment and response document. It is the collection of the comments received on the draft PEIS.

1069

V18/024323

Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action

Groundwater Project: Volume 2 [10/96]

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO

DOE/EIS-0198 (Vol. 2 10/96); 296 pp. (October 1996)

The purpose of the Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project is to eliminate, reduce, or address to acceptable levels the potential health and environmental consequences of milling activities. One of the first steps in the UMTRA Ground Water Project is the preparation of the Programmatic Environmental Impact Statement (PEIS). This report contains the comments and responses received on the draft PEIS.

1070

V18/024324

Final Programmatic Environmental Impact Statement for the Uranium Mill Tailings Remedial Action Groundwater Project: Volume 1 [10/96]

U.S. Department of Energy, Grand Junction Office, Grand Junction, CO

DOE/EIS-0198 (Vol. 1 10/96); 296 pp. (October 1996)

The purpose of the Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project is to eliminate, reduce, or address to acceptable levels the potential health and environmental consequences of milling activities by meeting Environmental Protection Agency (EPA) groundwater standards. One of the first steps in the UMTRA Ground Water Project is the preparation of this Programmatic Environmental Impact Statement (PEIS). The EPA standards allow the use of different strategies for achieving compliance with the standards. This document analyzes the potential impacts of four alternatives for conducting the Ground Water Project. Each of the four alternatives evaluated in the PEIS is based on a different mix of strategies to meet EPA groundwater standards. The PEIS is intended to serve as a programmatic planning document that provides an objective basis for determining site-specific groundwater compliance strategies and data and information that can be used to prepare site-specific environmental impact analyses more efficiently. DOE will prepare appropriate further National Environmental Policy Act documentation before making site-specific decisions to implement the Ground Water Project. Affected States, Tribes, local government agencies, and members of the public have been involved in the process of preparing this PEIS; DOE encourages their continued participation in the site-specific decision making process.

1071

V18/021178

Recommendations for Computer Modeling Codes to Support the UMTRA Groundwater Restoration Project

Tucker, M.D.; Khan, M.A.

Sandia National Laboratories, Albuquerque, NM;
International Technology Corporation, Albuquerque, NM
SAND96-1031; 77 pp. (April 1996)

The Uranium Mill Tailings Remediation Action (UMTRA) Project is responsible for the assessment and remedial action at the 24 former uranium mill tailings sites located in the U.S. The surface restoration phase, which includes containment and stabilization of the abandoned uranium mill tailings piles, has a specific termination

date and is nearing completion. Therefore, attention has now turned to the groundwater restoration phase, which began in 1991. Regulated constituents in groundwater whose concentrations or activities exceed maximum contaminant levels (MCLs) or background levels at one or more sites include, but are not limited to, uranium, selenium, arsenic, molybdenum, nitrate, gross alpha, radium-226 and radium-228. The purpose of this report is to recommend computer codes that can be used to assist the UMTRA groundwater restoration effort. The report includes a survey of applicable codes in each of the following areas: (1) groundwater flow and contaminant transport modeling codes, (2) hydrogeochemical modeling codes, (3) pump and treat optimization codes, and (4) decision support tools. Following the survey of the applicable codes, specific codes that can best meet the needs of the UMTRA groundwater restoration program in each of the four areas are recommended.

1072 V18/025316

Risk Reduction and Cost-Effectiveness in the UMTRA Project

Cornish, R.E.; Miller, M.L.; Pomatto, C.B.

U.S. Department of Energy, Albuquerque Operations Office, Environmental Restoration Division, Albuquerque, NM; Roy F. Weston, Inc., Albuquerque, NM; Jacobs Engineering Group Inc., Albuquerque, NM

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

The Uranium Mill Tailings Remedial Action (UMTRA) Project, a 1.45 billion dollar project to stabilize uranium mill tailings and remediate structures built with them, is nearing completion. Several times during the project, the 24 UMTRA Project sites were ranked according to health risks they presented to the public. There was an attempt to remediate the higher risk sites first, but it was not practical to remediate all of the sites in sequence strictly according to health risk. The most cost-effective remediations were at Salt Lake City, Utah, and Grand Junction, Colorado, where tailings piles were removed from the centers of cities. The remediation of structures built on tailings, or built of materials containing tailings, was more cost-effective than the remediation of the other tailings piles. The remediation of several of the UMTRA Project tailings piles was predicted on the basis of a priori calculations to yield negative benefits; remedial action was expected to kill more people through construction accidents than would be saved during the next 100 years through reduced radiation exposure following remedial action. The calculated public health benefits of remedial actions changed through the years as radiation risk factors shifted. As the project nears completion and the actual costs are known, more accurate cost-effectiveness calculations can be made.

1073 V18/022699

Technical Assistance Contractor Occurrence Reporting and Processing System [Rev. 2, Ver. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-111 (Rev. 2, Ver. 1); 63 pp. (August 1996)

Members of the Uranium Mill Tailings Remedial Action (UMTRA)

Project Technical Assistance Contractor (TAC) are responsible to notify management of TAC occurrence reporting and processing system (ORPS) classified occurrences. An ORPS occurrence is an unexpected or unplanned event on DOE property which causes bodily harm, death, damage to government property, exposure to toxic or hazardous substances above acceptable limits to workers, the environment, or general public. Examples of potential reportable occurrences include, but not limited to, site personnel exposures to airborne contaminants, incidents which could expose the general public to high levels of radiation or other contaminants, a vehicle accident resulting in property damage or personnel injuries. Listed TAC manager/staff contacts, with the assistance of TAC ORPS Program Coordinators, will determine if the occurrence is reportable under Department of Energy (DOE) Order M 232.1-2. The reportable occurrences will be classified as emergency, unusual, or off-normal. If determined to be reportable, listed TAC manager/staff will verbally report the details of the occurrence to the DOE Duty Officer within 2 hours of initial notification, and provide a written report of the event by noon the following work day.

1074 V18/021642

Technical Considerations for the Implementation of Subsurface Microbial Barriers for Restoration of Groundwater at UMTRA Sites

Tucker, M.D.

Sandia National Laboratories, Albuquerque, NM

SAND96-1459; 47 pp. (January 1996)

The Uranium Mill Tailings Remediation Action (UMTRA) Program is responsible for the assessment and remedial action at the 24 former uranium mill tailings sites located in the United States. The surface remediation phase, which has primarily focused on containment and stabilization of the abandoned uranium mill tailings piles, is nearing completion. Attention has now turned to the groundwater restoration phase. One alternative under consideration for groundwater restoration at UMTRA sites is the use of in-situ permeable reactive subsurface barriers. In this type of a system, contaminated groundwater will be allowed to flow naturally through a barrier filled with material which will remove hazardous constituents from the water by physical, chemical or microbial processes while allowing passage of the pore water. The subject of this report is a reactive barrier which would remove uranium and other contaminants of concern from groundwater by microbial action (i.e., a microbial barrier). The purpose of this report is to assess the current state of this technology and to determine issues that must be addressed in order to use this technology at UMTRA sites. The report focuses on six contaminants of concern at UMTRA sites including uranium, arsenic, selenium, molybdenum, cadmium and chromium. In the first section of this report, the fundamental chemical and biological processes that must occur in a microbial barrier to control the migration of contaminants are described. The second section contains a literature review of research which has been conducted on the use of microorganisms to immobilize heavy metals. The third section addresses areas which need further development before a microbial barrier can be implemented at an UMTRA site.

1075 V18/022694

Transient Drainage Summary Report: Final [Rev. 2, Ver. 5]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-224 (Rev. 2, Ver. 5); 70 pp. (September 1996)

This report summarizes the history of transient drainage issues on the Uranium Mill Tailings Remedial Action (UMTRA) Project. It defines and describes the UMTRA Project disposal cell transient drainage process and chronicles UMTRA Project treatment of the transient drainage phenomenon. Section 4.0 includes a conceptual cross section of each UMTRA Project disposal site and summarizes design and construction information, the groundwater protection strategy, and the potential for transient drainage.

1076

V18/020957

U.S. Department of Energy Uranium Mill Tailings Remedial Action Project Environmental Safety and Health Audit Process

Young, B.; Smythe, C.C.; Ross, L.E.

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM; Jacobs Engineering Group Inc., Albuquerque, NM

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (8 pp.) (1996)

The U.S. Department of Energy (DOE) Uranium Mill Tailings Remedial Action (UMTRA) Project has, over the last three years, developed an Environmental, Safety, and Health (ESH) audit process that is continuing to demonstrate positive results. The audit process is a cooperative effort between DOE and DOE contractors, the Remedial Action Contractor (RAC), and the Technical Assistance Contractor (TAC). The UMTRA audit process stresses site compliance with numerous code enforcement authorities using best management practices to design site safety and health procedures and site operating procedures that can be applied to all sites. The audit process demonstrates proactive ESH programs that are reducing incident rates on the DOE UMTRA Project. The UMTRA ESH Audit Process paper discusses the cooperative audit process.

1077

V18/024036

UMTRA Groundwater Project

TIE Quarterly 5(2):16,19 (Fall 1996/Winter 1997)

During the next few years, a team of scientists, engineers, regulators, and stakeholders will undertake what some call one of the most ambitious groundwater projects in the United States - the Uranium Mill Tailings Remedial Action (UMTRA) Ground Water Project. The goal (estimated to cost up to \$300 million) is to ensure compliance with U.S. Environmental Protection Agency (EPA) groundwater standards and to prevent future risks to human health or the environment at former uranium mill processing sites in several states.

1078

V18/021647

UMTRA Surface Project Management Action Process Document: Final Report [Rev. 2, Ver. 1]

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-221 (Rev. 2, Ver. 1); 51 pp. (June 1996)

Title 1 of the UMTRCA authorized the DOE to undertake remedial actions at these designed sites and associated vicinity properties (VP), which contain uranium mill tailings and other residual radioactive materials (RRM) derived from the processing sites. Title 2 of the UMTRCA addresses uranium mill sites that were licensed at the time the UMTRCA was enacted. Cleanup of these Title 2 sites is the responsibility of the licensees. The cleanup of the Title 1 sites has been split into two separate projects: the Surface Project, which deals with the mill buildings, tailings, and contaminated soils at the sites and VPs; and the Groundwater Project, which is limited to the contaminated groundwater at the sites. This management action process (MAP) document discusses the Uranium Mill Tailings Remedial Action (UMTRA) Surface Project. Since its inception through March 1996, the Surface Project (hereinafter called the Project) has cleaned up 16 of the 24 designated processing sites and approximately 5,000 VPs, reducing the risk to human health and the environment posed by the uranium mill tailings. Two of the 24 sites, Belfield and Bowman, North Dakota, will not be remediated at the request of the state, reducing the total number of sites to 22. By the start of FY1998, the remaining 6 processing sites and associated VPs will be cleaned up. The remedial action activities to be funded in FY1998 by the FY1998 budget request are remediation of the remaining Grand Junction, Colorado, VPs; closure of the Cheney disposal cell in Grand Junction, Colorado; and preparation of the completion reports for 4 completed sites.

1079

V18/022697

Uranium Mill Tailings Remedial Action Project: 1995 Environmental Report

Jacobs Engineering Group Inc., Albuquerque, NM

DOE/AL/62350-218; 425 pp. (June 1996)

In accordance with U.S. Department of Energy (DOE) Order 23 1. 1, Environment, Safety and Health Reporting, the DOE prepares an annual report to document the activities of the Uranium Mill Tailings Remedial Action (UMTRA) Project environmental monitoring program. This monitoring must comply with appropriate laws, regulations, and standards, and it must identify apparent and meaningful trends in monitoring results. The results of all monitoring activities must be communicated to the public. The UMTRA Project has prepared annual environmental reports to the public since 1989.

1080

V18/021649

Uranium Mill Tailings Remedial Action Project: Fiscal Year 1995 - Annual Report to Stakeholders

U.S. Department of Energy, Washington, DC

DOE/AL/62350-T9; 51 pp. (September 30, 1995)

In 1978, Congress authorized the DOE to assess and clean up contamination at 24 designated former uranium processing sites. The DOE is also responsible for cleaning up properties in the vicinity of the sites where wind and water erosion deposited tailings or people removed them from the site for use in construction or landscaping projects. Cleanup is being undertaken in cooperation with state governments and Indian tribes within whose boundaries

the sites are located. It is being conducted in two phases: the surface project and the groundwater project. This report addresses specifics about both phases of the UMTRA Project. DOE's UMTRA Project is the world's largest materials management project ever undertaken to reduce or eliminate risk to the general public from exposure to potentially hazardous and radioactive materials. With an estimated cost at completion of nearly \$2 billion for both phases of the UMTRA Project, and with the responsibility for encapsulating and isolating almost one-fourth of all the uranium mill tailings generated across the entire US (more than 44 million cubic yards), the UMTRA Project and its people have achieved a long record of safely and effectively completing its mission. It continually enhances its national reputation through its diligent process and cost efficiency as well as its international recognition for its technological innovation.

URANIUM MILL TAILINGS MANAGEMENT

1081 V18/023988

Final Technical Evaluation Report for the Proposed Revised Reclamation Plan for the Atlas Corporation Moab Mill

Fliegel, M.; Brummett, E.S.; Ibrahim, A.; Johnson, T.; Justus, P.; Layton, M.; Rom, D.

U.S. Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards, Washington, DC

NUREG-1532; 195 pp. (March 1997)

This report summarizes the U.S. Nuclear Regulatory Commission (NRC) staff's review of Atlas Corporation's proposed reclamation plan for its uranium mill tailings pile near Moab, Utah. The proposed reclamation would allow Atlas to: (1) reclaim the tailings pile for permanent disposal and long-term custodial care by a government agency in its current location on the Moab site, (2) prepare the site for closure, and (3) relinquish responsibility of the site after having its NRC license terminated. The NRC staff concludes that, subject to license conditions identified in the Technical Evaluation Report (TER), the proposed reclamation plan meets the requirements identified in NRC regulations, which appear primarily in 10 CFR Part 40.

1082 V18/020784

Data Dictionary and Discussion for the Midnite Mine GIS Database: Report of Investigations - 1996

Peters, D.C.; Smith, M.A.; Ferderer, D.A.

U.S. Bureau of Mines, Denver Research Center, Denver, CO
BUMINES-RI-9611; 357 pp. (January 18, 1996)

A geographic information system (GIS) database has been developed by the U.S. Bureau of Mines (USBM) for the Midnite Mine and surroundings in northeastern Washington State (Stevens County) on the Spokane Indian Reservation. The GIS database was compiled to serve as a repository and source of historical and research information on the mine site. The database also will be used by the Bureau of Land Management and the Bureau of Indian Affairs (as well as others) for environmental assessment and reclamation planning for future remediation and reclamation of the site. This report describes the data in the GIS database and their characteristics. The report also discusses known backgrounds on the data sets and any special considerations encountered by the USBM in developing the database.

1083 V18/020783

Groundwater Flow Model (GWFM) Development, Midnite Mine, Wellpinit, WA: Report of Investigations - 1996

Kirschner, F.E.

U.S. Bureau of Mines, Spokane Research Center, Spokane, WA

BUMINES-RI-9608; 11 pp. (1996)

The ultimate purpose of this research effort was to develop a groundwater flow model (GWFM) for the Midnite Mine that can be utilized by the contractor preparing the Environment Impact Statement (EIS) and by other interested parties. The objectives of

this study were to: (1) develop a shell model of the geology at the site, (2) develop the basis for a GWFM that will meet criteria described elsewhere in this Report of Investigations (RI) and that can be updated with new information generated during the EIS process, and (3) present the results of two steady-state simulations of groundwater flow within the bedrock units. The current GWFM generates non-unique solutions because flow data for the bedrock units currently do not exist. However, the model provides useful results with respect to directions of flow.

1084 V18/020787

Hydraulic Characterization of Midnite Mine, Wellpinit, WA: Summary of 1994 Field Season [Report of Investigations 1996]

Williams, B.C.; Riley, J.A.

U.S. Bureau of Mines, Spokane Research Center, Spokane, WA

BUMINES-RI-9606; 38 pp. (1996)

The Midnite Mine is an inactive uranium mine on the Spokane Indian Reservation in Washington State. Preliminary results of hydraulic stress tests performed in the bedrock at the site are described. Slug tests and pumping tests were conducted using preexisting USBM monitoring wells. Slug test results were used to generate hydraulic conductivity estimates for fractured and unfractured intrusives. The pumping tests demonstrated varying degrees of spatial continuity. Hydraulically continuous fractured zones along north-south planes were demonstrated in two cases for distances of 90 and 116 m (300 and 380 ft). The short-term pumping tests provided no evidence of east-west hydraulic continuity in fractured zones.

1085 V18/020788

Midnite Mine Radiation Survey 1995: Report of Investigations - 1996

Stroud, W.P.; Drouillard, R.F.

U.S. Bureau of Mines, Division of Environmental Technology, Washington, DC

BUMINES-RI-9610; 27 pp. (1996)

During the week of September 4, 1995, personnel from the U.S. Bureau of Mines (USBM) conducted a Ra-226 survey at the Midnite Mine. One hundred thirty measurements were made on a rectangular grid with 150-m spacings. Concurrently, Shepherd Miller, Inc., took gross gamma readings in micro-R/h at the same grid points. In addition, the USBM collected 17 soil samples to be analyzed for radium, thorium, and potassium. The results of this study are summarized in this report.

1086 V18/020785

Midnite Mine Summary Data: Data file

U.S. Bureau of Mines, Helium Field Operations, Amarillo, TX

Report; 10 pp. (1996)

This two-CD set is a compilation of most of the results of research conducted by the U.S. Bureau of Mines on the Midnite Mine in northeastern Washington state on the Spokane Indian Reservation.

The site is an inactive open pit uranium mine for which reclamation research and planning is being performed. Hydrologic monitoring and modeling of contaminated and potentially contaminated groundwater at the mine was performed and results of these studies make up part of volume 1 of the CD set. Likewise, analyses of the mine wastes were performed to determine what materials could be used for reclamation and which would have to be remediated, and these data also are on volume 1. To support research activities at the site and to serve as a historical reference on what is known about the mine site, a geographical information system GIS database was developed, including images of the site, topographic data, analytical data, and numerous other data sets that were available from government agencies and the mining company. Modeling of the site geology in 2D and 3D also was performed as part of GIS database development, and files from this research are included.

1087

V18/020786

Midnite Mine Summary Report: Report of Investigations - 1996

Dean, N.E.; Boldt, C.M.K.; Schultze, L.E.; Nilsen, D.N.; Isaacson, A.E.

U.S. Bureau of Mines, Division of Environmental Technology, Washington, DC

BUMNES-RI-9604; 24 pp. (1996)

The Midnite Mine is an inactive, hard-rock uranium mine in Stevens County, Washington. Oxidation of sulfide-containing minerals in the ore body produces large quantities of acidic water. The Report of Investigations summarizes the studies that were completed on: (1) treatment alternatives for uranium contaminated acid mine drainage and (2) overall site reclamation, including groundwater flowpaths in the bedrock, radiation, and waste rock reactivity. As an aid to site reclamation, a Geographic Information System database was also produced that contains available current and historic data and information on the Midnite Mine. The report explains the scope of the Bureau's study and summarizes the results of its investigations.

1088

V18/020782

US Bureau of Mines Final Report - Midnite Mine Water Treatment Studies: Report of Investigations - 1996

Schultze, L.E.; Nilsen, D.N.; Isaacson, A.E.; Lahoda, E.J.

U.S. Bureau of Mines, Reno Research Center, Reno, NV

BUMNES-RI-9605; 58 pp. (1996)

The U.S. Bureau of Mines reviewed and evaluated options for treatment of the approximately 500 million gallons of contaminated water in flooded pits at the Midnite Mine on the Spokane Indian Reservation. While current lime treatment produces discharge quality water, the resultant sludges are radioactive, presenting a disposal problem. Of the 24 commercial processes and seven emerging technologies evaluated, none demonstrated a significant advantage over ion exchange using a strong base anion exchange resin in either laboratory or field tests. Uranium was lowered by 22 ppm to 0.2 ppb in treated water. Radium was lowered from 44 pCi/L to less than 1 pCi/L using a modified precipitation with BaCl₂. The natural zeolite, clinoptilolite, lowered radium to 6-8 pCi/L when used as an ion exchanger.

1089

V18/024326

Application of Low-Level Counting Techniques for the Investigation of the Impact of Uranium Mining as Well as Remediation on the Environment

Niese, S.

Verein fuer Kernverfahrenstechnik und Analytik Rossendorf e.V., Dresden, Germany

CONF-9510424; Proceedings of an International Committee for Radionuclide Metrology Conference on Low-Level Measurement Techniques, Seville, Spain, October 2-6, 1995; Applied Radiation and Isotopes 47(9-10):1109-1112 (September-October 1996)

A chamber with a shield of steel and lead of a total surface density of 365 g/sq cm for low-level measurements has been installed within a cave at an old brewery named 'Felsenkeller' in the Wiesseritz-valley near Dresden. In the 45 m deep underground laboratory 98% of cosmic muons are shielded by the rock. Low detection limits are necessary for the measurement of different kinds of water and biological samples. The use of gamma-spectrometry reduces the need for complex chemical separation procedures.

1090

V18/022743

Applied Technology for Mine Waste Water Decontamination in the Uranium Ores Extraction from Romania

Bejenaru, C.; Filip, G.; Vacariu, V.T.

A.R.R.M., Bucharest, Romania; R.&D.I.R.R.M., Magurele, Romania

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 929-932) (1996)

The exploitation of uranium ores in Romania is carried out in underground mines. In all exploited uranium deposits mine waste waters result and will still result after the closure of uranium ore extraction activity. The mine waters are radioactively contaminated with uranium and its decay products and are a hazard both for underground waters and for the environment. This paper presents the results of research work on uranium elimination from waste waters and the problems involved with the existent equipment and its maintenance. The main waste water characteristics are discussed: solids in suspension, uranium, radium, mineral salts, pH, etc. The most suitable way to eliminate uranium from mine waste waters is the ion exchange process based on ion exchangers in fluidized beds.

1091

V18/021183

Aspects of the Permanent Storage of Uranium Tailings

Al-Hashimi, A.; Evans, G.J.; Cox, B.

University of Toronto, Department of Chemical Engineering, Toronto, Ontario, Canada

Water, Air and Soil Pollution 88(1-2):83-92 (March 1996)

Uranium tailings generated as solid and liquid wastes in uranium mining/milling operations are locally disposed of in sites with

suitable conditions to construct tailings basins. Radium presenting the liquid phase which overflows from dewatered tailings is precipitated chemically. The environmental hazards of uranium tailings arise when the disposal site is abandoned and huge amounts of small particles of depleted ore remain in place. Top soils are for soil stabilization and for controlling radon emissions. Hence water infiltration through uranium tailings presents a potential hazard to underground aquifers. Water triggers a sequence of reactions and carries contaminants away from waste sites. For permanent disposal of uranium tailings, either the hazardous constituents of these wastes have to be isolated from the percolating water or the subsoils must have acceptable sealing and sorptive characteristics. The first approach is effected by blending solidifying reagents with the tailings to block them from the leaching effects of aggressive pore water. Solid waste treatment may be costly. The leaching of toxic constituents is effective if the tailings are loose. Heavy metals and radioactive elements migrate to the pore water. The sorptive and neutralizing capacities of the underlying soils must be examined and measures taken to stop the progression of acidic interstitial water. The paper focuses on leaching in uranium tailings, sorption on natural geological barriers, and radium immobilization. 25 refs.

1092 V18/021669

Biosorption of Uranium by *Pseudomonas Aeruginosa* Strain CSU: Characterization and Comparison Studies

Hu, M.Z.C.; Norman, J.M.; Faison, B.D.; Reeves, M.E.

Oak Ridge National Laboratory, Chemical Technology Division, Oak Ridge, TN

Biotechnology and Bioengineering 51(2):237-247 (July 20, 1996)

Pseudomonas aeruginosa strain CSU, a nongenetically engineered bacterial strain known to bind dissolved hexavalent uranium (as $\text{UO}_2(+2)$ and/or its cationic hydroxo complexes) was characterized with respect to its sorptive activity. The uranium biosorption equilibrium could be described by the Langmuir isotherm. The rate of uranium adsorption increased following permeabilization of the outer and/or cytoplasmic membrane by organic solvents such as acetone. *P. aeruginosa* CSU biomass was significantly more sorptive toward uranium than certain novel, patented biosorbents derived from algal or fungal biomass sources. *P. aeruginosa* CSU biomass was also competitive with commercial cation-exchange resins, particularly in the presence of dissolved transition metals. Uranium binding by *P. aeruginosa* CSU was clearly pH dependent. Uranium loading capacity increased with increasing pH under acidic conditions, presumably as a function of uranium speciation and due to the $\text{H}(+1)$ competition at some binding sites. Nevertheless, preliminary evidence suggests that this microorganism is also capable of binding anionic hexavalent uranium complexes. Ferric iron was a strong inhibitor of uranium binding to *P. aeruginosa* CSU biomass, and the presence of uranium also decreased the $\text{Fe}(+3)$ loading when the biomass was not saturated with $\text{Fe}(+3)$. Thus, a two-state process in which iron and uranium are removed in consecutive steps was proposed for efficient use of the biomass as a biosorbent in uranium removal from mine waste water, especially acidic leachates.

1093 V18/023487

Brazilian Uranium Mine Decommissioning-Chemical and Radiological Study of Waste Rock Piles

Wiikmann, L.O.

Industrias Nucleares do Brasil, Pocos de Caldas, Brazil

CONF-9606116; Proceedings of an American Nuclear Society (ANS) Annual Meeting, Reno, NV, June 16-20, 1996. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 74:118-119 (1996)

The Pocos de Caldas plateau is a high-natural-radioactivity area in the state of Minas Gerais, southeast Brazil. Uranium occurrence in the plateau was first observed in 1948. Mining started in 1977 with mine scouring, and the first ore pile was constructed in 1981. Waste rocks are derived from the mine material. The analysis of core samples is discussed.

1094 V18/021654

Cleaning Former Uranium Sites in Eastern Germany

Gattsvajler, R.; Khagen, M.

Atomnaya Tekhnika za Rubezhom 12:29-31 (December 1995)

Problems related to recovery and decontamination of soil and water damaged during intensive uranium mining in Eastern Germany are presented. Design and reclamation efforts conducted as part of the unique project of the Wismut Company are described. The consultation department of environmental recovery was organized in this company to share experience and technology. (This document is in Russian).

1095 V18/020790

Consequences of the Hungarian Uranium Mining and Milling

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National Research Institute for Radiobiology and Radiohygiene, Budapest, Hungary; Mecsekuran Limited, Pecs, Hungary

IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 151-156) (February 1996)

In the south part of Hungary, uranium is produced from a low grade underground sandstone ore (0.07-0.12% U). The mining operation in two mines was started in 1958, and now three new mines supply uranium production. Until 1962, the ores had been ground and sorted only, and the milling was completed later by chemical processes for uranium extraction (acid and alkaline leach technology). The total amount of the waste rocks disposed of near the mines is 1.8×10^7 tons. The mill tailings have been emplaced in two retention ponds built with a ring dike. The ponds contain 1.9×10^7 tons of solid particles and 7×10^6 tons of solution. The amount of the ore heaps for the alkaline leach process is 7×10^6 tons. The radiation levels in the mining and milling area change from place to place in the range of from the background level to 10-100 times the background.

1096

V18/021133

Decommissioning Costs of Uranium Production Facilities: An International Comparison

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Wismut GmbH, Chemnitz, Germany; Federal Ministry of Economics, Bonn, Germany; Uranerzbergbau-GmbH, Wesseling, Germany

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (12 pp.) (1996)

During the initial period of uranium production, environmental protection was of no importance and legal provisions setting the terms for proper rehabilitation, decommissioning and institutional control were missing. This situation led to uncontrolled abandonment of production sites. In the former Eastern Block countries this situation prevailed and the massive closure of uranium production capacities in recent years results in major environmental legacies due to lack of technologies and experience in environmental management, lack of financial resources and lack of a legislative and regulatory frame for decommissioning. In the Western World countries since the early seventies uranium mining is strictly regulated regarding the environmental impacts of the projects. Companies are expected to take the costs of decommissioning and restoration into account from the very beginning of the projects and to adjust them continuously during the production phase. This paper summarizes results of an international study on decommissioning and reclamation costs of uranium production facilities commissioned by the German Federal Ministry of Economics. Within the frame of this study 14 countries with more than 100 projects were evaluated representing a cumulative uranium production of approx. three billion pounds of U_3O_8 and estimated rehabilitation costs of approx. 3.700 million US dollars. Due to numerous factors which influence decommissioning costs, the variance of specific costs is quite broad ranging from a minimum of 0.12 US\$/lb U_3O_8 to more than 40 US\$/lb U_3O_8 . The weighted average is 1.24 US\$/lb U_3O_8 . The specific unit costs per tonne of tailings range between 0.12 and 43 US\$. Factors influencing the costs can be classified as either inherent to the project and site-specific or of more general nature. One dominant inherent factor is the ore grade and ore mineralogy and the geological and hydrogeological setting of the deposit. One of the more important general factors is whether the decommissioning of the projects takes place immediately after mine closure and is financed and carried out by the mining company or is publicly funded and carried out some time after closing-down by public institutions. During the last twenty years major technology advancements have been made in waste management from uranium mining and milling. As a result the environmental impact of production operations has been mitigated and sustainable solutions for closing and rehabilitating these operations are available. This development has caused a shift of environmental cost (which substantially increased in absolute terms) from the decommissioning stage of a project to the planning and production stage.

1097

V18/020717

Decommissioning Plan for Andujar Uranium Mill

Facilities

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Empresa Nacional de Residuos Radiactivos S.A., Madrid, Spain; Empresa Nacional de la Ingenieria y Tecnologia S.A., Madrid, Spain

IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 219-226) (March 1996)

The milling of radioactive ores results in contaminated buildings and facilities which must be decommissioned, and large quantities of tailings which must be managed safely so that residual environmental and health risks do not exceed acceptable levels. In the south of Spain, on the outskirts of the town of Andujar, an inactive uranium mill facility is under decommissioning. Mill equipment, buildings and process facilities have been dismantled and demolished and the resulting metal wastes and debris have been placed in the pile. The tailing mass is being reshaped by flattening the sideslopes and a cover system will be placed over the pile. This paper describes the safety aspects and technical approaches which are being used for the remediation and closure of the Andujar mill site.

1098

V18/024879

Decommissioning Sullivan's Tailings

Canadian Mining Journal 117(5):25-26 (October 1996)

Since Cominco Ltd. announced it would close the Sullivan mine in Kimberley, B.C. in 2001 when all the ore remaining in pillars is mined out, Cominco has revised its closure plan several times and has measurably improved its tailings reclamation practices. Now, the future seems more certain. In recent months earth-moving activities have picked up on the 900-hectare site near Kimberley where tailings have been impounded, sometimes haphazardly, for the past 72 years. Where siliceous tailings were deposited, a layer of so-called "float" rock (waste rock from the heavy media plant) is laid down to create a capillary barrier which prevents the upward migration of water into the soil layer above. This allows vegetation to grow on top of the tailings deposit. Various combinations of compacted float and uncompacted float are being tested.

1099

V18/022219

Decommissioning of Uranium Mine Tailings Management Areas in the Elliot Lake Area: Report

Elliot Lake Uranium Mine Tailings Areas Environmental Assessment Panel, Ottawa, Ontario, Canada

SSC-EN105-52/1996E; 72 pp. (1996)

Rio Algom Limited and Denison Mines Limited are seeking licenses to decommission four uranium tailings waste management areas associated with uranium mines in the Elliot Lake area that operated in the last 40 years but are now closed. This report begins with a review of the local setting of the decommissioning project proposals, including the local environment, the tailings sites, and

the Elliot Lake community. It then outlines the primary issues associated with decommissioning (acid rock drainage, radiological exposure, security of waste storage facilities); the basic options for disposal, containment, and long-term monitoring; and the status of other idle uranium tailings sites in the area. The specific proposals for decommissioning each site are described and analysed with regard to phases of decommissioning, technical matters such as structural stability and effluent treatment, and socio-economic considerations. Finally, operation and management of the waste storage facilities over the long term are discussed, including monitoring, maintenance, research, financial assurance, and funding management.

1100

V18/022801

Decommissioning of Uranium Mines in Canada

Zgola, M.B.

Atomic Energy Control Board, Ottawa, Ontario, Canada
CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1735-1741) (1996)

The Atomic Energy Control Board (AECB) regulates the nuclear fuel cycle in Canada. This paper overviews the nature and function of the AECB; discusses its "site-specific" approach to regulating the decommissioning of uranium mining facilities; catalogues the location and status of inactive uranium mill tailings impoundments in Canada; and, summarizes the decommissioning work at the licensed Elliot Lake tailings impoundments.

1101

V18/023205

Decommissioning of Uranium Mining in Saxony and Thuringia/Germany Challenges and Initial Solutions

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Wismut GmbH, Engineering Department, Chemnitz, Germany

CONF-9210194; Proceedings of an International Symposium on Environmental Contamination in Central and Eastern Europe, Budapest, Hungary, October 12-16, 1992, 968 pp.; (pp. 344-346) (1992)

Uranium mining in East Germany produced approximately 222,000 tons of uranium and left behind a host of wastes covering a surface of some 240 square kilometers. At present, efforts are focused on decommissioning, risk reduction and rehabilitation of 32 square kilometers of site facilities of Wismut GmbH comprising 1,550 ha of waste piles, 620 ha of tailings ponds, one worked-out open cut, and the underground openings of five former mining sites. Once the exposure situation is assessed, the scope of rehabilitation will be defined, technological issues addressed, and their ecological benefit identified. The main scientific and technological challenges are the prognosis of pollutant dispersion while the pits are flooded, the removal of the covering of waste piles in an ecologically acceptable manner, the dewatering of tailings ponds, and the establishment of a comprehensive monitoring system.

1102

V18/021514

Decontamination of Acid Mine Water from Ronneburg/Thuringen Which is High in Sulfates and Metals Using Sulfate-Reducing Bacteria: Part 2, Biological Bases - Final Report of the Preliminary Phase

Hard, B.; Friedrich, S.

Umweltforschungszentrum Leipzig-Halle GmbH, Leipzig, Germany; C&E Consulting und Engineering GmbH, Sektion Umweltmikrobiologie, Chemnitz, Germany

INIS-mf-15177; 42 pp. (July 25, 1995)

The mining in Eastern Europe, particularly in East Germany, is a major source of pollution to the surrounding areas of the mines. With the end of the Cold War the demand for uranium has drastically declined. Many of the pits have therefore been closed down or are in the process of closure such as the uranium mine in Ronneburg in Thuringen. One major problem is making the pits and dumps safe as they are highly radioactive through naturally occurring uranium and other radioactive elements. Because of the leaching process through bacteria, drainage water is very acidic, with pH-values between 1-2. The water is very rich in magnesium, iron and aluminum sulfate. Here the application of a microbial process to decontaminate acid mine drainage was investigated. Decontamination of the water includes: Increase in pH, decrease in sulfate concentrations, and minimization of the metal and radionuclide load. Sulfate-reducing bacteria seem suitable for this process. In order for such a microbial process to be economically viable, a cheap and widely available electron donor has to be used (eg., methanol). The work carried out reports on the isolation, characterization and physiology of sulfate-reducing methylotrophic bacteria and their suitability for a decontamination process of sulfuric acid uranium mine water. (This document is in German).

1103

V18/020791

Effects of Uranium Mining on the Contamination of Some Areas in Poland

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 193-216) (February 1996)

In Poland there are two areas which are contaminated by natural radioactive materials. The first area is in Lower Silesia and the second in Upper Silesia. In Lower Silesia extensive uranium exploration and mining activities were carried out in the early 1950's under the direction of Soviet Union experts. Uranium exploration and mining took place at Kowary Podgorze (eastern

Sudety Mountains), Radoniow and Koapniec villages and in the vicinity of Kletno. Extensive uranium-bearing mine dumps resulted from the exploration and mining. The contamination has become dispersed and the local people have not been informed regarding the health risk that this represents. Field gamma-radiation measurements made first in 1971, showed that the highest levels of radioactivity were at the dump in Radoniow (up to 2000 [mu]R/h) and in Kowary Podgorze (up to 1500 [mu]R/h). Also, the dump at Radoniow has partly been reexploited for local use in construction. In the Upper Silesian region radium (Ra-226, Ra-228) contamination is present as suspended particulate matter and in solution in mine ground waters released during black coal mining. Near mine water discharge sites, as well as in active sediments of small rivers, up to 460 Bq/kg Ra-228 and up to 1430 Bq/kg of Ra-226 are present.

1104 V18/023039

Elliot Lake Growing Independent of Mining

Attenborough, M.

Northern Miner 82(21):1,13 (July 22, 1996)

Short communication. No abstract available.

1105 V18/024050

Environmental Impact Assessment of Tailings Dispersal from a Uranium Mine Using Toxicity Testing Protocols

Rippon, G.D.; Riley, S.J.

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Water Resources Bulletin 32(6):1167-1175 (December 1996)

Toxicity testing is a means of establishing the environmental risk of a uranium tailings release. It is valuable in designing tailings containment structures because it assists in setting acceptable levels of risk for the design. This paper presents details of toxicity tests of the tailings from Ranger Uranium Mine, Northern Territory, Australia. The results suggest that the non-radiological toxicity of the tailings is low. The environmental risk of a tailings release is more likely to be related to the physical impacts of the tailings, including infilling of billabongs and changes in the sedimentology of riparian ecosystems rather than biogeochemical impact. Two major results were: (1) water from treatment with washed tailing fines were not toxic to *Hydria viridissima*, and (2) mixtures of washed tailings fines and natural floodplain sediment (overlying water or elutriates) were not toxic to *Hydra viridissima* or *Moinodaphnia macleayi*.

1106 V18/020801

Environmental Restoration of Uranium Mines and Mills in the Czech Republic

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a

Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 113-135) (February 1996)

A great number of uranium mines and mills, a long-term history of uranium industry production, a lack of environmental concern during the Socialist period and application of both mining and in situ leaching methods are the most important causes of great environmental restoration problems. The most complicated situation is on the ore deposit Straz pod Ralskem-Hamr in Northern Bohemia. The paper describes principal results of the complex investigation performed as a basis for the environmental restoration program in this area.

1107 V18/020975

Evidence of Diagenetic Processes in Uranium Mill Tailings from the ECARPIERE Uranium Deposit (Cogema-France)

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (6 pp.) (1996)

An integrated analysis of a tailings impoundment, ECARPIERE (Western part of France) was performed in order to get a good understanding of the behavior of radionuclides and associated heavy metals. Three drill holes performed on the tailings impoundments (former open-pit and ring dyke) give a good outline of the mineralogical and geochemical modifications accruing in the tailings which, in some cases, have been stored for nearly 40 years. Mineralogical and geochemical investigations of the solid fraction and isotopic characterization of the tailings pore water were made from the top to the bottom of the storage all along the drillcore; they lead us to the conclusion that the stored tailings have undergone a significant diagenesis. (1) Mineralogical Modifications consist of: Precipitation of new mineralogical paragenesis: smectite, gypsum, barite, hexavalent uranium minerals; Dissolution of residual minerals such as sulfides, feldspars, biotite, monazite, etc.; and Close relationships between some heavy metals, radionuclides and the newly formed minerals. (2) Leaching Test performed on both stored and fresh tailings lead to the same conclusions as mentioned above. The radionuclides and associated heavy metals releases are higher in a fresh tailings than in a stored one; development of smectite does not appear in fresh tailings. (3) The Th-230/Ra-226 and Ra-226/Pb-210 ratios are in disequilibrium in the acidic tailings. The main conclusion of these studies is: a tailings impoundment is not inert, deep modifications appear short time after the deposit especially in the saturated zone of the tailings. These modifications will have an influence on the mobility of the radionuclides and heavy metals in the tailings and consequently on their release toward the environment.

1108 V18/023040

Experience in the Transport and Disposal of Uranium Mill Tailings from Aldama City to Sierra Pena Blanca in Chihuahua, Mexico

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INIS-PE-8; CONF-9510349; Radiological and Nuclear Safety: Radiological Protection in Latin America and the Caribbean, Proceedings of the Third Joint Regional Meeting of the International Radiation Protection Association (IRPA) and the Peruvian Society of Radioprotection (SPR), Cusco, Peru, October 23-27, 1995, 1207 pp.; (pp. 66-71) (August 1996)

In the process of decontamination, transport and disposal of uranium mill tailings in the state of Chihuahua, Mexico, the main task for the multidisciplinary and multi-institutional taskforce was to select the site for the final disposal. The uranium mill tailings contain Ra-226, which has a half life of 1600 years. Therefore, the disposal site should be adequately stable, remote from populations, and provide containment for thousands of years. The decontamination of the site where the uranium mill tailings were stored 25 years ago required meeting regulatory standards. For transport of uranium mill tailings it was necessary that the vehicles used had devices to reduce the dispersion of material on the road. The selection of the site was the product of a balance between the cost of transport and the final disposal. To characterize the site studies of hydrology, meteorology, ecology, geology and seismology were performed. (This document is in Spanish).

1109

V18/022742

Five Years of Uranium Mine and Mill Decommissioning in Germany: Progress of the Wismut Environmental Remediation Project

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CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 922-928) (1996)

With the end of the Cold War and the fall of the iron curtain, Germany inherited in 1990 by its reunification the legacy of 45 years of unrestricted, intensive uranium mining in the eastern part of Germany. The environmental damages and risks related to widespread soil and groundwater contamination, caused by huge tailings ponds and numerous waste rock piles in one of Germany's most densely populated areas, made it necessary to implement one of the world's largest environmental clean-up programs. 13 billion German Marks (8.7 billion US-\$) will be spent within approx. 20 years for decommissioning and environmental restoration efforts. Five years after the start-up of the Wismut project considerable results have been achieved. Conceptual work, even regarding technically difficult issues of the program, is far advanced, and about one third of the physical work program has been completed. At the former mining and milling locations significant improvements of the environmental situation have been achieved. The further on-schedule progress of the Wismut program is an important

prerequisite for the socio-economical development in the former uranium mining districts.

1110

V18/020796

Identification and Radiological Characterization of Contaminated Site in Spain: Andujar Uranium Mill Site

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 299-313) (February 1996)

Empresa Nacional de Residuos Radioactivos, S.A. (ENRESA) is remediating an inactive uranium mill facility in the town of Andujar in the south of Spain. The Andujar plant became operational in 1959 and continued in operation until 1981. All solid wastes generated during the operation of the plant are contained in a tailings pile, which covers an area of 9.4 hectares and has a total volume of about one million cubic meters. The remedial action plan proposed for Andujar mill site involved stabilizing and consolidating the uranium mill tailings and contaminated materials in place. The actual tailings pile was reshaped by flattening the sideslopes to improve stability. Tailings from sideslope flattening were relocated around the existing pile and on the top of the lower pile. Mill equipment, buildings and process facilities were dismantled, demolished and placed in the tailings pile. Off-pile contaminated soils were excavated and placed on top of the tailings pile in order to reduce the radon flux. The pile has been covered with a multilayer system to meet the three simultaneous demands of erosion control, infiltration and radon control. This paper describes the identification and radiological characterization of Andujar Uranium Mill site which was carried out in three phases. During the first phase, the radioactive concentration in tailings was established, and site general parameters and potential spreading of contamination were defined. During the second phase, once stabilization in place was decided, three main tasks were performed: a radon flux field test, a radionuclide migration study and a radiometric study. During the third phase, in order to establish the final conditions of the stabilized tailings pile and off-pile soils clean conditions after remediation activities, a radiometric survey was carried out.

1111

V18/020803

Identification and Radiological Characterization of Contaminated Site in Estonia

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in

Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 137-141) (February 1996)

Three sites are considered radioactively contaminated areas by the Estonian public. This report presents the available information concerning the environmental consequences of the radioactive waste depository at Saku, the Russian Navy training center with two submarine reactors at Paldiski, and the uranium mill tailings at Sillamae. On the basis of the presented information only, the Sillamae area can be considered a radioactively contaminated site in Estonia which needs clean-up and immediate remedial actions. The other two sites should be considered potential sources of radioactive contamination. Mill tailings of the Sillamae plant are located at the coast of the Gulf of Finland (59 deg. 24.9' N, 27 deg. 43.5 E). According to the data from the plant, the tailings contain about 9 million tons of waste which consists of some 1200 tons of uranium, 800 tons of thorium and about 3×10^{14} Bq (7000 Ci) of Ra-226. The dose rate on the depository varies between 0.5 and 35 μ Sv/h. The international working group of Estonian, Finnish, Norwegian and Swedish experts is currently preparing the final report of the environmental impact assessment study of the Sillamae depository. This report presents the preliminary results of this study.

1112 V18/020795

Identification and Radiological Characterization of Contamination Sites in Slovenia

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 283-298) (February 1996)

Known radioactive contaminated sites and radioactive waste storage areas in the Republic of Slovenia are identified. The only significant site (Zirovski vrh Uranium Mine) is closed. Three main radioactive contamination sources are mine waste disposal (1.5 million tons), mill tailings disposal (0.7 million tons), and mine water runoff (60-90 cu. m/h). The influence of the uranium and radium contaminated mine water runoff, and mine and mill tailing drainage waters on nearby water streams are shown. Effects have been monitored regularly from startup of the mine operations up to the present. Two small rivers collect all eventual radioactive and/or chemical contaminants. From a radioactive contaminants point of view, streams are potable as defined by Slovene maximal permissible concentrations. Even these will be minimized in the future. There will be minor problems with the contamination in future due to the small scale and short operating time of Zirovski vrh Uranium production center. Mill waste tailings site represents a serious reclamation problem because of site area earth slide. The moving mass is 7 million tons. An effective equivalent dose contribution for

the population in years 1991 and 1992 was estimated to be 0.34 mSv/a, effective equivalent dose from natural sources is estimated to be 5.5 mSv/a in this area.

1113 V18/021656

Induction Log: A Good Watchdog - Induction Well Logging Through the Polyethylene Casing for Acidification Measurements of Groundwater and Rock Environment in the ISL Area of the Straz Uranium Deposit in the North Bohemian Cretaceous, Czech Republic

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IAEA-TECDOC-868; CONF-9412123; Innovations in Uranium Exploration, Mining and Processing Techniques, and New Exploration Target Areas, Proceedings of a Technical Committee Meeting, Vienna, Austria, December 5-8, 1994, 148 pp.; (pp. 79-88) (March 1996)

The Straz uranium deposit in Northern Bohemia is exploited using the ISL method. When using this method, it is necessary to observe the spatial extent and time changes of sulfuric acid leaching solutions. Hydrochemical sampling of groundwater provides data during the whole production period. If it is possible, it is advisable to supplement these analyses with well logging results for more detailed spatial zoning. The leaching solution, which is almost completely made up of sulfuric acid, significantly changes the electric conductivity of groundwater and consequently of water-bearing rocks. Surface geophysical measurements cannot usually be used. The majority of injection, recovery, and hydrogeological wells are cased by polyethylene casing. This circumstance does not allow use of the classical well logging methods for measurement of electric resistivity, such as laterolog. However, it allows the use of the induction log. A suitable small tool (AK 2) for high frequency induction logging was designed in 1977. Several of these tools have been used for periodic checking of hundreds of wells in the ISL plant since 1979. This paper briefly recapitulates the methodology and shows typical examples of results of this method. It also describes important innovations in this method.

1114 V18/021657

Innovations in Uranium Exploration, Mining and Processing Techniques, and New Exploration Target Areas: Proceedings of a Technical Committee Meeting, Vienna, Austria, December 5-8, 1994

International Atomic Energy Agency, Vienna, Austria

IAEA-TECDOC-868; CONF-9412123; Innovations in Uranium Exploration, Mining and Processing Techniques, and New Exploration Target Areas, Proceedings of a Technical Committee Meeting, Vienna, Austria, December 5-8, 1994, 148 pp. (March 1996)

In 1994 there were 432 nuclear power plants in operation with a combined electricity generating capacity of 340 to 347 MWe. To achieve this, 58,000 tons of uranium were required as nuclear fuel. In view of its economic importance, the International Atomic Energy Agency has had a long-standing interest in uranium exploration, resources, production and demand. This is reflected in

numerous publications covering different aspects of this field. Particularly worth mentioning is the periodical "Uranium Resources, Production and Demand," published jointly with the Nuclear Energy Agency of the Organization for Economic Cooperation and Development (OECD). Its fourteenth edition was published in early 1994. It was the objective of this Technical Committee meeting, the proceedings of which are presented in this TECDOC, to bring together specialists in the field and to collect information on new developments in exploration, mining techniques and innovative methods of processing that are more environmentally friendly. The meeting was attended by a total of 22 participants from 14 countries. Eleven papers were presented describing new exploration areas, improvements in processing methods, new mining techniques for the extraction of high grade ore, and innovative approaches for site reclamation. Two working groups were organized and dealt with the analysis of world uranium resources and the new direction of research in mining and ore processing.

1115 V18/020804

Investigation Report on the Decommissioning Technologies of Uranium Mining and Mill Facilities in Australia

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Uranium Mining and Metallurgy (Youkuangye) 14(4):217-223 (November 1995)

This paper introduces chiefly the technological policies in decommissioning of the uranium mining and mill facilities in Australia, the requirements in disposal of objects, and the main technological measures taken, as well as the research work of the major research institutes in the field of environmental control and disposal of the uranium mining and mill facilities in Australia. (This document is in Chinese).

1116 V18/021181

Legal Problems Arising in the Decommissioning of Uranium Mines and the Rehabilitation and Reclamation of Abandoned Uranium Mining Areas in Eastern Germany

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CONF-9409429; New Atomic Energy Law - International and National Developments, N. Pelzer (ed.), Proceedings of the Fifth Regional Conference of the German Branch of AID/INLA, Landshut, Germany, September 8-9, 1994. Nomos Verlagsges, Baden-Baden, Germany, 377 pp.; (pp. 335-345) (1995)

Rehabilitation of the abandoned uranium mining areas in Saxonia and Thuringia is a task posing legal problems. The radiation protection laws of the former GDR have continued to be effective to a great extent and have proved to be a legal basis not "perfect" in formal terms, but suitably efficient in practice to tackle the manifold problems encountered in the land reclamation and waste disposal work. Originally intended to serve as a legal interim regime awaiting amendment at a later date, the body of laws available for

the task proved to be sufficient. (This document is in German).

1117 V18/021945

Long Term Contaminant Migration and Impacts from Uranium Mill Tailings: Comparison of Computer Models Using a Hypothetical Dataset

Swedish Radiation Protection Institute, Stockholm, Sweden
BIOMOVS II Technical Report No. 4; 65 pp. (November 1995)

The Uranium Mill Tailings Working Group of BIOMOVS II was initiated in Vienna in 1991 with the primary objective of comparing models which can be used to assess the long term impact of radioactive releases from uranium mill tailings, involving multiple pathways, multiple contaminants and multiple environmental receptors. A secondary objective was to examine how these models can be used to assess the fate of stable toxic elements. This is an interim report of the Working Group describing: (1) development of a basic scenario describing a tailings system; (2) application of models in deterministic calculations of contaminant concentrations in biosphere media, and related radiation doses, contaminant intakes and health risks; and (3) comparison of model results and review of the modelling.

1118 V18/021182

Long-Term Effects of Uranium Ore Tailings

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StrahlenschutzPraxis (Koeln) 2(1):53-58 (1996)

The method of chemical modeling is applied specifically on a dump of uranium ore residues (tailings) in the geographic region of Dresden/Coschuetz-Gittersee (Eastern Germany) with the aim of evaluating the actual and future emission potential of radio elements in order to estimate necessary remedial measures. The effects of changes in equilibrium conditions are also discussed. Assuming that the present hydrological and geochemical conditions are stabilizing, no fundamental increase of radioelements and heavy metal emissions are to be expected in the future. (This document is in German).

1119 V18/022218

Measurement of Radon Decay Products at the Bouchet Site

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Radioprotection (Bulletin de la Societe Francaise de Radioprotection) 31(1):67-81 (January-March 1996)

Between 1949 and 1971, the French Atomic Energy Commission operated a uranium ore processing facility at Le Bouchet, 40 km from Paris. The plant was dismantled in the seventies. However, an additional patch of land, next door to the main premises had served for the disposal of uranium ore process mill tailings until 1956, and until 1971 as a settling basin for the plant effluent mud. The Bouchet plant operation has resulted in a deposit of tailings on a land area of 0.01 sq km. The level of radon emissions from these

premises before rehabilitation was 10 to 100 times greater than the mean level at the earth's surface, and the concentrations of radon decay products in the immediate environment of the site were on the average 20% above the levels legally allowed for the public in the vicinity of mines. The results obtained after this rehabilitation show that the short-lived radon decay product concentration has been lowered down to the same order of magnitude as the representative regional background noise in the Paris basin, typical of a sedimentary environment. (This document is in French).

1120

V18/020794

Milling Sites Remediation: Elements for a Methodology as Developed in France by COGEMA

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 97-112) (March 1996)

Compared to other metals, mining and milling of uranium generate specific potential hazards due to radioactivity. Remediation of the sites concerned and especially impoundments of mill tailings is a very important step of mining. We must first remember the principles and objectives governing site remediation in France. Important steps of the methodology are reviewed: inventory (characterization of the wastes products, location and tonnages); some studies which support the choice made for remediation techniques (mineralogical studies, leaching tests, hydrogeologic, compaction, stability studies); and communication. Some of the cost estimates are mentioned: impact on the environment, as well as occupational exposure, and of course financial costs of the operations.

1121

V18/021184

Planning for Environmental Restoration of Contaminated Areas in Romania

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 145-152) (March 1996)

Presently in Romania several human activities are increasing the concentrations of natural radionuclides which could lead to potential risk to the public. Here, we are referring to the great producers of radioactive wastes: uranium ore mining and milling, the fertilizer industry and coal-fired power plants. The most significant

contribution to radioactive contamination is produced by mining and milling uranium ore. A case study on the implementation of remedial actions is offered. The contributions of the fertilizer industry through its most radioactive by-product, phosphogypsum, and coal-fired power plants are under evaluation, a number of studies being in process. In this connection some preliminary results on the rationale and goals for cleanup are presented, no remedial actions being implemented so far. 11 refs.

1122

V18/020792

Planning for Environmental Restoration of Contaminated Sites in Slovenia

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 197-218) (March 1996)

Compared to the large extent of contaminated sites in other countries, this problem arises in Slovenia only on a small scale. After World War II there were some attempts to exploit uranium from mercury ore residues and from coal ash, both with moderately enhanced uranium contents. The subject of this paper is the contaminated sites belonging to the former uranium mining and milling operation at Zirovski Vrh. The general features of the former Zirovski Vrh uranium mine (uranium production ceased after 5 years of operation, in 1990) were presented already at the first Workshop in Budapest. Main attention in this paper is focused on planning for environmental restoration. A large project covering all aspects of decommissioning of the mining and milling facilities has been prepared. Some additional studies and decisions should still be made before starting the restoration activities. In parallel, a regulatory framework is in preparation to set authorized limits for emissions from tailings and wastes and for residual environmental radioactivity, including all categories of contaminated sites, even radioactivity deposited from non-uranium related practices.

1123

V18/020813

Planning for Environmental Restoration of Contaminated Sites of the Uranium Industry in the Czech Republic

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 81-95) (March 1996)

This article follows the previous report presented at the last workshop in Budapest in October 1993. Radioactive contamination as a result of the uranium industry activities does not have a breakdown character so the cleanup can be made gradually with respect to all ecological, economic and social relations. The basic goals of cleanup are health protection and ecological incorporation of particular sites into the countryside. Cleanup criteria are divided into three main groups: (1) results of studies of radiation impact on critical groups based on common methods; (2) legal provisions for radioactive nuclide concentrations in environmental components; and (3) Nature's ecosystems impact data. The cleanup programs are being made for the four basic types of objects: (1) heaps, (2) tailings pile, (3) buildings and equipment, and (4) in-situ leaching. The inseparable part of the cleanup plan is its incorporation into a region environment protection program. At the same time we have to respect cost effectiveness and risk reduction. This can be done through combining cleanup and waste management. We have to realize that it is the costs that can become the decisive factor whether the cleanup will be carried out in the near future.

1124 V18/020797

Planning for the Restoration of the Closed-Down Uranium Mine in Ranstad, Sweden

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 227-236) (March 1996)

The leachate from the mill tailings from the Ranstad Uranium Mine has continuously been collected and treated since the beginning of the mining operation started in the middle of the 1960's. Different studies were performed during the 1970's and 1980's to find effective ways for reducing the leaching processes. The aim of the investigations was to find methods for reducing the infiltration of rain water and entrance of oxygen into the tailings. Among other things a test pile, consisting of 15,000 tons of the mill tailings, was constructed in 1972 for studying the effect of different cover systems. In 1985 the planning of the restoration started with general planning and investigations including collection of available information and completion concerning maps, geology, hydrology and water quality. A detailed plan for the restoration was submitted to the Country Administration in October 1988. After reviewing the authorities granted permission for the project to be started in January 1990. The demands from the authorities were that a release and recipient control programme for the concentration of uranium and radium as well as heavy metals (e.g. cadmium, copper and nickel) should be performed. The groundwater levels within and surrounding the tailings should also be measured as well as the groundwater quality. In addition, a quality assurance program for the cover system of the tailings should be established. The aim is to get close to the natural background values of the Ranstad area. However, no fixed limits have so far been decided. Exposure rates and radon emanation should also be measured during the covering of

the mill tailings area.

1125 V18/024329

Pollution of the Waste Ores and Mill Tailings in Uranium Mining and Metallurgy and Its Treatment

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Uranium Mining and Metallurgy (Youkuangye) 15(2):118-122 (May 1996)

During uranium mining and metallurgy some waste ores and mill tailings with radioactive elements are produced that may do harm to the natural environment and people. In order to prevent this, efficient ways must be used to treat ores and tailings. Among mitigation techniques are reducing the pollution of the waste ores and mill tailings with new techniques, covering them with materials, planting vegetation, controlling leakage, and environmental monitoring. (This document is in Chinese).

1126 V18/020798

Radiation Exposure Owing to Sites Contaminated by Mining and Milling: Methods of Dose Estimation

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 113-119) (March 1996)

A proper dose estimation is the indispensable pre-requisite for classification of sites as "radioactive contaminated" and for decisions on remedial measures. The parameters applied for dose estimations should be established "as realistic as possible" and site specific investigations would be required. In the most cases generic approaches are possible if "realistic but sufficiently conservative" parameters are applied for dose estimation. The major pathways considered and parameters applied in Germany for estimation of radiation dose to man owing to sites contaminated by wastes from uranium mining and milling are described.

1127 V18/020800

Radioactively Contaminated Sites in Bulgaria

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern

Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 43-63) (February 1996)

The report contains a description of radioactively contaminated sites in Bulgaria due to the uranium industry and polymetallic ore mining. A detailed picture of the most contaminated areas due to the two processing plants in Buhovo and Eleshnitsa is presented. The case of Buhovo is of special concern because a large area is contaminated with radium, due to continuous operation (1947-1958) without a tailings pond. The source terms for some underground mines and in-situ leaching are described and radiologically characterized. A case of interest of large area radioactive contamination is the Bay of Vromos which is not related to uranium industry but to copper ore mining.

1128 V18/020789

Radiohygienic Analysis of the Radioactive Contamination in the Region of the Uranium Mining and Milling

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 121-134) (March 1996)

The radiological impact analysis of the environment has been carried out according to both the mining and milling activities for the planning of the restoration work. At the first step, the source term is to be defined as input to the analysis. A selection was made from the geographical and meteorological characteristics of the territory including the distribution of precipitation and temperature, moisture of soil, and wind directions. In the case of the surface waters the activity concentrations, the yields of these and consumption of water (irrigation, drinking) has mainly been studied. The amount of population around the site in the radius of 20 km was summarized, and a sector arrangement was set up in two different distance ranges (0-10, 10-20) with sectors. In these sectors the age groups and customs of food consumption were first considered. For the earlier and present mining and milling activities the radiological assessment was performed in two ways. On the one hand the radiation burden was calculated by using measurement results, and on the other hand, in lack of exact data the radiological impact was estimated by model calculations.

1129 V18/024327

Radiological Consequences of Mining Activities and Required Remedial Action

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StrahlenschutzPraxis (Koeln) 2(3):17-26 (1996)

Former mining activities for uranium and their consequences for the environment and the population in the areas present a novel challenge to be met by the system of radiological protection in Germany. The article gives a comprehensive survey of the measurable damage recorded, the measuring programs performed, and the requirements and concepts developed for remedial action. (This document is in German).

1130 V18/025311

Regulatory Approach to Soil Cleanup Verification at Decommissioning Uranium Mill Sites

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CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (4 pp.) (1997)

The U.S. Nuclear Regulatory Commission (NRC), Division of Waste Management, has recently delineated policy and developed staff guidance regarding uranium mill site decommissioning activities. These activities are primarily related to soil cleanup and verification, because usually buildings are buried in the tailings pile. The policy calls for streamlining the confirmatory survey process by putting more emphasis on inspection of licensee performance. To support this approach, staff guidance was developed in the form of a detailed generic decommissioning inspection plan. Where possible, the inspection program staff is involved at the beginning of decommissioning activities, so that deficiencies can be identified and corrected early. Use of the decommissioning inspection plan provides a means to gain confidence in the licensee's performance and to document the evaluation of that performance. The licensee's performance is also considered during review of decommissioning plans by the licensing program staff. When evaluating proposed new methods, or new approaches to site-specific problems, staff must ensure that compliance with the regulations can be demonstrated by the licensee. Staff considers data and policy developed in the U.S. Department of Energy program for abandoned mill sites to assist with some of these evaluations. Implementation of both aspects of this regulatory approach to decommissioning allows staff to reduce their confirmatory survey effort and allows licensees to comply with applicable standards in a cost-efficient manner.

1131 V18/021659

Rehabilitation Technologies to be Used in the Decommissioning of Uranium Mining Sites in the Federal Republic of Germany

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IAEA-TECDOC-865; CONF-9412128 (Vol. 3); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 3: Technologies for, and the

Implementation of, Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Rez, Czech Republic, December 12-16, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 3, 356 pp.; (pp. 153-160) (May 1996)

The world's largest uranium mining operations in Saxony and Thuringia produced a total of 220,000 t of uranium. In 1990 production came to an end and decommissioning began. The clean-up effort focuses on the sources of contamination: waste piles covering a total area of 1517 ha, tailings ponds of 720 ha, 9 underground mines, one large open pit mine, as well as plant areas, structures, and facilities. In 1990/91 emphasis was on activities aimed at reducing population exposure and on development and planning of rehabilitation work. The concept chosen by Wismut GmbH for final rehabilitation comprises the following elements: removal of hazardous materials from and partial backfilling of mine workings; mine flooding; in-situ rehabilitation of tailings ponds; treatment of mine waters and tailings waters; in-situ rehabilitation or relocation of waste rock piles; dismantling and demolition of contaminated structures and facilities, rehabilitation of plant areas; and development of an environmental monitoring system. Total costs are estimated at 13 thousand million German marks to be funded by the federal budget.

1132 V18/023206

Relationship Between Geogenic and Technologically Induced Radioactive Exposure in Areas Bearing Uranium Ore in Saxony and Thuringia

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CONF-9210194; Proceedings of an International Symposium on Environmental Contamination in Central and Eastern Europe, Budapest, Hungary, October 12-16, 1992, 968 pp.; (pp. 356-358) (1992)

The areas of Saxony and Thuringia form part of a metallogenic unit specialized for uranium which is a part of the Bohemian Massif. The radiogeochemical characteristics of these areas show for many rocks a significant increase in uranium content and, on a local scale, a strong diversification of the uranium content. The uranium deposits in the entire geotectonical unit of the Bohemian Massif can be seen in this context. As a result of very intensive mining activities after World War II there exist in these areas more or less contaminated abandoned mines, waste rock piles and tailing ponds. Obtaining an overview of all mining remnants which are contaminated by radioactive sources and assessing their impact in a quantitative way are the basic activities for the intended decommissioning of these areas. Using the relationship between airborne gamma-spectrometric measurements and known areas of mining activities it was possible to determine specific areas for more detailed investigation. The results will be used in a model of contaminated areas as a base for the evaluation of the radiological situation and for decisions concerning remediation measures.

1133 V18/021655

Remediation Program in the North Bohemia Region

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Ministry of the Environment, Prague, Czech Republic

IAEA-TECDOC-868; CONF-9412123; Innovations in Uranium Exploration, Mining and Processing Techniques, and New Exploration Target Areas, Proceedings of a Technical Committee Meeting, Vienna, Austria, December 5-8, 1994, 148 pp.; (pp. 69-77) (March 1996)

The Bohemian Massif belongs to a very important uranium province where mining activities started in 1840. Since the end of World War II large mining operations have taken place resulting in a large accumulation of waste dumps and tailings. In 1969, the Straz sandstone type uranium deposits were exploited by in situ leaching methods. 3.8 million tons of H₂SO₄, 270,000 tons of HNO₃ and 103,000 tons of NH₄ were injected into the Cenomanian aquifer. The wastes affect 188 million cubic meters of water over an areal extent of 28 sq km. The problem is compounded by the presence of an underground mine next to the Straz deposit. The paper describes the environmental remediation program established by the government. The present estimation of the time necessary for the decontamination of the Straz deposit lies between 50 and 70 years.

1134 V18/021658

Remediation of ECARPIERE Uranium Tailing Pond by COGEMA (France)

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IAEA-TECDOC-865; CONF-9412128 (Vol. 3); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 3: Technologies for, and the Implementation of, Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Rez, Czech Republic, December 12-16, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 3, 356 pp.; (pp. 139-152) (May 1996)

The mining division of Vendee has been operated by COGEMA from 1954 to 1991. The main site is named ECARPIERE where underground and open pit mining and heap leaching produced a total of 15000 t of Uranium. The frame of the methodology was presented during the second workshop in Piastany. Specific information and details concerning the inventory of ECARPIERE, the materials used on this site, and results of the studies are given. Main points for implementation are mill dismantling, resloping of the dykes, covering of the impoundment and water management. Every step needs a careful radiological and topographical follow up. Post-remediation monitoring is adapted from the initial network to the new situation of the site.

1135 V18/023675

Seismic Stability of Tailings Dams and Tailings Deposits at Elliot Lake

AGRA Earth & Environmental Ltd., Ottawa, Ontario, Canada

INTO-0643; 66 pp. (1996)

This report presents an analysis of three tailings dams in the Elliot Lake region of Ontario to determine the potential crest displacements of the dams in the event of large earthquake ground

motions having peak ground accelerations ranging between 0.2 and 1.0 of gravity. Analysis methodologies included finite element analysis and shear beam analysis. The report also includes a tailings runoff analysis of one of the dams (Quirke Lake Main Dam) which investigated the possibility of tailings flowing and overtopping the perimeter embankments should the dikes fail due to liquefaction of their foundations.

1136 V18/020793

Short Review of Swedish Uranium Mining, Milling and Restoration in Ranstad

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IAEA-TECDOC-865; CONF-9310459 (Vol. 1); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 1: Identification and Characterization of Contaminated Soils, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Budapest, Hungary, October 4-8, 1993. International Atomic Energy Agency, Vienna, Austria, Vol. 1, 356 pp.; (pp. 315-318) (February 1996)

In Sweden large but low grade uranium ore reserves are found in the district of Vaestergoetland. The total uranium content is estimated to be in the order of 1 million tons. An uranium mining and processing plant was taken into operation in 1965 and the capacity was designed for an annual production of 1275 tons of uranium. In 1984 the Swedish government made the decision to stop all plans for uranium production in Sweden and in 1985 it was decided that the whole Ranstad area should be restored. Through all the years of industrial activities at Ranstad, the environmental consequences have been studied. Today the environmental sampling program is still in force to ensure that emissions and seepage from the mining area are below acceptable levels.

1137 V18/023676

Sorption/Desorption Phenomena in Uranium Mill Tailings: Study of the Distribution of Radionuclides on Pure Solid Phases and Application to the Modelling of Source Term

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CONF-960409 (Vol. 2); IRPA9, K.E. Duftschmid (ed.), Proceedings of the 1996 International Radiation Protection Association (IRPA) Ninth World Congress on Radiation Protection, Vienna, Austria, April 14-19, 1996. Berger, Horn, Austria, 817 pp.; (pp. 792-794) (1996)

The mining and milling of the uranium raw material are processes which leave substantial volumes of uranium mill tailings. These radioactive waste products may have an environmental impact in the future. The health hazards occur by a number of pathways - via radioactive gas emanation, external exposure, radioactive dust, and through contamination of surface and ground waters. To assess long

term consequences, modelling has to be performed to predict future exposures. Using predictive models requires a basic understanding of the relevant physical, chemical and geochemical properties of the system components. In a previous paper, we have reported data obtained on uranium tailings deposited in Lengenfeld (Germany) 20 years ago. The solid phases (determined by XRD) are mainly quartz, dolomite and kaolinite. The lack of data concerning the mechanisms responsible for the retention of radionuclides on these solids has led us to perform batch experiments on pure solid phases. In this paper, we present the influence of the solution composition (pH, ionic strength) on the sorption of radium onto a solid phase (kaolinite). The variations obtained have allowed us to define the mechanisms controlling the sorption and to determine the associated constants. The introduction of these values into geochemical codes based on thermodynamic equilibrium will allow prediction of the mobility of radium in the presence of these phases.

1138 V18/020974

Study of a Uranium Mill Tailings Site: Characterization of the Source Term and Modeling

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (19 pp.) (1996)

Uranium mining and milling have left behind great amounts of tailings containing both radionuclides (radium and uranium) and toxic elements (arsenic, lead, nickel, etc.) which may be released through aquatic pathways. The main exposure from uranium mill tailings is currently the inhalation of radon daughters. The contaminants release towards subsurface compartment and groundwaters is not of concern at present date. Nevertheless, potential modifications of such release in the long term have to be evaluated. An uranium mill tailings site impact assessment related to aquatic pathways involves at first a complete definition of the source term (contaminants inventory, determination of the mechanisms responsible of their mobility in the tailings). The second step is the understanding of the numerous processes involved in the weathering of the tailings (pH and redox buffers, dissolution and precipitation of minerals). In this paper, we present data obtained for the Lengenfeld site (located in the south of Dresden in Germany) which contains 300,000 m³ of tailings deposited 30 years ago and covered with 5 to 10 meters of sandy soil. No information was available about uranium ores, milling treatments and disposal conditions. From six drillings performed on the site, samples of the cover, the tailings and the underlying soil have been analyzed. From the results, we can assume that the tailings are issued from granitic and/or sedimentary ores which have been attacked by an alkaline solution (Na₂CO₃, NaHCO₃). The comparison with a well known site containing similar residues (basic treatment) may be used to improve present knowledge of the evolution of the Lengenfeld tailings. The analysis of the tailings, specially the determination of the amounts of the different minerals present at different depths, has allowed to point out a beginning of weathering through

dissolution and precipitation reactions. The experimental data will be compared to simulations performed by means of geochemical codes, based on thermodynamic equilibrium.

1139 V18/024330

Technological Investigation on Ventilation of Uranium Mine and Environmental Treatment During Decommissioning in Russia

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Uranium Mining and Metallurgy (Youkuangye) 15(2):73-80 (May 1996)

The current situation of uranium mining and metallurgy, ventilation and protection of pit and environmental treatment during decommissioning in Russia are briefly introduced. The technology of heap leaching of uranium ore in Russia is also presented. (This document is in Chinese).

1140 V18/021662

Technologies for and Implementation of Environmental Restoration in the Uranium Industry in Czech Republic

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IAEA-TECDOC-865; CONF-9412128 (Vol. 3); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 3: Technologies for, and the Implementation of, Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Rez, Czech Republic, December 12-16, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 3, 356 pp.; (pp. 121-137) (May 1996)

This contribution is a logical continuation of the first and the second parts of the Regional Technical Cooperation Project on Environmental Restoration in Central and Eastern Europe. The first part was concentrated on identification and radiological characterization of contaminated sites; the second part, then, on planning for environmental restoration; this third part has been directed to particular technologies for environmental restoration. This contribution deals with problems of the uranium industry only. As documented in the previous parts, protection of water is the fundamental problem in the field of environmental protection in the uranium industry. This is the reason why we have focused our attention on technologies which are used for decontamination of water in the uranium industry in the Czech Republic.

1141 V18/021660

Technologies for and Implementation of Environmental Restoration of the Uranium Mine in Ranstad Sweden

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IAEA-TECDOC-865; CONF-9412128 (Vol. 3); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 3: Technologies for, and the

Implementation of, Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Rez, Czech Republic, December 12-16, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 3, 356 pp.; (pp. 237-242) (May 1996)

In 1985 the planning of the restoration of the closed-down uranium mine of Ranstad started. The plan was accepted in 1990 by the authorities and the main part of the plan was implemented from 1990 to 1992. The procedures and techniques for the remedial actions are described for the open pit mine and the mill tailings. A multilayer barrier cover system was implemented for reducing the weathering of the pyrite in the tailings and minimize the leachate of uranium, radium and heavy metals. Performance control of the cover system and especially the leaktight barrier was carried out by groundwater leveling and use of lysimeters. The open pit mine was transformed into a lake for recreation and wildlife.

1142 V18/021663

Technology for Restoration of Contaminated Sites: Review of Available Experience in the Field of Environmental Restoration in Romania

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IAEA-TECDOC-865; CONF-9412128 (Vol. 3); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 3: Technologies for, and the Implementation of, Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Rez, Czech Republic, December 12-16, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 3, 356 pp.; (pp. 181-188) (May 1996)

In Romania as a result of human activities there are several contaminated sites with low specific activity widely dispersed. Among these, uranium mining and milling, fertilizer industry, and coal-fired power plants are the most significant. Particularly, for heaps resulting from uranium mining and milling activities, the environmental restoration is justified but no comprehensive optimization process (multi-attribute cost-benefit analysis) has been implemented so far. The lack of specific technology and necessary financial resources are major problems in the implementation of environmental restoration work. The same difficulty is foreseen with respect to available technology and necessary funds. However, a number of research projects are under development and could be considered in the light of international cooperation programmes. Limited remedial actions were performed in order to do something with respect to smaller areas of contamination with higher specific activity.

1143 V18/021185

Uranium Industry in Bulgaria and Environment: Problems and Specific Features of the Period of the Technical Close-Out and Remediation of the Negative Consequences

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IAEA-TECDOC-865; CONF-9404316 (Vol. 2); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 2: Planning for Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Piestany, Slovakia, April 11-15, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 2, 248 pp.; (pp. 43-53) (March 1996)

The uranium industry in Bulgaria started immediately after the II World War with classical underground mining and hydrometallurgical processing of the ore to uranium concentrate. Up to 1958 no tailings pond existed at the Buhovo plant and the result is 1.2×10^{10} square meters of radium contaminated land along the rivers Yanishtitsa and Lesnovska. In the process of mining approximately 300 heaps of low grade ore and sterile rock and three tailings ponds were generated mainly in the southern part of the country. Along the valleys of the rivers Maritsa, Tundzha and Struma approximately 15 low grade ore deposits were processed by in-situ leaching with sulphuric acid. The surface communications (tubes) cover approximately 1.6×10^7 square meters of agricultural land and forests. Some of the heaps of the underground mines have been processed by combined in-situ leaching technologies. Almost no preventive or counter measures have been implemented during the whole period of operation for preservation of water, soil and air from mechanical, chemical and radioactive pollution. Therefore in the period of the close-out of the uranium industry a programme has been developed for remediation procedures which includes assessment of the status of the environment, prognoses for the influence of the uranium sites on the region, technical projects for cleaning facilities and remediation procedures. For each case, depending on the type and the level of contamination, the specific optimal ecological solutions have the purpose of reasonable minimization of the risk at minimum cost. In the present work estimations and predictions for the underground and surface waters and surface contamination for several typical uranium sites are discussed. 8 refs, 4 tabs.

1144 V18/021664

Uranium Industry in Bulgaria and Environment: Technologies and Implementation of Environmental Restoration Projects

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IAEA-TECDOC-865; CONF-9412128 (Vol. 3); Planning for Environmental Restoration of Radioactively Contaminated Sites in Central and Eastern Europe, Volume 3: Technologies for, and the Implementation of, Environmental Restoration of Contaminated Sites, Proceedings of a Workshop on Environmental Restoration in Central and Eastern Europe, Rez, Czech Republic, December 12-16, 1994. International Atomic Energy Agency, Vienna, Austria, Vol. 3, 356 pp.; (pp. 51-57) (May 1996)

The paper presents a summary of the environmental restoration process in Bulgaria before the termination of the uranium industry (August 1992) when some sites had been closed due to depletion. The methods for rehabilitation depend on the type of site and therefore the uranium mines, the milling plants, and the auxiliary units are discussed separately. At present all sites have been

ecologically assessed and for most of them the restoration technologies are selected. Part of the land is restored and returned to its owners. For the in-situ leaching sites long term monitoring of underground water is necessary. The restoration activities must be synchronized since residual ore has to be processed and waste has to be dumped in tailing ponds and underground mines. It has been pointed out that there is a need for cheap and proven technologies since the closed uranium industry has to provide the funding for the restoration process and there are difficulties due to the general reduction of industrial production in the country.

1145

V18/020973

Uranium Mill Tailings: Physicochemical Properties and Radon Emanating Power

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (20 pp.) (1996)

Uranium mill tailings resulting from an acidic treatment were sampled at a Cogema site (Jouac, France) and separated into 5 particle size fractions by wet sieving. The morphology, the chemical and mineralogical compositions as well as radium-226 content were determined for bulk tailings and 2 selected fractions. The coarse particles were shown to be rough shaped and to form important aggregates when fine particles were present. Quartz, mica and feldspars were identified as the major components of the investigated materials in addition with clay for the fine fraction, but mineralogy and particle size fractionations were found to be dependent characteristics. Although the fines contained more radium than the coarses, direct correlation did not exist between radium concentration and particle size. An experimental procedure was developed to determine radon emanating power using a sweeping type of collection. Measurements were performed at various moisture content and showed a slight effect of water on radon emanation from the coarse fraction while the emanating power of saturated bulk tailings and saturated fine fraction were respectively about 5 and 3 times those from dried materials. The apparent influence of size fractionation on radon emanation was found to be small for wet tailings. However, this study indicated that interferences between the properties of mill tailings may hide their respective effect on radon emanation process.

1146

V18/023486

Uranium Mining Operations in Spain

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CONF-950976; Proceedings of the 20th International Symposium on Uranium and Nuclear Energy - 1995, London, United Kingdom, September 6-8, 1995. The Uranium Institute, United Kingdom, 191 pp.; (pp. 117-126) (1995)

The Empresa Nacional del Uranio, SA (ENUSA) was founded in 1972 to undertake and develop the industrial and procurement

activities of the nuclear fuel cycle in Spain. Within the organization of ENUSA, the Uranium Division is directly responsible for the uranium mining and production operations that have been carried out since 1973 in the area of Ciudad Rodrigo in the province of Salamanca. These activities are based on open pit mining, heap leaching and a hydrometallurgical plant (Elefante) for extracting uranium concentrates from the ore. This plant was shut down in 1993 and a new plant was started up on the same site (Quercus) with a dynamic leaching process. The nominal capacity of the new plant is 950 tons U₃O₈ per year. Because of the historically low uranium prices which have recently prevailed, the plant is currently running at a strategic production rate of 300 tons U₃O₈ per year. From 1981 to 1990, in the area of La Haba (Badajoz province), ENUSA also operated a uranium production site, based on open pit mining, and an experimental extraction plant (Lobo-G). ENUSA is currently decommissioning these installations. This paper describes innovations and improvements that ENUSA has recently introduced in the field of uranium concentrates production with a view to cutting production costs, and to improving the decommissioning and site restoration processes in those sites where production is being shut down or resources have been worked out.

1147 V18/023485

Uranium Mining and Milling: Assessing Issues of Environmental Restoration

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International Atomic Energy Agency Bulletin 38(2):22-26 (June 1996)

The political changes brought forward a fragmentary disclosure of radioactively contaminated sites. They also created conditions in which these countries became receptive to cooperation with a range of countries from which they previously had been isolated. The following factors contribute to an increased risk of radioactive contamination: long operational periods contribute to greater risk of contamination; higher ore grade increases radiation dose rates from the residues; natural climatic conditions (e.g., rain, wind) significantly enhance dispersal and contamination; and countries with limited resources can only allocate marginal resources to environmental restoration. Unfortunately, most of the Central Eastern European countries "qualify" under these factors. This article briefly describes some of the typical problems in planning and implementing environmental restoration projects in these countries.

1148 V18/020802

Uranium and Thorium Mining Regulations: Amendments Relating to Financial Assurances and Decommissioning of Uranium Mining Facilities [Consultative Document]

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Atomic Energy of Canada Limited, CANDU Operations, Sheridan Park, Ontario, Canada; Atomic Energy Control Board, Ottawa, Ontario, Canada

AEBC-C-137; 73 pp. (December 23, 1993)

The purpose of this document is to describe the objectives, scope, substance and application of proposed amendments to the Uranium and Thorium Mining Regulations; in particular, amendments relating to the provision of financial assurances for the decommissioning of Canadian uranium mines.

**U.S. DEPARTMENT OF ENERGY (DOE)
SITE-WIDE REMEDIAL ACTIONS**

1149

V18/020757

**1995 Annual Water Monitoring Report: LEHR
Environmental Restoration, University of California at
Davis**

Stewart, D.L.; Smith, R.M.; Sauer, D.R.

Pacific Northwest National Laboratory, Richland, WA

PNNL-11085; 635 pp. (March 1996)

This 1995 Annual Water Monitoring Report presents analytical data collected between January and December 1995 at the Laboratory for Energy Related Health Research (LEHR) located at the University of California (UC), Davis. This report has been prepared by Pacific Northwest National Laboratory in compliance with the Water Monitoring Plan for the LEHR site, which contains the sample collection, analysis, and quality assurance/quality control procedures and reporting requirements. Water monitoring during 1995 was conducted in conjunction with the Remedial Investigation/Feasibility Study currently being implemented at the LEHR site as part of a U.S. Department of Energy (DOE)-sponsored environmental restoration program. Based on a review of historical groundwater monitoring data compiled since the fall of 1990, the list of analytes included in the program was reduced and the schedule for analyzing the remaining analytes was revised. The revision was implemented for the first time in the summer monitoring period. Analytes eliminated from the program were those that were (1) important for establishing baseline groundwater chemistry (alkalinity, anions, Eh, total organic carbon, and chemical oxygen demand); (2) important for establishing sources of contamination; (3) not detected in water samples or not from the LEHR site; and (4) duplicates of another measurement. Reductions in the analytical schedule were based on the monitoring history for each well; the resultant constituents of concern list was developed for individual wells. Depending on its importance in a well, each analyte was analyzed quarterly, semi-annually, or annually. Pollutants of major concern include organic compounds, metals, and radionuclides.

1150

V18/022787

Adaptive Remediation Using Portable Treatment Units

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UCRL-JC-122286; CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1394-1399) (1996)

Lawrence Livermore National Laboratory (LLNL) is using adaptive remediation to optimize our environmental restoration strategy. Adaptive remediation uses hydrostratigraphic analysis to gain a better understanding of the subsurface characteristics, hydraulic tests to optimize contaminant transport models, and Portable Treatment Units (PTUs) as an alternative to fixed facilities. Hydrostratigraphic analysis is an optimization tool that improves our ability to identify and target contaminant migration pathways, identify the relationship between plumes and source areas, and better define hydraulic capture areas. Hydraulic tests, performed with PTUs, provide valuable data about subsurface characteristics.

As clean up progresses, PTUs can be moved to the appropriate extraction wells to optimize contaminant mass removal. PTUs can also be placed to support innovative treatment technologies such as steam injection and microbial filters. Construction of PTUs will reduce by one-half the capital costs of building the rest of the fixed treatment system planned in the Record of Decision. Regulatory agencies are receptive to the use of the PTUs because the same treatment technology is being used and the PTUs will be able to clean up the plume cheaper and faster. Using adaptive remediation, LLNL is more effectively implementing remediation plans, improving cleanup time, and reducing project costs.

1151

V18/025449

Environmental Report 1995: Volume 1

Harrach, R.J.; Failor, R.A.; Gallegos, G.M.

Lawrence Livermore National Laboratory, Livermore, CA

UCRL-50027-95 (Vol.1); 390 pp. (September 1996)

This report contains the results of Lawrence Livermore National Laboratory's (LLNL) environmental monitoring and compliance effort and an assessment of the impact of LLNL operations on the environment and the public. This first volume describes LLNL's environmental impact and compliance activities and features descriptive and explanatory text, summary data tables, and plots showing data trends. The summary data include measures of the center of data, their spread or variability, and their extreme values. Chapters on monitoring air, sewage, surface water, groundwater, soil and sediment, vegetation and foodstuff, and environmental radiation are presented.

1152

V18/023029

**Hydrostratigraphic Analysis Used to Optimize
Groundwater Remediation at the Lawrence Livermore
National Laboratory Superfund Site**

Blake, R.G.

Lawrence Livermore National Laboratory, Livermore, CA

CONF-960527; Global Exploration and Geotechnology, Proceedings of an Annual Convention of the American Association of Petroleum Geologists, Inc., and the Society for Sedimentary Geology, San Diego, CA, May 19-22, 1996, 231 pp.; AAPG Bulletin 80(5):15-16 (1996)

Lawrence Livermore National Laboratory (LLNL), a Superfund site near Livermore, California, is underlain by 300-400 ft of heterogeneous alluvial sediments. The groundwater in these sediments contains multiple plumes of contaminants consisting predominantly of volatile organic compounds (VOCs). To better evaluate the hydrogeologic factors controlling subsurface flow and transport of VOCs for the design and implementation of remediation systems, we subdivided the subsurface into hydrostratigraphic units (HSUs). The HSUs have similar hydraulic characteristics based on a methodical analysis of lithology, structure, geophysical logs, VOC distributions, aquifer tests, and water levels. We constructed maps and cross sections showing the changes in the plumes through time. To aid in well field design, these maps and cross sections were then analyzed with respect to hydrogeologic factors, such as hydraulic gradients and geometry of the high-permeability pathways within each HSU. This approach

enables us to better position extraction wells and piezometers to optimize VOC mass removal and ensure adequate hydraulic capture of the VOC plumes. We reduced the number of wells originally proposed for the site by demonstrating to the regulatory agencies the hydraulic communication within the HSUs. This work has also provided input parameters to a 3D numerical model and assisted in evaluating the feasibility of using new, innovative technologies at the site. Such subsurface characterization allows us to better evaluate the effectiveness of the groundwater cleanup program and reduce long-term closure costs while meeting the requirements of the Record of Decision for the site.

1153 V18/020980

**Lawrence Livermore National Laboratory
Environmental Report 1994: Volume 1**

Harrach, R.J.; Gallegos, G.M.; Failor, R.A.; Christofferson, E.; Tate, P.J.; Brandstetter, E.R.; Larson, J.M.; McIntyre, J.R.; Fields, B.C.; Brown, R.A.; Garcia, L.M.; Grayson, A.R.

Lawrence Livermore National Laboratory, Livermore, CA

UCRL-50027-94 (Vol. 1); 346 pp. (September 1, 1995)

Lawrence Livermore National Laboratory (LLNL), a U.S. Department of Energy (DOE) facility operated by the University of California, serves as a national resource of scientific, technical, and engineering capability. The Laboratory's mission focuses on nuclear weapons and national security, and over the years has been broadened to include areas such as strategic defense, energy, the environment, biomedicine, technology transfer, the economy, and education. The Laboratory carries out this multifaceted mission in compliance with local, state, and federal environmental regulatory requirements. It does so with the support of the Environmental Protection Department, which is responsible for environmental monitoring and analysis, hazardous waste management, environmental restoration, and ensuring compliance with environmental laws and regulations. LLNL comprises two sites: the Livermore site and Site 300. The Livermore site occupies an area of 3.28 square kilometers on the eastern edge of Livermore, California. Site 300, LLNL's experimental testing site, is located 24 kilometers to the east in the Altamont Hills, and occupies an area of 30.3 square kilometers. Environmental monitoring activities are conducted at both sites as well as in surrounding areas. This summary provides an overview of LLNL's environmental activities in 1994, including radiological and nonradiological sampling and surveillance monitoring, remediation, assessment of radiological releases and doses, and determination of the impact of LLNL operations on the environment and public health.

1154 V18/021575

**Phase Two of Site 300's Ecological Risk Assessment:
Model Verification and Risk Management**

Carlson, T.M.; Gregory, S.D.

Lawrence Livermore National Laboratory, Livermore, CA

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (pp. 238-239)

(1995)

The authors completed the baseline ecological risk assessment (ERA) for Lawrence Livermore National Laboratory's Site 300 in 1993. Using data collection and modeling techniques adapted from the human health risk assessment (HRA), they evaluated the potential hazard of contaminants in environmental media to ecological receptors. They identified potential hazards to (1) aquatic invertebrates from heavy metal contaminants in surface water, (2) burrowing vertebrates from contaminants volatilizing from subsurface soil into burrow air, and (3) grazing deer and burrowing vertebrates from cadmium contamination in surface soil. They recently began collecting data to refine the estimates of potential hazard to these ecological receptors. Bioassay results from the surface water failed to verify a hazard to aquatic invertebrates. Soil vapor surveys of subsurface burrows did verify the presence of high concentrations of volatile organic compounds (VOCs). However, they have not yet verified a true impact on the burrowing populations. The authors also completed an extensive surface soil sampling program, which identified local hot spots of cadmium contamination. In addition, they have been collecting data on the land use patterns of the deer population. Their data indicate that deer do not typically use those areas with cadmium surface soil contamination. Information from this phase of the ERA, along with the results of the HRA, will direct the selection of remedial alternatives for the site. For the ecological receptors, remedial alternatives include developing a risk management program which includes ensuring that (1) sensitive burrowing species (such as rare or endangered species) do not use areas of surface or subsurface contamination; and (2) deer populations do not use areas of surface soil contamination.

1155 V18/022750

**Ion-Exchange Resin for Removing Hexavalent
Chromium from Groundwater at Treatment Facility C:
Data on Removal Capacity, Regeneration Efficiency, and
Operation**

Bahowick, S.M.; Dobie, D.; Kumamoto, G.

Lawrence Livermore National Laboratory, Livermore, CA

UCRL-JC-122285; CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1009-1014) (1996)

Lawrence Livermore National Laboratory (LLNL) is operated for the Department of Energy by the University of California. In July 1987, LLNL was placed on the National Priorities List based on the presence of volatile organic compounds (VOCs) in groundwater. The July 1992 Record of Decision stipulates air stripping for treatment of VOCs and ion-exchange to treat chromium in the groundwater for Treatment Facility C (TFC). TFC, which was activated in October 1993, was designed to treat influent groundwater at 60 gpm with concentrations of hexavalent chromium averaging 30 ppb. The ion exchange system removes the hexavalent chromium to below its limit of detection (2 ppb). The resin used is a strongly basic Type I quaternary ammonium anion exchange resin with a styrene-divinylbenzene copolymer gel matrix. The total hexavalent chromium removed from the groundwater as of October 8, 1995 was 660 grams. An initial operating capacity

was achieved of 6.4 grams CrO₄(2-) removal per cubic feet of resin, but this was observed in the rate of breakthrough. The regeneration process was optimized to minimize waste produced and maximize regeneration of the resin. Elevated levels of chloride, sulfate, nitrate, potassium 40 and uranium have been observed in the regeneration waste. Because of the potassium and uranium content, the regenerated waste had to be disposed of as mixed waste.

1156

V18/020981

**Lawrence Livermore National Laboratory
Environmental Report 1994: Volume 2**

Harrach, R.J.; Gallegos, G.M.; Faylor, R.A.; Christofferson, E.; Tate, P.J.; Brandstetter, E.R.; Larson, J.M.; McIntyre, J.R.; Fields, B.C.; Brown, R.A.; Garcia, L.M.; Grayson, A.R.

Lawrence Livermore National Laboratory, Livermore, CA
UCRL-50027-94 (Vol. 2); 202 pp. (September 1, 1995)

The 1994 Environmental Report provides an overview of LLNL's environmental activities for the year, including radiological and nonradiological sampling and surveillance monitoring, remediation, assessment of radiological releases and doses, and determination of the impact of LLNL operations on the environment and public health. This volume 2 of the Report is a companion document that supports Volume 1 summary data and is a detailed report that provides individual data points, where applicable, along with some summary data and more detailed accounts of sample collection and analytical methods. Six chapters have information on monitoring of air, surface water, groundwater, soil and sediment, vegetation and foodstuffs, and environmental radiation; two other chapters cover compliance self-monitoring and quality assurance.

1157

V18/021120

Site Environmental Report for 1995

Holland, R.C.; Brekke, D.D.

Science Applications International Corporation, Pleasanton, CA; Sandia National Laboratories, Environmental Operations Department, Livermore, CA

SAND96-8007; 160 pp. (July 1996)

The U.S. Department of Energy (DOE) Order 5400.1, General Environmental Protection Programs, establishes a requirement for environmental protection programs at DOE sites, including Sandia National Laboratories (SNL). These programs ensure that DOE operations comply with Federal, State, and local environmental laws and regulations, as well as DOE orders and policies. To comply with DOE Order 5400.1, SNL/California has prepared the Environmental Protection Implementation Plan. This document provides the framework for SNL/California to implement the DOE's environmental protection goals and to comply with environmental regulations. To verify effective protection of the environment, SNL/California performs the following: (1) Maintains extensive effluent monitoring and environmental surveillance programs; (2) Identifies the operations and emissions at the site and describes the effluent monitoring and environmental surveillance programs and activities; (3) Responsible for all environmental programs and activities, including reporting requirements; (4) Prepares the Site Environmental Report annually, as required by the DOE and other regulatory agencies; and (5) Serves the needs of the public. The

body of this report is a comprehensive description of environmental activities. It provides substantial background information and covers all major environmental programs at SNL/California.

1158

V18/025323

**Field Perspective on the DOE EM Ten Year Plan
Revolution and Evolution of a Cleanup Strategy**

Lockhart, F.R.; Jordan, E.A.; Schubert, A.L.

U.S. Department of Energy, Rocky Flats Field Office,
Golden, CO; Kaiser-Hill Company, Golden, CO

CONF-970335; Waste Management '97: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
March 2-6, 1997; (7 pp.) (1997)

Rocky Flats has taken full advantage of the Ten Year Planning process initiated by the U.S. Department of Energy (DOE) Assistant Secretary for Environmental Management (EM), Alvin L. Alm. He directed all EM sites to develop draft Ten Year Plans (TYP) describing how the sites would achieve his vision of complete cleanup of most DOE EM sites within ten years. Rocky Flats Environmental Technology Site (RFETS) already had in place a new Integrating Management Contract (IMC); had already embarked on the RFETS Accelerated Site Action Project (ASAP) planning process; and was in the final stages of negotiating the Rocky Flats Cleanup Agreement (RFCA) and prepared a "VISION" of how the Site would be cleaned up and what the facility would look like in the future. Rocky Flats Field Office (RFFO)/Kaiser-Hill (K-H) planning teams were focusing on the selection process for an ASAP "preferred alternative" and developing a life cycle baseline for closure of the site. With the birth of the TYP, ASAP became the Rocky Flats Ten-Year Plan, which is, the Rocky Flats Closure Project. The Closure Project consists of Special Nuclear Material (SNM) stabilization, consolidation, and storage, facility deactivation and decommissioning, waste management, and environmental restoration of the Site. An estimated \$7.0 billion (FY97 constant dollars) is required to achieve an "intermediate site condition" where the only facilities remaining after the planning period would be an interim SNM storage building, a low-level mixed waste (LLMW) treatment facility, and several office and manufacturing buildings. All facilities would be demolished by 2015, except those leased to the private sector. The principal activity after 2015 is long term environmental monitoring. RFFO solicits stakeholder input throughout the planning process; is projectizing site work through a change controlled, real-work-oriented Work Breakdown Structure; and will maintain RFETS moving as a project on the clear path to closure. This paper will describe the process, issues, and resolution of cleaning up and closing the Rocky Flats Environmental Technology Site to the Department of Energy's vision.

1159

V18/022849

Final Rocky Flats Cleanup Agreement

Colorado Department of Public Health and Environment,
Denver, CO

Report; 275 pp. (July 19, 1996)

Activities at Rocky Flats will be guided generally by the Rocky Flats Vision. The Rocky Flats Cleanup Agreement is the legally binding

agreement between the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Colorado Department of Public Health and Environment (CDPHE) to accomplish the required cleanup of radioactive and other hazardous substances contamination at and from the Rocky Flats Environmental Technology Site (RFETS). The U.S. Government owns RFETS and DOE is the Party required by law to perform the cleanup work. DOE's activities in this regard are subject to the EPA's and CDPHE's statutory authorities to approve and monitor both the conduct and completion of the cleanup. The following objectives will help to guide implementation of the Rocky Flats Cleanup Agreement (RFCA) in order to achieve the goals expressed in the Vision. The provisions of the RFCA, which follow, comprise the legal document that describes the relationship between the Agencies during cleanup. The RFCA will also ensure the effective and efficient cleanup of the Site. The following objectives, while not legally binding commitments unless also included within the body of RFCA (or other binding documents, orders or regulatory requirements), define how DOE and the regulators will oversee specific activities at the Site, and will guide implementation of RFCA to be consistent with, and to help achieve the goals of the Rocky Flats Vision.

1160

V18/025363

Future Plans and Technical Needs for RFETS

Chapin, J.; Healy, T.

Rocky Mountain Remediation Services, LLC, Golden, CO;
Kaiser-Hill Company, Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

The Department of Energy/Rocky Flats Field Office (DOE/RFFO) is faced with the challenge of decommissioning its weapon production facilities within the next ten years (i.e., 2006). Rocky Flats Environmental Technology Site (RFETS) has developed a comprehensive Decommissioning Program Plan and a 10-Year Site Plan to accomplish this monumental task. The decommissioning projects at RFETS vary in complexity from simple, non-contaminated structures such as trailers, to large complex plutonium (Pu) contaminated buildings. The majority of these facilities will either be moved off-site for reuse or demolished. Of the over 500 facilities identified at RFETS, 8 are contaminated with Pu, 12 are contaminated with both uranium (U) and Pu, 34 have minor radioactive contamination, and the remainder have no known history of radioactive contamination. The technical challenges reside within the small number of Pu and U contaminated facilities and are associated with gloveboxes, ductwork, and building surfaces.

1161

V18/022749

Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site

Reeder, D.C.; Ellerbroek, D.; Barnard, W.; Burcar, S.; Smith, R.

S.M. Stoller Corporation, Boulder, CO; Commonwealth Scientific and Industrial Research Organization, Wembley,

Australia; HCI, Lakewood, CO; Rocky Mountain Remediation Services, LLC, Golden, CO

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1000-1008) (1996)

The Denver groundwater basin encompasses approximately 6,700 square miles, extending east from the Front Range of the Rocky Mountains. This structural basin contains four Cretaceous bedrock aquifers overlain by a regional Quaternary alluvial aquifer. The Rocky Flats Site is located on the northwest margin of the basin. The shallow groundwater system at the Rocky Flats Site is divided into upper and lower hydrostratigraphic units (UHSU and LHSU, respectively). The UHSU at the Rocky Flats site comprises Quaternary alluvium, colluvium, valley-fill alluvium, artificial fill, weathered bedrock of the undifferentiated Arapahoe and Laramie formations and all sandstones that are hydraulically connected with overlying surficial groundwater. The LHSU comprises unweathered claystone with interbedded siltstones and sandstones of the undifferentiated Arapahoe and Laramie formations. The contact separating the UHSU and LHSU is identified as the base of the weathered zone. The separation of hydrostratigraphic units is supported by the contrasting permeabilities of the units comprising the UHSU and LHSU, well hydrograph data indicating that the units respond differently to seasonal recharge events, and geochemical data reflecting distinct major ion chemistries in the groundwaters of the UHSU and LHSU. Surface-water/groundwater interactions at the Rocky Flats site generally response to seasonal fluctuations in precipitation, recharge, groundwater storage, and stream and ditch flow. Effluent conditions are dominant in the spring along western stream segments and influent conditions are common in the late summer and fall along most stream reaches.

1162

V18/021289

National Conversion Pilot Project: A Creative Approach to Recycling

Gandee, K.R.; Cornils, K.N.; Taylor, R.A.

U.S. Department of Energy, Washington, DC; Kaiser-Hill Company, Golden, CO

CONF-950601; Proceedings of an American Nuclear Society (ANS) Annual Meeting, I.O. Macke (ed.), Philadelphia, PA, June 25-29, 1995. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 72:49-50 (1995)

As a result of the Bush-Yeltsin summit in 1991, the U.S. Department of Energy (DOE) has undergone a significant downsizing of its defense mission. In July 1992, the Rocky Flats site in Colorado was the first DOE site to be closed. Its mission was changed from defense to environmental cleanup and economic development. Recognizing the need to assist displaced workers and affected communities and to conduct cost-effective cleanup of DOE sites, Congress initiated two legislative provisions in the 1994 National Defense Authorization Act that required DOE to (a) provide local impact assistance to communities that are affected by the defense downsizing and (b) conduct at least one waste recycling project within the 1994 fiscal year. At the Rocky Flats site, the National Conversion Pilot Project presents an innovative approach

in which both Congressional requirements are achieved simultaneously, and the strategy for meeting these requirements was developed through the active participation of all stakeholders of the project.

1163

V18/025358

Planning for the Rocky Flats Closure: Tri-Party, CERCLA, and Decommissioning

Whiting, J.; Chapin, J.; Guinn, G.

Kaiser-Hill Company, Golden, CO; Rocky Mountain Remediation Services, LLC, Golden, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (5 pp.) (1997)

The Department of Energy (DOE) at Rocky Flats has commenced the actions to close the Site in accordance with the scenario outlined in an aggressive 10-year plan. This action will include the regulatory framework provided by Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This paper presents the regulatory documents and processes that have been adopted at the Rocky Flats Environmental Technology Site (RFETS) to implement its decommissioning program. Each document is discussed in regards to its contents and its regulatory elements. The Rocky Flats Cleanup Agreement (RFCA), the tri-party agreement, implements the DOE/Environmental Protection Agency (EPA) guidance on decommissioning with the State of Colorado involvement. The Facility Disposition Process chronicles the cleanup process of the RFETS from operations to final disposition. The Decommissioning Program Plan (DPP) documents how decommissioning is conducted at RFETS. Decommissioning will utilize a Decommissioning Operations Plan (DOP) for high risk projects or the RFCA Standard Operating Protocol (RSOP) for all other buildings. Applicable or Relevant and Appropriate Requirements (ARARs) and administrative records will be included in each project. ARARs are discussed for general knowledge.

1164

V18/022848

Response to Public Comments on the Draft Rocky Flats Vision (March 14, 1996) and Draft Rocky Flats Cleanup Agreement (March 14, 1996)

Colorado Department of Public Health and Environment, Denver, CO

Report; 135 pp. (July 19, 1996)

The vision for Rocky Flats is to: (1) achieve accelerated cleanup and closure of Rocky Flats in a safe, environmentally protective manner and in compliance with applicable state and federal environmental laws; (2) to ensure that Rocky Flats does not pose an unacceptable risk to the citizens of Colorado or to the site's workers from either contamination or an accident; and, (3) to work toward the disposition of contamination, wastes, buildings, facilities and infrastructure from Rocky Flats consistent with community preferences and national goals. Public Comment drafts of the Rocky Flats Vision and Rocky Flats Cleanup Agreement were released on March 14, 1996. Since then, more than 100 individuals and organizations submitted written Comments. Additionally, nearly 40

persons presented oral statements at three public hearings. Many persons and organizations expressed general support for the approaches outlined in the Vision and asked for modifications to the documents, some of which were adopted, while some requests for change were not made. Each Comment has been reviewed carefully and considered by the Parties in preparing the Responses which follow, and in determining whether changes to the documents are appropriate. All references in this document are to the March 1996 Draft versions of the Vision, Preamble, and RFCA.

1165

V18/024237

Rocky Flats Cleanup Agreement Implementation Successes and Challenges

Shelton, D.C.

Kaiser-Hill Company, Golden, CO

RFP-5107; CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

On July 19, 1996 the US Department of Energy (DOE), State of Colorado (CDPHE), and US Environmental Protection Agency (EPA) entered into an agreement called the Rocky Flats Cleanup Agreement (RFCA) for the cleanup and closure of the Rocky Flats Environmental Technology Site (RFETS or Rocky Flats). Major elements of the agreement include: an Integrated Site-Wide Baseline; up to twelve significant enforceable milestones per year; agreed upon soil and water action levels and standards for cleanup; open space as the likely foreseeable land use; the plutonium and TRU waste removed by 2015; streamlined regulatory process; agreement with the Defense Nuclear Facilities Safety Board (DNFSB) to coordinate activities; and a risk reduction focus. Successful implementation of RFCA requires a substantial effort by the parties to change their way of thinking about RFETS and meet the deliverables and commitments. Substantial progress toward Site closure through the implementation of RFCA has been accomplished in the short time since the signing, yet much remains to be done. Much can be learned from the Rocky Flats experience by other facilities in similar situations.

1166

V18/021331

Rocky Flats Program: Status Report to the Public

Colorado Department of Public Health and Environment, Denver, CO

Report; 40 pp. (1994)

What will Rocky Flats be like in five, ten or 20 years? The answer will be shaped by several projects that began in 1994. Many of these projects related to the new mission of Rocky Flats, which changed in 1992 to waste management, environmental cleanup and economic conversion. This mission is one with which the Rocky Flats Program at the Colorado Department of Public Health and Environment (CDPHE) is closely involved. This report describes some of the projects of 1994, including: Plutonium Assessment; Site Wide Environmental Impact Statement; National Conversion Pilot Project; Future Site Use; Strategic Plan; Tolling Agreement; Risk Assessment; Solar Ponds; Residue Storage; Hazardous Waste Compliance; Site Treatment Plan; Pond Water Management; Historical Public Exposure Studies; and others.

1167

V18/021309

Health Advisory Panel's Report to Colorado Citizens on the Phase I Study of the State of Colorado's Health Studies on Rocky Flats

Colorado Department of Public Health and Environment,
Denver, CO

Report; 30 pp. (October 1993)

Phase I of the Rocky Flats dose reconstruction study was designed to provide estimates of possible historical exposures to radionuclides and chemicals released from the Rocky Flats Plant to people living or working near the plant, and to assess potential health effects of these exposures. Phase I provides preliminary estimates of exposures and illustrative risk estimates for these exposures. These preliminary estimates form the basis for more in-depth investigations of particular radionuclides, chemicals and their releases. This report summarizes the results of Phase I studies, outlines "where we are" in the study process, and establishes the foundation for continuing investigation in Phase II.

1168

V18/021547

Pinellas Plant Annual Site Environmental Report for Calendar Year 1995

Lockheed Martin Specialty Components, Inc., Largo, FL
MMSC-EM-96010; 155 pp. (May 1996)

The Annual Site Environmental Report presents a comprehensive summary of the results of the Environmental Monitoring, Waste Management, and Environmental Restoration Programs at the Pinellas Plant for 1995. This report also includes the plant's performance in the areas of compliance with applicable regulatory requirements and standards and identifies major Environmental, Safety and Health Program initiatives and accomplishments for 1995. As a result of the end of the Department of Energy's Defense Programs mission (weapons production) on September 30, 1994, considerable changes at the Pinellas Plant are occurring. The Department of Energy Environmental Management is now the landlord of the Pinellas Plant to facilitate the plant's new mission of transition to alternate use in support of economic development and safe shutdown. The Department of Energy sold the Pinellas Plant to the Pinellas County Industry Council in March 1995, and it is leasing back a portion of the plant through September 1997, to complete the safe shutdown and transition activities.

1169

V18/022574

Effect of Competing Cations on Strontium Sorption to Surficial Sediments

Bunde, R.L.; Rosentreter, J.J.

Idaho State University, Chemistry Department, Pocatello, ID

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 311) (1995)

The following study was conducted to determine strontium distribution coefficients (K_d) of a surficial sediment at the Idaho National Engineering Laboratory (INEL), Idaho. Batch experimental techniques were used to determine K_d s which describe the partitioning of a solute between the solution and solid phase. A surficial sediment was mixed with synthesized aqueous solutions designed to chemically simulate wastewater disposed to infiltration ponds near the Idaho Chemical Processing Plant at the INEL with respect to major ionic character and pH. The effects of variable concentrations of competing cations (sodium, potassium, calcium, and magnesium) on strontium sorption were investigated at a fixed pH of 8.00. The pH of the natural system shows no appreciable variation, whereas a marked variability in cation concentration has been noted. Strontium sorption was affected to a greater degree by the concentration of calcium and magnesium in solution than by the presence of sodium or potassium. However, extreme sodium solution concentrations of 1.0 to 5.0 g/L dramatically reduced strontium sorption. In all cases, strontium K_d s decreased as the concentration of calcium and magnesium in solution increased. Linear isotherm model K_d s ranged from 12.0 to 84.7 mL/g. Analysis of data from these experiments indicated that moderate concentrations of calcium and magnesium (less than 40 mg/L) and high concentrations of sodium (1.0 to 5.0 g/L) in wastewater increase strontium mobility by decreasing the sorption of strontium on surficial sediments beneath infiltration ponds at the INEL. (Complete text)

1170

V18/020928

Environmental Restoration Program Management and Implementation Methodology: The INEL Approach

Falconer, K.L.; Green, L.A.

Lockheed Martin Idaho Technologies Company, Idaho Falls, ID; U.S. Department of Energy, Washington, DC

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (11 pp.) (1996)

The overall objectives of the INEL Environmental Restoration (ER) Program management approach are to facilitate meeting mission needs through the successful implementation of a sound and effective project management philosophy. This paper outlines the steps taken to develop the ER program, and explains further the implementing tools and processes used to achieve what can be viewed as fundamental to a successful program. The various examples provided will demonstrate how the strategies for implementing these operating philosophies are actually present and at work throughout the program, in spite of budget drills and organizational changes within DOE and the implementing contractor. A few of the challenges and successes of the INEL Environmental Restoration Program have included: (a) completion of all enforceable milestones to date, (b) acceleration of enforceable milestones, managing funds to reduce uncosted obligations at year end by utilizing greater than 99% of FY-95 budget, (d) an exemplary safety record, (e) developing a strategy for partial Delisting of the INEL by the year 2000, (f) actively dealing with Natural Resource Damages Assessment issues, (g) the achievement of significant project cost reductions, (h) and implementation of a partnering charter and application of front end quality principles.

1171

V18/021204

Evaluation of Ecologically-Based Screening Levels for Grouped Ecological Receptors

Hampton, N.L.; VanHorn, R.L.; Harris, G.A.

Idaho National Engineering Laboratory, Idaho Falls, ID
CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 171) (1995)

Ecologically-based screening levels (EBSLs) have been applied using a functional grouping approach for screening-level ecological risk assessment at the Idaho National Engineering Laboratory (INEL). Individual species were grouped according to trophic, taxonomic and habitat parameters, and EBSLs were calculated to represent the group as a whole. A series of sensitivity analyses were conducted to identify data components critical to the calculation of EBSLs. The uncertainties associated with EBSLs for functional groups were then compared to the more traditional single species models to determine the usefulness of grouping methodology in building or reducing conservatism for calculated EBSLs. (Complete text)

1172

V18/023402

Evaluation of Potential for Molten Salt Reactor Experiment (MSRE) Spent Fuel and Flush Salt Storage and Treatment at the Idaho National Engineering Laboratory (INEL)

Ougouag, A.M.; Ostby, P.A.; Nebeker, R.L.

Lockheed Idaho Technologies Company, Idaho Falls, ID
INEL-96/0329; 62 pp. (September 1996)

The potential for interim storage as well as for treatment of the Molten Salt Reactor Experiment (MSRE) spent fuel at the Idaho National Engineering Laboratory (INEL) has been evaluated. Provided that some minimal packaging and chemical stabilization prerequisites are satisfied, safe interim storage of the spent fuel at the INEL can be achieved in a number of existing or planned facilities. Treatment by calcination in the New Waste Calcining Facility at the INEL can also be a safe, effective, and economical alternative to treatment that would require the construction of a dedicated facility. If storage at the INEL is chosen for the Molten Salt Reactor Experiment (MSRE) spent fuel salts, their transformation to the more stable calcine solid would still be desirable as it would result in a lowering of risks. Treatment in the proposed INEL Remote-Handled Immobilization Facility (RHIF) would result in a waste form that would probably be acceptable for disposal at one of the proposed national repositories. The cost increment imputable to the treatment of the MSRE salts would be a small fraction of the overall capital and operating costs of the facility or the cost of building and operating a dedicated facility. Institutional and legal issues regarding shipments of fuel and waste to the INEL are summarized. The transfer of MSRE spent fuel for interim storage or treatment at the INEL is allowed under existing agreements between the State of Idaho and the Department of

Energy and other agencies of the Federal Government. In contrast, current agreements preclude the transfer into Idaho of any radioactive wastes for storage or disposal within the State of Idaho. This implies that wastes and residues produced from treating the MSRE spent fuel at locations outside Idaho would not be acceptable for storage in Idaho. Present agreements require that all fuel and high-level wastes stored at the INEL, including MSRE spent fuel if received at the INEL, must be moved to a location outside Idaho by the year 2035.

1173

V18/021548

Hazard Classification of Environmental Restoration Activities at the INEL

Peatross, R.G.

Lockheed Idaho Technologies Company, Idaho Falls, ID
INEL-96/0054; 28 pp. (April 1996)

The following documents require that a hazard classification be prepared for all activities for which US Department of Energy (DOE) has assumed environmental, safety, and health responsibility: DOE Order 5481.1B, "Safety Analysis and Review System" and DOE Order 5480.23, "Nuclear Safety Analysis Reports". A hazard classification defines the level of hazard posed by an operation or activity, assuming an unmitigated release of radioactive and nonradioactive hazardous material. For environmental restoration activities, the release threshold criteria presented in "Standard for Hazard Baseline Documentation" (DOE-EM-STD-5502-94) are used to determine classifications, such as Radiological, Nonnuclear, and Other Industrial facilities. Based upon DOE-EM-STD-5502-94, environmental restoration activities in all but one of the sites addressed by the scope of this classification can be classified as "Other Industrial Facility." DOE-EM-STD-5502-94 states that a Health and Safety Plan and compliance with the applicable Occupational Safety and Health Administration (OSHA) standards are sufficient safety controls for this classification.

1174

V18/024038

INEL Site-Wide Soil Remediation Strategy Gets a Boost from Industry Leaders

TIE Quarterly 5(2):18 (Fall 1996/Winter 1997)

A site-wide soil remediation strategy is being developed at the Idaho National Engineering Laboratory (INEL) to deal with multiple areas that are contaminated with low levels of cesium, strontium, and cobalt. The combined area of the contaminated ground is about eighty acres, with varying soil composition depending on the location within the 900 square mile site. The strategy will have a site-wide framework, but will be implemented area-by-area, using the best combination of options for each specific location.

1175

V18/022111

Partnerships in Cleanup at the Idaho National Engineering Laboratory

Hula, G.A.; Nearmen, M.J.; Koch, D.G.

U.S. Department of Energy, Idaho Operations Office, Environmental Restoration Division, Idaho Falls, ID; U.S. Environmental Protection Agency, Seattle, WA; Idaho

Department of Health and Welfare, Boise, ID

CONF-951139 (Vol. 1); Superfund 16: Proceedings of a Hazardous Waste Conference and Exhibition, Washington, DC, November 6-8, 1995. E.J. Krause and Associates, Bethesda, MD, Vol. 1, 828 pp.; (pp. 275-278) (1994)

Environmental Restoration activities at the Idaho National Engineering Laboratory (INEL) are currently being conducted under a Federal Facility Agreement and Consent Order (FFA/CO). The FFA/CO was signed by the U.S. Department of Energy - Idaho Operations Office (DOE-ID), the Environmental Protection Agency - Region 10 (EPA), and the state of Idaho Department of Health and Welfare (IDHW) in December 1991. The INEL FFA/CO has been successfully implemented due to the coordination, integration and communication among the DOE-ID, IDHW and EPA Project and WAG Managers. Successful implementation of this Tri-party Agreement hinges on one key concept: ownership of the agreement, including the routine and unexpected problems and conflicting schedules typically associated with three separate agencies. Other factors, such as: (1) open and frequent communication; (2) trust among all players; (3) "giving" in order to "get"; (4) clear, concise documentation surrounding key decisions during implementation; and (5) little turnover among the implementers of the Agreement (i.e., good institutional knowledge) will enhance implementation of the Agreement, but without ownership, successful implementation of the agreement may be jeopardized. This sense of ownership, as well as a sound professional working relationship between the Project and WAG Managers from each agency, has resulted in avoidance of the need for invoking the formal "dispute resolution" process outlined in the INEL Agreement. This facilitates timely decision-making (10 Record of Decisions have been signed to date at the INEL) which has quickly progressed the program from an assessment phase to a cleanup phase.

1176 V18/021321

Radiological, Physical, and Chemical Characterization of Additional Alpha Contaminated and Mixed Low-Level Waste for Treatment at the Advanced Mixed Waste Treatment Project

Hutchison, D.P.

Idaho National Engineering Laboratory, Idaho Falls, ID
INEL-95/0381; 450 pp. (July 1995)

This document provides physical, chemical, and radiological descriptive information for a portion of mixed waste that is potentially available for private sector treatment. The format and contents are designed to provide treatment vendors with preliminary information on the characteristics and properties for additional candidate portions of the Idaho National Engineering Laboratory (INEL) and offsite mixed wastes not covered in the two previous characterization reports for the INEL-stored low-level alpha-contaminated and transuranic wastes. This report defines the waste, provides background information, briefly reviews the requirements of the Federal Facility Compliance Act (P.L. 102-386), and relates the Site Treatment Plans developed under the Federal Facility Compliance Act to the waste streams described herein. Each waste is summarized in a Waste Profile Sheet with text, charts, and tables of waste descriptive information for a

particular waste stream. A discussion of the availability and uncertainty of data for these waste streams precedes the characterization descriptions.

1177 V18/025422

Straddle-Packer Aquifer Test Analyses of the Snake River Plain Aquifer at the Idaho National Engineering Laboratory

Johnson, G.S.; Frederick, D.B.

University of Idaho, Idaho Water Resources Research Institute, Moscow, ID; State of Idaho, INEL Oversight Program, Idaho Falls, ID

DOE/ID-13042-52; 65 pp. (January 1997)

The State of Idaho Idaho National Engineering Laboratory (INEL) Oversight Program, with the University of Idaho, Idaho State University, Boise State University, and the Idaho Geologic Survey, used a straddle-packer system to investigate vertical variations in characteristics of the Snake River Plain aquifer at the Idaho National Engineering Laboratory in southeast Idaho. Sixteen single-well aquifer tests were conducted on isolated intervals in three observation wells. Three analytical models were applied for comparison to the conceptual model and to provide estimates of aquifer properties. Theis, Hantush-Jacob leaky aquifer, and the Moench double-porosity fractured rock models were fit to time-drawdown data. The leaky aquifer type curves of Hantush and Jacob generally provided the best match to observed drawdown. A specific capacity regression equation was also used to estimate hydraulic conductivity. Estimated values of horizontal hydraulic conductivity of tested intervals ranged from 1.5×10^{-5} to 18 feet/min depending upon the interval and analytical technique employed. Hydraulic conductivity estimates resulting from the different analytical techniques varied by less than one order of magnitude for a given interval. The large variation in estimated hydraulic conductivity among the tested intervals, more than four orders of magnitude, demonstrates the extreme vertical heterogeneity of the fractured basalts and interbedded sediments of the Snake River Plain aquifer.

1178 V18/022302

Thickness of Surficial Sediment at and near Idaho National Engineering Laboratory, Idaho

Anderson, S.R.; Liszewski, M.J.; Ackerman, D.J.

U.S. Geological Survey, Idaho Falls, ID

DOE/ID-22128; 20 pp. (June 1996)

Thickness of surficial sediment was determined from natural-gamma logs in 333 wells at and near Idaho National Engineering Laboratory in eastern Idaho to provide reconnaissance data for future site-characterization studies. Surficial sediment, which is defined as the unconsolidated clay, silt, sand, and gravel that overlie the uppermost basalt flow at each well, ranges in thickness from 0 feet in seven wells drilled through basalt outcrops east of the Idaho Chemical Processing Plant to 313 feet in well Site 14 southeast of the Big Lost River sinks. Surficial sediment includes alluvial, lacustrine, eolian, and colluvial deposits that generally accumulated during the past 200 thousand years. Additional thickness data, not included in this report, are available from numerous auger holes and

foundation borings at and near most facilities.

1179

V18/020961

Tools: Introduction to the INEL ER Program Management Tools

Huttermann, L.L.; Nielsen, R.R.

Idaho National Engineering Laboratory, Idaho Falls, ID
CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (5 pp.) (1996)

The INEL ER Program discovered early in the program that it needed two things: (1) An agreement with the State of Idaho and the EPA that supported working together to deal with the CERCLA problems at the INEL, and (2) Tools to manage the program in a time of change. These tools needed to meet the needs of the program and the intent of the DOE Orders. This paper presents these tools in a condensed format developed to do many communicating tasks. Three of the most used applications of these tools are: (1) Training aid for new members of the staff; (2) Communication tool for all of the organizations performing overview activities of the program; and (3) Background for new management joining the program. These papers were developed in a standard format and were called the two-page papers. This title was derived from the requirement that all of the information provided must fit on the front and back of a single sheet of 8 1/2 x 11 sheet of paper. As you read these two-page papers you will discover that each paper provides: (1) Background, (2) How the Process Works, (3) Who Could Use This Process, (4) Why Should the Process Be Used, and (5) INEL ER Program Contacts. This format has been very successful. The next step is to place these papers on the INEL internet home page so that everyone has access to this information. In developing this tool system we had strong support from many in the program but the brunt of the work fell on the point of contacts listed in the papers.

1180

V18/025489

Evaluation of Radionuclide, Inorganic Constituent, and Organic Compound Data from Selected Wells and Springs from the Southern Boundary of the Idaho National Engineering Laboratory to the Hagerman Area, Idaho - 1989 Through 1992

Bartholomay, R.C.; Williams, L.M.; Campbell, L.J.

U.S. Geological Survey, Idaho Falls, ID; Idaho Department of Water Resources, Idaho Falls, ID

DOE/ID-22133; USGS/WRI-97-4007; 79 pp. (January 1997)

The U.S. Geological Survey and the Idaho Department of Water Resources, in cooperation with the U.S. Department of Energy, evaluated the water quality data collected from 55 wells and springs during 1989 and 1990 through 1992 from the southern boundary of the Idaho National Engineering Laboratory to the Hagerman area, Idaho. Water samples collected in 1989-92 were analyzed for selected radionuclides, inorganic constituents, and organic compounds. A statistical comparison between data collected in 1989 and data collected in 1990-92 along with the comparison of replicate pairs was used to evaluate changes in water quality between

samples and to assess sampling and analysis precision for individual constituents. The comparisons of radionuclide data showed no pattern of water quality change between samples as concentrations randomly increased or decreased. Tritium concentrations did show a consistent pattern with location in the aquifer. The largest tritium concentrations occurred in water from wells in the Big Wood and Little Wood River drainages and in the southern part of the study area where heavy irrigation occurs. The variability of radionuclide concentrations may be attributed to the change in the contract laboratory used for radiochemical analyses between 1989 and 1990. The replicate data for radionuclides showed better overall reproducibility for data collected in 1990-92 than for 1989, as 70 of 76 replicate pairs were statistically equivalent for 1990-92 whereas 55 of 73 replicate pairs were equivalent for 1989 data. The comparisons of most of the inorganic constituent data showed no statistical change between samples. Exceptions include nitrite plus nitrate as nitrogen and orthophosphate as phosphorus data. Fifteen sample pairs for nitrite plus nitrate and 18 sample pairs of orthophosphate were not statistically equivalent and concentrations randomly increased or decreased. Nitrite plus nitrate concentrations showed a consistent pattern with location as concentrations were larger in agriculture areas than in rangeland areas. The replicate data for inorganic constituents showed good reproducibility as 117 of 120 replicate pairs were statistically equivalent. The comparison of most of the organic compound data showed no statistical change between samples. Anionic surfactants is an exception as only 13 of 55 sample pairs were statistically equivalent and values randomly increased or decreased. Most of the purgeable organic compounds, insecticides, herbicides, and polychlorinated compounds had concentrations below the laboratory reporting levels and were considered statistically equivalent. The replicate data for organic compounds showed good reproducibility as all but three replicate pairs were statistically equivalent.

1181

V18/022571

Idaho National Engineering Laboratory Radiological Environmental Surveillance Program: 1995 Annual Report

Miles, M.; Wilhelmsen, R.N.; Borsella, B.W.; Wright, K.C.

Lockheed Idaho Technologies Company, Idaho Falls, ID

INEL-0132(95); 116 pp. (August 1996)

This report describes calendar year 1995 environmental surveillance activities of Environmental Monitoring and Water Resources of Lockheed Martin Idaho Technologies Company, performed at the following Waste Management Facilities: the Radioactive Waste Management Complex, the Waste Experimental Reduction Facility, the Mixed Waste Storage Facility, and two surplus facilities. Results of the sampling performed by the Radiological Environmental Surveillance Program, Site Environmental Surveillance Program, and the United States Geological Survey at these facilities are included in this report. The primary purposes of monitoring are to evaluate environmental conditions, to provide and interpret data, to verify compliance with applicable regulations or standards, and to ensure protection of human health and the environment. This report compares 1995 environmental surveillance data with US DOE Derived Concentration Guides and with data from previous years.

1182

V18/021566

Stratigraphic Data for Wells at and near the Idaho National Engineering Laboratory, Idaho

Anderson, S.R.; Ackerman, D.J.; Liszewski, M.J.; Frieberger, R.M.

U.S. Geological Survey, Washington, DC; Idaho National Engineering Laboratory, Idaho Falls, ID

DOE/ID-22127; USGS-OFR-96-248; 34 pp. (May 1996)

A stratigraphic data base containing 230 stratigraphic units in 333 wells was constructed for deposits that make up the unsaturated zone and the Snake River Plain aquifer at and near INEL in eastern Idaho. Stratigraphic units, which were identified and correlated using data from numerous outcrops, 26 continuous cores, and 328 natural-gamma logs available in December 1993, include 121 basalt-flow groups, 102 sedimentary interbeds, 6 andesite-flow groups, and 1 rhyolite dome. By volume, basalt flows make up about 90% of the deposits underlying most of this 890 sq. mi. area. Basalt, sediment, andesite, and rhyolite were identified from outcrops and cores that were selectively evaluated. Stratigraphic units were correlated using these data and natural-gamma logs. Best correlations were for basalt and sediment at Test Area North, the Naval Reactors Area, the Test Reactor Area, ICPP, and the Radioactive Waste Management Complex (RWMC), where most cores and 2/3 of the logs were obtained. Correlations range from good at the RWMC to uncertain in the eastern half of the study area. A computer diskette containing the data is included.

1183

V18/021381

Radiologically Contaminated Lead Shot Reuse at the Idaho National Engineering Laboratory (INEL)

Heilesen, W.M.; Grant, R.P.

Lockheed Idaho Technologies Company, Idaho Falls, ID; Argonne National Laboratory-West, Idaho Falls, ID

INEL-95/00202; 3 pp. (1995)

This project involved the utilization of radioactively contaminated lead shot located at the Radioactive Waste Management Complex (RWMC) for radiation shielding on a radioactive liquid process tank located at Argonne National Laboratory-West (ANL-W). The use of previously contaminated shot precludes the radioactive contamination of clean shot. With limited treatment and disposal options for contaminated lead shot, the reuse of lead for shielding is significant due to the inherent characteristic of becoming a mixed waste when radiologically contaminated. The INEL conducted a lead cleanup campaign in 1990. This was designed to ensure control of potential Resource Conservation and Recovery Act (RCRA) regulated waste. Contaminated lead from throughout the INEL, was containerized per the lead Waste Acceptance Criteria at the generator sites. Limited areas at the INEL are designated for mixed waste storage. As a result, some of the lead was stored at the RWMC in the air support weather shield (ASWS). This lead was contaminated with small amounts of fission product contamination. The lead was in the form of shot, brick, sheet, casks, and other various sized pieces. In 1993, ANL-W identified a need for lead shot to be used as shielding in a radioactive liquid waste storage and processing tank at the Fuel Cycle Facility (FCF). The contaminated lead used on this project had been in storage as mixed waste at the

RWMC. This paper will focus on the processes and problems encountered to utilize the contaminated lead shot.

1184

V18/021678

Argonne National Laboratory Chemical Technology Division: Annual Technical Report 1995

Laidler, J.J.; Myles, K.M.; Green, D.W.; McPheeters, C.C.

Argonne National Laboratory, Argonne, IL

ANL-96/10; 203 pp. (June 1996)

Highlights of the Chemical Technology (CMT) Division's activities during 1995 are presented. In this period, CMT conducted research and development in the following areas: (1) electrochemical technology, including advanced batteries and fuel cells; (2) methods for treatment of hazardous waste and mixed hazardous/radioactive waste; (3) the reaction of nuclear waste glass and spent fuel under conditions expected for an unsaturated repository; (4) processes for separating and recovering selected elements from waste streams, concentrating low-level radioactive waste streams with advanced evaporator technology, and producing Mo-99 from low-enriched uranium; (5) electrometallurgical treatment of different types of spent nuclear fuel in storage at Department of Energy sites; and (6) physical chemistry of selected materials in environments simulating those of fission and fusion energy systems.

1185

V18/022861

Argonne National Laboratory Institutional Plan: FY 1997-2002

Argonne National Laboratory, Argonne, IL

ANL/OTD-EEST/RP-91988; 230 pp. (October 1996)

The Institutional Plan is the culmination of Argonne's annual planning cycle. The document outlines what we regard as the optimal development of programs and resources in the context of national research and development needs, the missions of the Department of Energy and Argonne National Laboratory, and pertinent resource constraints. It is the product of our internal planning process and extensive discussions with DOE managers.

1186

V18/022875

Depleted Uranium Risk Assessment for Jefferson Proving Ground Using Data from Environmental Monitoring and Site Characterization: Final Report

Ebinger, M.H.; Hansen, W.R.

Los Alamos National Laboratory, Los Alamos, NM

LA-UR-96-3852; 75 pp. (October 1996)

This report documents the third risk assessment completed for the depleted uranium (DU) munitions testing range at Jefferson Proving Ground (JPG), Indiana, for the U.S. Army Test and Evaluation command. Jefferson Proving Ground was closed in 1995 under the Base Realignment and Closure Act and the testing mission was moved to Yuma Proving Ground. As part of the closure of JPG, assessments of potential adverse health effects to humans and the ecosystem were conducted. This report integrates recent information obtained from site characterization surveys at JPG with environmental monitoring data collected from 1983 through 1994 during DU testing. Three exposure scenarios were evaluated for

potential adverse effects to human health: an occasional use scenario and two farming scenarios. Human exposure was minimal from occasional use, but significant risk were predicted from the farming scenarios when contaminated groundwater was used by site occupants. The human health risk assessments do not consider the significant risk posed by accidents with unexploded ordnance. Exposures of white-tailed deer to DU were also estimated in this study, and exposure rates result in no significant increase in either toxicological or radiological risks. The results of this study indicate that remediation of the DU impact area would not substantially reduce already low risks to humans and the ecosystem, and that managed access to JPG is a reasonable model for future land use options.

1187 V18/022871

Ames Laboratory: Site Environmental Report - Calendar Year 1995

Ames Laboratory, Ames, IA

IS-5123; 56 pp. (1997)

This report summarizes the environmental status of Ames Laboratory for calendar year 1995. It includes descriptions of the Laboratory site, its mission, the status of its compliance with applicable environmental regulations, its planning and activities to maintain compliance, and a comprehensive review of its environmental protection, surveillance and monitoring programs.

1188 V18/022766

Ames Laboratory Chemical Disposal Site Removal Action: Source Removal, Processing, and Disposal
Shirley, R.S.

OHM Remediation Services Corporation, Miamisburg, OH

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1198-1204) (1996)

The Ames Laboratory has historically supported the U.S. Department of Energy (USDOE) and its predecessor agencies by providing research into the purification and manufacturing of high purity uranium, thorium, and yttrium metals. Much of this work was accomplished in the late 1950s and early 1960s prior to the legislation of strict rules and regulations covering the disposal of radioactive and chemical wastes. As a result, approximately 800 cubic meters of low-level radioactive wastes, chemical wastes, and contaminated debris were disposed in nine near surface cells located in a 0.75 hectare plot of land owned by Iowa State University in Ames, Iowa. Under a national contract with the U.S. Army Corps of Engineers (USACE), OHM Remediation Services Corp (OHM) was tasked with providing turnkey environmental services to remove, process, package, transport, and coordinate the disposal of the waste materials and contaminated environmental media.

1189 V18/021252

Initial Closure and Erosion Control for Remediation of the Maxey Flats Nuclear Waste Disposal Site

Basinger, D.L.; Cannon, R.P.; Cockrell, R.G.

Applied Geosciences and Engineering, Inc., Greensboro, NC;
Cockrell & Associates, Inc., Greensboro, NC

CONF-941148 (Vol. 1); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp. 222-226) (1994)

Ebasco performed a Remedial Investigation (RI) and Feasibility Study (FS) for the Maxey Flats Steering Committee under a Consent Order from the United States Environmental Protection Agency (EPA). The EPA issues a Record of Decision for remediation of the Maxey Flats Disposal Site (MFDS), a low level radioactive disposal site in eastern Kentucky. A natural stabilization alternative was selected for initial closure. This alternative requires the disposal trenches to be covered and graded with compacted soil fill and then covered with a geomembrane cap to minimize infiltration of precipitation into the trench disposal area. The cap will be designed to provide adequate drainage and minimize erosion of the cap, hillslopes, and receiving streams. The conceptual design for the initial closure cap with erosion control features shows that it is feasible to channel all of the surface water runoff from the cap to a detention basin. The runoff will then be discharged by a controlled release to a drainage channel on the hillslope at a discharge rate less than the pre-development condition, and thus minimize erosion of the cap and adjacent hillslopes.

1190 V18/023514

Paducah Site 1995 Annual Environmental Report

Jones, V.W.; Knaus, S.E.; Belcher, G.

Lockheed Martin Energy Systems, Inc., Kevil, KY
KY/EM-176; 135 pp. (January 1997)

The Paducah Gaseous Diffusion Plant, located in McCracken County, Kentucky, has been producing enriched uranium since 1952. In July 1993, the U.S. Department of Energy (DOE) leased the production areas of the site to the United States Enrichment Corporation (USEC). A new subsidiary of Lockheed Martin Corporation, Lockheed Martin Utility Services, manages the leased facilities for USEC. DOE maintains responsibility for the environmental restoration, waste management, and enrichment facilities activities at the plant through its management contractor, Lockheed Martin Energy Systems. The purpose of this document is to summarize calendar year 1995 environmental monitoring activities for DOE activities at the Paducah Site. DOE requires all of its facilities to conduct and document such activities annually. This report does not include USEC environmental activities.

1191 V18/023515

Paducah Site 1995 Annual Environmental Report Summary

Jones, V.W.; Knaus, S.E.; Belcher, G.

Lockheed Martin Energy Systems, Inc., Kevil, KY
KY/EM-176 (Summary); 16 pp. (January 1997)

This pamphlet contains summaries of the environmental programs at the Paducah Site, environmental monitoring and the results, and

the impact of DOE operations on the environment and the public for 1995. More detailed information on the material summarized in this pamphlet is available in the Paducah Annual Environmental Report for 1995. The data used to compile the site annual environmental report and this summary are published in the Paducah Site Annual Environmental Report for 1995, which is a collection of tables containing effluent monitoring, environmental surveillance, and dose calculation data for 1995.

1192 V18/022584

Geohydrologic Data for the St. Charles County Well Field and Public-Water Supply 1985-91, and Projected Public-Water Supply, 1995 and 2000, for St. Charles County, Missouri

Mugel, D.N.

U.S. Geological Survey, Rolla, MO

DOE/OR/21985-93-455; CONF-9602126 (Summary);
USGS-OFR-93-455; Proceedings of a Geosciences Workshop,
O'Fallon, MO, February 21, 1996; 33 pp. (1996)

Geohydrologic data for this well field and public water supply data for St. Charles County were compiled to assist US DOE in developing the St. Charles County well field contingency plan to ensure a supply of water in the event that the well field becomes contaminated from wastes (radioactive, nitroaromatic, other) stored in the Weldon Spring quarry. The well field consists of 8 wells penetrating the entire thickness of the Missouri River alluvial aquifer and is 98-116 feet deep. Aquifer tests were conducted on 3 occasions at 3 different locations in the well field. Calculated transmissivities range from 900 to 60,200 feet squared per day; hydraulic conductivities ranged from 23 to 602 feet/day. Calculated/estimated storage coefficients ranged from 0.005 to 0.2. Tracer test showed effective porosity of 0.21-0.32. Point dilution showed a groundwater velocity of 0.83 foot/day. From 1985-91, average daily water supply from the well field and water treatment plant increased from 5.76 to 10.23 Mgd; this is projected to increase to 11.0 Mgd in 1995 and to 12.2 Mgd in 2000. The water department's projections of peak daily demands from customers indicate that these demands will exceed the capacity of the treatment plant in 1995 and will exceed the capacities of the well field and plant during 2000.

1193 V18/023390

Floodplain/Wetlands Assessment for the Remediation of the Southeast Drainage near the Weldon Spring Site, Weldon Spring, Missouri

Van Lonkhuyzen, R.; Yin, S.C.L.

Argonne National Laboratory, Argonne, IL

ANL/EAD/TM-64; 16 pp. (August 1996)

The US DOE proposes to remove contaminated sediments from selected portions of the Southeast Drainage, a natural stream near the Weldon Spring site in Missouri. Under the Preferred Alternative, approximately 1,929 cu m of sediments would be excavated from the Southeast Drainage. Aquatic communities within the stream would be temporarily disturbed, but populations of aquatic biota within the stream would be expected to recover. No long-term adverse impacts to floodplains are expected.

1194 V18/022568

Water-Quality Data for the Missouri River and Missouri River Alluvium near Weldon Spring, St. Charles County, Missouri, 1991-92

Kleeschulte, M.J.

U.S. Geological Survey, Rolla, MO

DOE/OR/21990-93-109; 54 pp. (1993)

This report contains the water-quality data collected at two cross sections across the Missouri River and from monitoring wells in the Missouri River alluvium near Defiance, Missouri. The sampling results indicate the general water composition from the Missouri River changes with different flow conditions. During low-base flow conditions, the water generally contained about equal quantities of calcium and sodium plus potassium and similar quantities of bicarbonate and sulfate. During high-base flow conditions, water from the river predominantly was a calcium bicarbonate type. During runoff conditions, the water from the river was a calcium bicarbonate type, and sulfate concentrations were larger than during high-base flow conditions but smaller than during low-base flow conditions. The total and dissolved uranium concentrations at both the upstream and downstream cross sections, as well as from the different vertical samples across the river, were similar during each sampling event. However, sodium, sulfate, nitrate, and total and dissolved uranium concentrations varied with different flow conditions. Sodium and sulfate concentrations were larger during low-base flow conditions than during high-base flow or runoff conditions, while nitrate concentrations decreased during low-base flow conditions. Both total and dissolved uranium concentrations were slightly larger during runoff events than during low-base or high-base flow conditions.

1195 V18/020846

Weldon Spring Site Environmental Report for Calendar Year 1995

MK-Ferguson Company, St. Charles, MO; Jacobs Engineering Group Inc., St. Charles, MO; U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project, St. Charles, MO

DOE/OR/21548-592; 275 pp. (June 1996)

This Weldon Spring Site Environmental Report for Calendar Year 1995 has been prepared to provide information about the public safety and environmental protection programs conducted by the Weldon Spring Site Remedial Action Project (WSSRAP). The Weldon Spring site is located in southern St. Charles County, Missouri, approximately 48 km (30 mi) west of St. Louis. The site consists of two main areas, the Weldon Spring Chemical Plant and raffinate pits and the Weldon Spring Quarry. The chemical plant, raffinate pits, and quarry are located on Missouri State Route 94, southwest of U.S. Route 40/61. The objectives of the Site Environmental Report are to present a summary of data from the environmental monitoring program, to characterize trends and environmental conditions at the site, and to confirm compliance with environmental and health protection standards and requirements. The report also presents the status of remedial activities and the results of monitoring these activities to assess their impacts on the public and environment. This report includes

monitoring data from routine radiological and nonradiological sampling activities. These data include estimates of dose to the public from the Weldon Spring site, estimates of effluent releases, and trends in groundwater contaminant levels. Additionally, applicable compliance requirements, quality assurance programs, and special studies conducted in 1995 to support environmental protection programs are discussed. Dose estimates presented in this report are based on hypothetical exposure scenarios for public use of areas near the site. In addition, release estimates have been calculated on the basis of 1995 National Pollutant Discharge Elimination System (NPDES) and air monitoring data. Effluent discharges from the site under routine NPDES and National Emission Standards for Hazardous Air Pollutants (NESHAPs) monitoring were below permitted levels.

1196 V18/025514

Aerial Radiological Survey of Frenchman Flat at the Nevada Test Site, Southern Nevada

Hopkins, R.C.

Bechtel Nevada Corporation, Las Vegas, NV; EG&G Energy Measurements, Inc., Las Vegas, NV

DOE/NV/11718-012; 21 pp. (October 1996)

An aerial radiological survey was conducted over Frenchman Flat at the Nevada Test Site from January 27 to February 7, 1982. Parallel lines were flown at an altitude of 100 feet (30 meters) above ground level with line spacing intervals of 200 feet (61 meters) over a 170-square-mile (440-square-kilometer) area. This covered both Frenchman Flat and the area of the Nellis Range Complex where a fallout deposition plume had exited the Nevada Test Site to the east. The aerial data obtained were reduced to a man-made radiation contour map and overlaid on a U.S. Geological Survey map. The survey detected the presence of fission and activation products.

1197 V18/022578

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 2 - Framework for the Resource Management Plan

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 2); 62 pp. (August 1996)

The purpose of this document is to publicize how the U.S. Department of Energy Nevada Operations Office (DOE/NV) proposes to develop and use a Resource Management Plan for the Nevada Test Site (NTS) so the public can comment on and assist in the following activities: (1) developing the methods for creating and using the plan; (2) identifying the values people place on man-made and natural resources found on the NTS; (3) developing the goals the DOE/NV will use to guide the conservation and use of those resources; (4) identifying the management actions needed to meet constraints and resource management goals; and (5) incorporating the principles of ecosystem management into land and resource management on the NTS. This framework for the Resource Management Plan was developed in conjunction with the Environmental Impact Statement for the Nevada Test Site and off-site locations in the state of Nevada (NTS EIS) to take advantage of the extensive data collection and public participation

activities associated with the National Environmental Policy Act. After public input was received during the comment period for the Draft NTS EIS, DOE/NV revised this description of the Resource Management Plan and published it with the NTS Final EIS. This revision includes the goals DOE/NV has developed for managing resources and land-use constraints. It also includes the final plans for developing the Resource Management Plan. These plans will guide DOE/NV as it develops a Resource Management Plan in the coming years.

1198 V18/025451

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Mitigation Action Plan

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243; 49 pp. (February 1997)

The DOE Notice of Availability for this environmental impact statement was published in the Federal Register on Friday, October 18, 1996 (61 FR 54437). The final environmental impact statement identifies potential adverse effects resulting from the four use alternatives evaluated and discusses measures that DOE considered for the mitigation of these potential adverse effects. The Secretary of Energy signed the Record of Decision on the management and operation of the Nevada Test Site and other DOE sites in the state of Nevada on December 9, 1996. These decisions will result in the continuation of the multipurpose, multi-program use of the Nevada Test Site, under which DOE will pursue a further diversification of interagency, private industry, and public-education uses while meeting its Defense Program, Waste Management, and Environmental Restoration mission requirements at the Nevada Test Site and other Nevada sites, including the Tonopah Test Range, the Project Shoal Site, the Central Nevada Test Area, and on the Nellis Air Force Range Complex. The Record of Decision also identifies specific mitigation actions beyond the routine day-to-day physical and administrative controls needed for implementation of the decisions. These specific mitigation actions are focused on the transportation of waste and on groundwater availability. This Mitigation Action Plan elaborates on these mitigation commitments.

1199 V18/024008

Focused Evaluation of Selected Remedial Alternatives for the Underground Test Area

U.S. Department of Energy, Nevada Operations Office, Environmental Restoration Division, Las Vegas, NV

DOE/NV-465; 145 pp. (April 1997)

The Nevada Test Site (NTS), located in Nye County, in southern Nevada, was the location of 928 nuclear tests conducted between 1951 and 1992. Of the total tests, 824 were nuclear tests performed underground. This report describes the approach taken to determine whether any specific, proven, cost-effective technologies exist to aid in the removal of the radioactive contaminants from the groundwater, in the stabilization of these contaminants, and in the removal of the source of the contaminants. The report evaluates the no action alternative as a worst-case scenario. Additional alternatives evaluated include pumping with reinjection and in-situ

treatment and excavation with physical separation/extraction and on-site disposal. Alternatives are compared with respect to risk reduction, technical feasibility, and costs.

1200 V18/023948

Laboratory and Field Studies Related to the Hydrologic Resources Management Program - October 1, 1995-September 30, 1996

Los Alamos National Laboratory, Los Alamos, NM
LA-13270-PR; 25 pp. (March 1997)

This report describes the work done at Los Alamos National Laboratory in FY 1996 for the Hydrologic Resources Management Program funded by the US Department of Energy/Nevada Operations Office. Despite declining financial support, a significant analytical effort has been maintained because the Underground Test Area Operable Unit at the Nevada Test Site has drilled several wells adjacent to cavities produced by nuclear tests. The radionuclide content in groundwater samples and rock cores taken from near cavities at two sites on Pahute Mesa were measured. At one of these sites plutonium was detected in the groundwater in significant concentrations. Cs-137 deposition was also detected in soils high in a collapsed chimney above the working point at a location in the Low Level Waste Management facility in Area 3 of the Nevada Test Site. Samples from four wells suspected or known to contain radionuclides were analyzed. Sampling efforts in wells completed with small-bore tubing or casing continue to be hampered by the inability to adequately purge the well prior to sampling.

1201 V18/023406

National Emission Standards for Hazardous Air Pollutants Submittal - 1995

Black, S.C.; Townsend, Y.E.

Bechtel Nevada Corporation, Las Vegas, NV
DOE/NV/11718-032; 81 pp. (June 1996)

This report contains National Emission Standards for Hazardous Air Pollutants at the Nevada Test Site (NTS). It provides lists of figures and tables related to the NTS and includes a site description. The source description includes current and previous activities conducted on the NTS. The site has been the primary location for testing of nuclear explosives in the Continental U.S. since 1951. Historical testing has included: (1) atmospheric testing in the 1950's and early 1960s, (2) earth-cratering experiments, and (3) open-air nuclear reactor and rocket engine testing. At the North Las Vegas Facility, operated for DOE Nevada Operations Office by EG&G Energy Measurements, there was an Unusual Occurrence that led to an insignificant potential exposure to an offsite person. The incident involved the release of tritiated water (HTO), and a description of the incident and the method of calculating the effective dose equivalent for offsite exposure are described. The source description further describes work under the following headings: Ground Seepage of Noble Gases, Radioactive Waste Management Sites, and Plutonium Contaminated Surface Areas.

1202 V18/025510

Nevada Risk Assessment/Management Program - Scientific Peer Review

Bentz, E.J., Jr.; Bentz, C.B.; O'Hara, T.D.; Chen, S.Y.

E.J. Bentz & Associates, Inc., Alexandria, VA; Argonne National Laboratory, Environmental Assessment Division, Argonne, IL

ANL/EA/CP-92259; CONF-970322; Proceedings of an International Conference on Radiation Dosimetry and Safety, Taipei, Taiwan, March 31-April 2, 1997; (7 pp.) (1997)

The 1,350 square-mile Nevada Test Site and additional sites in Nevada served as the continental sites for US nuclear weapons testing from 1951 to 1992. The Nevada Risk Assessment/Management Program (NRAMP) is a currently on-going effort of the Harry Reid Center for Environmental Studies at the University of Nevada, Las Vegas (UNLV) and the firm of E. J. Bentz and Associates, Inc., in cooperation with the US Department of Energy (DOE) Environmental Management Program. Argonne National Laboratory is one of several public and private organizations supporting personnel appointed by the NRAMP to the NRAMP Scientific Peer Review Panel. The NRAMP is part of a national effort by the DOE to develop new sources of information and approaches to risk assessment, risk management, risk communication, and public outreach relevant to the ecological and human health effects of radioactive and hazardous materials management and site remediation activities. This paper describes the development, conduct, and current results of the scientific peer review process which supports the goals of the NRAMP.

1203 V18/023405

U.S. Department of Energy, Nevada Operations Office Environmental Monitoring Program: Summary Data Report - First Calendar Quarter 1996

Black, S.C.; Townsend, Y.E.

Bechtel Nevada Corporation, Las Vegas, NV
DOE/NV/11718-046; 32 pp. (November 1996)

This report discusses environmental surveillance activities conducted on the Nevada Test Site during the first calendar quarter of 1996. Surveillance activities included collection and analysis of air, noble gas, tritiated water vapor, and other water samples. Samples were analyzed for both radiological and non-radiological effluents.

1204 V18/024862

Underground Test Area Quality Assurance Project Plan Nevada Test Site, Nevada [Rev. 1]

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-341 (Rev. 1); 40 pp. (April 1997)

This Quality Assurance Project Plan (QAPP) is one of the planning documents used for the Underground Test Area (UGTA) Subproject at the Nevada Test Site (NTS) which falls under the oversight of the U.S. Department of Energy, Nevada Operations Office (DOE/NV) Nevada Environmental Restoration Project (NV ERP). The Nevada ERP consists of environmental restoration activities on the NTS, Tonopah Test Range, Nellis Air Force Range, and eight sites in five other states. The UGTA Subproject constitutes a component of the Nevada Environmental Restoration Project. The purposes of the

UGTA Subproject are to define boundaries around each Corrective Action Unit (CAU), as defined by the Federal Facility Agreement and Consent Order (FFACO), that establish areas containing water that may be unsafe for domestic or municipal use and to establish monitoring programs for each CAU that will verify modeling upon which the boundaries are based. This QAPP describes policies, organization, responsibilities, and objectives of the UGTA Project and is intended to provide a consistent framework for the collection, evaluation, and use of physical and chemical data. The information provided in this QAPP has been prepared to ensure that the work is of the quality necessary to satisfy NV ERP objectives and the requirements of the FFACO. In the event that the subproject objectives or regulatory jurisdiction changes, this document must be reevaluated for adequacy.

1205

V18/023439

Geohydrology of Pahute Mesa-3 Test Well, Nye County, Nevada

Kilroy, K.C.; Savard, C.S.

U.S. Geological Survey, Carson City, NV

DOE/NV/10583-T1; 46 pp. (1997)

The Pahute Mesa-3 test well is on Pahute Mesa about 3 miles west of the Nevada Test Site and 20 miles northeast of Oasis Valley near Beatty, Nevada. The well was drilled for the U.S. Department of Energy Radionuclide Migration Program to monitor conditions near the western edge of the Nevada Test Site. The well was drilled with conventional rotary methods and an air-foam drilling fluid to a depth of 3019 feet. A 10.75-inch diameter steel casing was installed to a depth of 1473 feet. The test well penetrates thick units of non-welded to partly welded ash-flow and air-fall tuff of Tertiary age with several thin layers of densely welded tuff, rhyolite and basalt flows, and breccia. Geophysical logs indicate that fractures are significant in the Tiva Canyon Tuff of the Paintbrush Group and this was confirmed by high flow in this unit during a borehole-flow survey. The geophysical logs also show that the effective porosity in tuffaceous units ranges from 19 to 38 percent and averages 30 percent, and the total porosity ranges from 33 to 55 percent and averages 42 percent. The measured temperature gradient of 1.00 degree Celsius per 100 feet is steep, but is similar to that of other nearby wells, one of which penetrates a buried granite intrusion. Injection tests for six intervals of the well yielded transmissivities that ranged from $3.1 \times 10(E-3)$ to 25 feet squared per day and hydraulic conductivities that ranged from $6 \times 10(E-5)$ to 0.12 foot per day. The sum of the transmissivities is 28 feet squared per day and the geometric mean of hydraulic conductivity is $1.7 \times 10(E-3)$ foot per day. Estimates of the storage coefficient range from $2.1 \times 10(E-5)$ to $3.8 \times 10(E-3)$, indicating that the aquifer responded to the injection tests in a confined manner. An aquifer test produced a drawdown of 78 feet during 31 hours of testing at 169 gallons per minute.

1206

V18/022312

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Summary

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Summary); 45 pp. (August 1996)

This sitewide EIS evaluates the potential environmental impacts of four possible land-use alternatives being considered for the Nevada Test Site (NTS), the Tonopah Test Range, and the formerly operated DOE sites in the state of Nevada: the Project Shoal Area, the Central Nevada Test Area, and portions of the Nellis Air Force Range Complex. Three additional sites in Nevada - Eldorado Valley, Dry Lake Valley, and Coyote Spring Valley - are evaluated for colocation of solar energy production facilities. The four alternatives include Continue Current Operations (No Action, continue to operate at the level maintained for the past 3 to 5 years); Discontinue Operations (discontinue operations and interagency programs); Expanded Use (increased use of NTS and its resources to support defense and nondefense programs; and Alternate Use of Withdrawn Lands (discontinue all defense-related activities at NTS; continue waste management operations in support of NTS environmental restoration efforts; expand nondefense research). Environmental impacts were assessed for each alternative by analyzing, to the extent possible, the discrete and cumulative environmental impacts associated with Defense Waste Management, Environmental Restoration, Nondefense Research and Development, and Work for Others Programs. A framework for a Resource Management Plan is included as Volume 2 of this EIS and represents the development of an ecosystem based planning process closely integrated with the National Environmental Policy Act process. This EIS, among other things, analyzed the impacts of transportation of low level waste, and site characterization activities related to the Yucca Mountain Project but did not analyze the suitability of the site as a repository. This EIS does not analyze the suitability of the Yucca Mountain site as a repository as this is an action beyond the scope of the EIS. The Preferred Alternative is identified as Expanded Use plus the public education activities from Alternate Use of Withdrawn Lands. Volume 3 of this EIS contains the public comments and the responses to the comments.

1207

V18/022313

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 1, Chapters 1-9

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 1); 2290 pp. (August 1996)

This sitewide EIS evaluates the potential environmental impacts of four possible land-use alternatives being considered for the Nevada Test Site (NTS), the Tonopah Test Range, and the formerly operated DOE sites in the state of Nevada: the Project Shoal Area, the Central Nevada Test Area, and portions of the Nellis Air Force Range Complex. Three additional sites in Nevada-Eldorado Valley, Dry Lake Valley, and Coyote Spring Valley- are evaluated for colocation of solar energy production facilities. The four alternatives include Continue Current Operations (No Action, continue to operate at the level maintained for the past 3 to 5 years); Discontinue Operations (discontinue operations and interagency programs); Expanded Use (increased use of NTS and its resources to support defense and nondefense programs; and Alternate Use of Withdrawn Lands (discontinue all defense-related activities at NTS; continue waste management operations in

support of NTS environmental restoration efforts; expand nondefense research). Environmental impacts were assessed for each alternative by analyzing, to the extent possible, the discrete and cumulative environmental impacts associated with Defense Waste Management, Environmental Restoration, Nondefense Research and Development, and Work for Others Programs. A framework for a Resource Management Plan is included as Volume 2 of this EIS and represents the development of an ecosystem based planning process closely integrated with the National Environmental Policy Act process. This EIS, among other things, analyzed the impacts of transportation of low level waste, and site characterization activities related to the Yucca Mountain Project but did not analyze the suitability of the site as a repository. This EIS does not analyze the suitability of the Yucca Mountain site as a repository as this is an action beyond the scope of the EIS. The Preferred Alternative is identified as Expanded Use plus the public education activities from Alternate Use of Withdrawn Lands. Volume 3 of this EIS contains the public comments and the responses to the comments.

1208 V18/022314

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 1 - Appendices A-F

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 1, App. A-F); 140 pp. (August 1996)

This sitewide EIS evaluates the potential environmental impacts of four possible land-use alternatives being considered for the Nevada Test Site (NTS), the Tonopah Test Range, and the formerly operated DOE sites in the state of Nevada: the Project Shoal Area, the Central Nevada Test Area, and portions of the Nellis Air Force Range Complex. Three additional sites in Nevada - Eldorado Valley, Dry Lake Valley, and Coyote Spring Valley - are evaluated for colocation of solar energy production facilities. The four alternatives include Continue Current Operations (No Action, continue to operate at the level maintained for the past 3 to 5 years); Discontinue Operations (discontinue operations and interagency programs); Expanded Use (increased use of NTS and its resources to support defense and nondefense programs; and Alternate Use of Withdrawn Lands (discontinue all defense-related activities at NTS; continue waste management operations in support of NTS environmental restoration efforts; expand nondefense research). Environmental impacts were assessed for each alternative by analyzing, to the extent possible, the discrete and cumulative environmental impacts associated with Defense Waste Management, Environmental Restoration, Nondefense Research and Development, and Work for Others Programs. The description of these existing and potential projects is contained in Appendix A. Appendix B contains the Federal Register notices and Appendix C includes Relevant Regulatory Requirements. Appendix D is a Distribution List, Appendix E provides the Impact Assessment Methods, and Appendix F contains Project-Specific Environmental Analysis.

1209 V18/022315

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada:

Volume 1, Appendix G - American Indian Assessments

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 1, App. G); 145 pp. (August 1996)

The Native American Resource Document is a summary of opinions expressed by the Consolidated Group of Tribes and Organizations (CGTO) regarding the Environmental Impact Statement for the Nevada Test Site and Other Off-Site Locations within the State of Nevada (NTS EIS). The document contains: (a) general concerns regarding long-term impacts of the U.S. Department of Energy's (DOE) operations on the NTS; and (b) a synopsis of specific comments made by the American Indian Writers Subgroup (AIWS) for various chapters of the NTS EIS.

1210 V18/022316

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 1, Appendix H - Human Health Risks and Safety Impacts Study

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 1, App. H); 120 pp. (August 1996)

Proposed changes in the Nevada Test Site (NTS) operations, as well as the U.S. Department of Energy (DOE) policy of reviewing sitewide National Environmental Policy Act (NEPA) documents, have resulted in the need for the U.S. Department of Energy, Nevada Operations Office (DOE/NV) Operations Office to prepare a new Environmental Impact Statement (EIS) for the NTS. This report has been prepared to assess the human health and safety impacts from operations expected to be carried out under each of the four alternatives defined in the NTS EIS. These alternatives are: (1) Alternative 1, Continue Current Operations (No Action); (2) Alternative 2, Discontinue Operations; (3) Alternative 3, Expanded Use; and (4) Alternative 4, Alternate Use of Withdrawn Lands.

1211 V18/022317

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 1, Appendix I - Transportation Study

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 1, App. I); 185 pp. (August 1996)

This report has been prepared to address local transportation issues concerning current and potential operations at the Nevada Test Site (NTS), to document the results of the NTS transportation risk analysis, and to provide information and supporting documentation for the Environmental Impact Statement (EIS) for the NTS and Off-Site Locations in the State of Nevada. Four alternatives are evaluated in the NTS EIS: Alternative 1, Continue Current Operations, (No Action); Alternative 2, Discontinue Operations; Alternative 3, Expanded Use; and Alternative 4, Alternate Use of Withdrawn Lands. The transportation risk analysis estimated the health risk from highway transportation of DOE-generated low-level waste, mixed waste, and defense-related nuclear materials for each of the four alternatives.

1212

V18/022318

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 3 - Public Comment and Response Document, Part A - Comments

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 3, Part A); 2290 pp. (August 1996)

This sitewide EIS evaluates the potential environmental impacts of four possible land-use alternatives being considered for the Nevada Test Site (NTS), the Tonopah Test Range, and the formerly operated DOE sites in the state of Nevada. Volume 3 of the Final NTS EIS contains 3 chapters. Chapter 1 summarizes the major issues raised by the public. Chapter 2 contains the full text of the public comments on the Draft NTS EIS received by the DOE; it included public hearing transcripts, written comments, and comments received via a toll-free comment "hot line." Chapter 3 contains the DOE's responses to the public comments and describes how the comments were considered in the Final NTS EIS.

1213

V18/022319

Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada: Volume 3 - Public Comment and Response Document, Part B - Responses

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/EIS-0243 (Vol. 3, Part B); 325 pp. (August 1996)

This sitewide EIS evaluates the potential environmental impacts of four possible land-use alternatives being considered for the Nevada Test Site (NTS), the Tonopah Test Range, and the formerly operated DOE sites in the state of Nevada. Volume 3 of the Final NTS EIS contains 3 chapters. Chapter 1 summarizes the major issues raised by the public. Chapter 2 contains the full text of the public comments on the Draft NTS EIS received by the DOE; it included public hearing transcripts, written comments, and comments received via a toll-free comment "hot line." Chapter 3 contains the DOE's responses to the public comments and describes how the comments were considered in the Final NTS EIS.

1214

V18/024240

Mitigation Action Plan: Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

Report; 50 pp. (February 1997)

This document includes the following topics as indicated in its Table of Contents: (1) Introduction; (2) Function and Organization of the Mitigation Action Plan; (3) Mitigation Action Plan Monitoring and Reporting System; (4) Potential Impacts, Commitments, and Action Plans; (5) Transportation and Groundwater; (6) Appendix A: Routine Compliance Measures and DOE/NV Responsibility; and (7) Appendix B: Record of Decision - Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the

State of Nevada.

1215

V18/021752

1995 Site Environmental Report: Tonopah Test Range, Tonopah, Nevada

Culp, T.; Forston, W.

Sandia National Laboratories, Air Quality Department, Albuquerque, NM; Kirk-Mayer, Inc., Tonopah, NV

SAND96-2269; 135 pp. (September 1996)

This report summarizes the environmental surveillance activities conducted by Sandia National Laboratories, and Kirk-Mayer, Inc., for the Tonopah Test Range operated by Sandia National Laboratories. Sandia National Laboratories' responsibility for environmental surveillance results extends to those activities performed by Sandia National Laboratories or under its direction. Results from other organizations environmental surveillance activities are included to provide a measure of completeness. Other environmental compliance programs such as the National Environmental Policy Act of 1969, environmental permits, and environmental restoration and waste management programs are also included in this report, prepared for the U.S. Department of Energy (DOE) in compliance with DOE Order 5400.1.

1216

V18/020941

Waste Minimization Applications for Environmental Restoration at the Nevada Test Site

Krogbin, D.L.; Maize, T.; Colarusso, A.P.

GeoTrans, Inc., Las Vegas, NV; International Technology Corporation, Las Vegas, NV; U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (5 pp.) (1996)

Traditionally, waste minimization has been applied to process line applications, but not to clean-up operations, such as environmental restoration (ER) and decontamination and decommissioning (D&D) operations. Because the purpose of ER and D&D activities is, essentially, to generate waste, waste minimization was thought not to apply. In 1994, the U.S. Department of Energy provided limited funding to a pilot project at the Nevada Test Site to determine whether traditional waste reduction techniques, such as pollution prevention opportunity assessments, could be applied to ER and D&D projects. The purpose of the pilot was to demonstrate that there are many repeatable elements in ER and D&D activities; therefore, traditional waste reduction techniques could be applied. In addition, tools such as up-front planning, regulatory negotiations, employee awareness campaigns, and involvement of pollution prevention personnel in all phases of a project, can be used to greatly reduce the amount of secondary waste generated by ER and D&D projects. Legacy waste can also be reduced through recycling or reusing building materials, planning for waste minimization in selection of treatment and characterization technologies, and negotiating clean-up levels. The success of the program has led to additional funding to study other methods of applying waste minimization and pollution prevention to ER and D&D projects.

To date, five pollution prevention opportunity assessments have been completed for Nevada ER projects, and over 30 tons of scrap metal have been recycled from clean-up operations at the Tonopah Test Range.

1217 V18/021753

1995 Site Environmental Report: Sandia National Laboratories Albuquerque, New Mexico

Shyr, L.J.; Duncan, D.

Sandia National Laboratories, Environmental Monitoring and Reporting Department, Albuquerque, NM

SAND96-2270; 318 pp. (September 1996)

This 1995 report contains data from routine radiological and non-radiological environmental monitoring activities. Summaries of significant environmental compliance programs in progress, such as National Environmental Policy Act documentation, environmental permits, environmental restoration, and various waste management programs at Sandia National Laboratories in Albuquerque, New Mexico, are included. This report is prepared for the U.S. Department of Energy in compliance with DOE Order 5400.1.

1218 V18/022865

Environmental Assessment of the Environmental Restoration Project at Sandia National Laboratories/New Mexico

U.S. Department of Energy, Kirtland Area Office, Albuquerque, NM

DOE/EA-1140; 258 pp. (March 1996)

The U.S. Department of Energy (DOE) is proposing to conduct Environmental Restoration (ER) site characterization and waste cleanup (corrective action) activities at the currently estimated 157 ER Project sites (also known as solid waste management units or SWMUs) at Sandia National Laboratories/New Mexico (SNL/NM). Site characterization and cleanup would be performed using a range of treatment options. The corrective measures selected for this cleanup and analyzed in this environmental assessment are those reasonable, feasible, and implementable technologies that DOE believes would achieve U.S. Environmental Protection Agency (EPA) corrective action objectives and meet EPA technology selection criteria. These actions will be implemented in compliance with the Resource Conservation and Recovery Act (RCRA), the Hazardous and Solid Waste Amendments (HSWA) of 1984, other applicable laws and regulations, and applicable DOE Orders.

1219 V18/022371

Sandia National Laboratories/New Mexico 1995 Site Environmental Report: Summary Pamphlet

Sandia National Laboratories, Albuquerque, NM

SAND96-2333; 20 pp. (1995)

Sandia National Laboratories/New Mexico (SNL/NM) is managed and operated by Sandia Corporation, a prime contractor of the U.S. Department of Energy (DOE). As required by the US DOE, an Annual Site Environmental Report has been prepared. This report represents a key component of DOE's effort to keep the public informed about environmental efforts and compliance status at

SNL/NM. This summary pamphlet contains information on the following areas: sources of radiological and nonradiological emissions; environmental monitoring; wastewater monitoring; environmental restoration; waste management; and, quality assurance.

1220 V18/021755

Sandia National Laboratories/New Mexico Environmental Baseline Update: Revision 1.0

Wolff, T.A.

International Technology Corporation, Albuquerque, NM

SAND96-1608; 372 pp. (July 1996)

The purpose of this report is to provide the background information necessary for SNL/NM personnel and contractors to prepare clear and concise NEPA documentation. The scope of the Environmental Baseline Update is to provide comprehensive data needed to support a description of the affected environment at the SNL/NM facility. The "description of the affected environment," required by the Council on Environmental Quality (CEQ) regulations in 40 CFR Section 1502.15, is an essential prerequisite for assessing the environmental consequences (Section 1502.18) of a proposed action (project) to be implemented by SNL/NM. It is intended that this Environmental Baseline Update be used as a source document for preparing environmental descriptions in environmental checklist/action description memoranda, EAs, and EISs.

1221 V18/024037

Sandia National Laboratories/New Mexico Successfully Implements EPA's CAMU/TU Rule

TIE Quarterly 5(2):19 (Fall 1996/Winter 1997)

Sandia National Laboratories/New Mexico is the first DOE facility to successfully implement the U.S. Environmental Protection Agency's (EPA's) Corrective Action Management Unit/Temporary Unit (CAMU/TU) Rule for an environmental restoration (ER) project. EPA's CAMU/TU Rule, published in the Federal Register in February 1993, recognizes the intrinsic difference in the management requirements for remediation wastes from those for "as-generated" or industrial wastes, while maintaining protection of human health and the environment. This rule encourages using innovative on-site treatment technologies, eliminates strict schedule requirements, discourages capping waste in place, and allows more flexibility in designing permanent containment cells.

1222 V18/022155

Environmental Surveillance at Los Alamos During 1994

Los Alamos National Laboratory, Environmental Assessments and Resource Evaluations Group, Los Alamos, NM

LA-13047-ENV; 393 pp. (July 1996)

This report describes environmental monitoring activities at Los Alamos National Laboratory (LANL) for 1994. The Laboratory routinely monitors for radiation and for radioactive and nonradioactive materials at (or on) Laboratory sites as well as in the surrounding region. LANL uses the monitoring results to determine compliance with appropriate standards and to identify potentially

undesirable trends. Data were collected to assess external penetrating radiation; quantities of airborne emissions and liquid effluents; concentrations of chemicals and radionuclides in ambient air, surface waters and groundwaters, municipal water supply, soils and sediments, and foodstuffs; and environmental compliance. Using comparisons with standards, regulations, and background levels, this report concludes that environmental effects from Laboratory operations are small and do not pose a demonstrable threat to the public, Laboratory employees, or the environment.

1223

V18/023945

Environmental Surveillance at Los Alamos During 1995

Anderman, L.; Baars, J.A.; Blackwell, C.; Derkacs, D.; Krier, D.; Haarmann, T.; Lincoln, K.; Malinauskas, L.K.; Rogers, D.B.; Stone, G.L.

Los Alamos National Laboratory, Los Alamos, NM

LA-13210-ENV; 390 pp. (October 1996)

This report describes the environmental surveillance program at Los Alamos National Laboratory (LANL or the Laboratory) during 1995. The Laboratory routinely monitors for radiation and for radioactive and nonradioactive materials at (or on) Laboratory sites as well as in the surrounding region. LANL uses the monitoring results to determine compliance with appropriate standards and to identify potentially undesirable trends. Data were collected in 1995 to assess external penetrating radiation; quantities of airborne emissions and liquid effluents; concentrations of chemicals and radionuclides in ambient air, surface waters and groundwaters, municipal water supply, soils and sediments, and foodstuffs; and environmental compliance. Using comparisons with standards, regulations, and background levels, this report concludes that environmental effects from Laboratory operations are small and do not pose a demonstrable threat to the public, Laboratory employees, or the environment.

1224

V18/023738

Imaging Data Analyses for Hazardous Waste Applications

David, N.A.; Ginsberg, I.W.; Lewis, A.A.; Odenweiler, J.B.; Stahl, G.A.; Tyler, W.A.; Van Eckhout, E.M.; Balick, L.K.; Weber, R.M.

Environmental Research Institute of Michigan, Ann Arbor, MI; Los Alamos National Laboratory, Los Alamos, NM; Bechtel Nevada Corporation, Remote Sensing Laboratory, Las Vegas, NV

CONF-960203 (Vol. 2); Geologic Remote Sensing - Practical Solutions for Real World Problems, Proceedings of the Eleventh Thematic Conference, Las Vegas, NV, February 27-29, 1996. Environmental Research Institute of Michigan, Ann Arbor, MI, Vol. 2, 723 pp.; (pp. II241-II242) (1996)

The interactive poster session presentation gives examples of the use of remote sensing products for characterization of hazardous waste sites. The sites are located at the Los Alamos National Laboratory (LANL) where materials associated with past weapons testing are buried. Problems of interest include the detection and delineation of buried trenches containing contaminants, seepage from old septic drain fields, and location of faults and fractures

relative to hazardous waste areas. Overlays of suspected trench locations on multispectral and thermal images showed correlation between image signatures and trenches. Overlays of engineering drawings on recent and historical photos showed error in trench location and extent. A thermal image showed warm anomalies suspected to be areas of water seepage through an asphalt cap. Overlays of engineering drawings on multispectral and thermal images showed correlation between image signatures and drain fields.

1225

V18/020976

Proactive Public Involvement Strategies for the Environmental Restoration Project at Los Alamos National Laboratory

Shaner, M.

Los Alamos National Laboratory, Los Alamos, NM

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (6 pp.) (1996)

The Resource Conservation and Recovery Act mandates formal public involvement at the corrective measures stage of any environmental restoration activity. At Los Alamos National Laboratory, the Environmental Restoration Project has exceeded legislative requirements in its approach to public involvement. However, formal public meetings are not particularly successful, especially in an area of substantial economic and racial diversity. In the past, activists have monopolized the Laboratory's formal public meetings. To ensure that a broad cross-section of the public participates, the Environmental Restoration Project at Los Alamos has developed an approach that involves a much broader variety of stakeholders in making recommendations on various remediation activities. This approach consists of attending community meetings and familiarizing different constituencies with the purpose and goals of the Environmental Restoration Project. Attending community meetings has helped Los Alamos and our neighbors build a more positive relationship based on mutual respect and trust. As a direct result of this different approach, community representatives have volunteered to participate in a focus group that will work together on issues of concern and interest.

1226

V18/022255

Stratigraphic Nomenclature of the Bandelier Tuff for the Environmental Restoration Project at Los Alamos National Laboratory

Broxton, D.E.; Reneau, S.L.

Los Alamos National Laboratory, Los Alamos, NM

LA-13010-MS; 21 pp. (August 1995)

This technical guidance document sets forth a system of stratigraphic nomenclature for the Bandelier Tuff for use by the Environmental Restoration Project at Los Alamos. It identifies the major lithologic characteristics of the Bandelier Tuff, defines criteria for unit classification, and provides guidance for the consistent use of rock names. This proposed nomenclature system will improve the exchange of information among investigators working at different field units by providing a common stratigraphic framework for discussing the influence of geology on contaminant

transport.

1227 V18/022154

Summary of Environmental Surveillance at Los Alamos During 1994

Los Alamos National Laboratory, Los Alamos, NM
LALP-96-36; 25 pp. (March 1996)

For the past twenty years, Los Alamos National Laboratory has published an annual environmental report. This report offers a synopsis that briefly explains important concepts such as radiation, and provides a summary of the monitoring results and regulatory compliance status that are explained at length in Environmental Surveillance at Los Alamos During 1994. This information is organized in five sections: the Fundamentals of Radiation, 1994 Risk Estimates, Environmental Programs at Los Alamos National Laboratory, Environmental Monitoring, and Environmental Compliance.

1228 V18/023949

Summary of Environmental Surveillance at Los Alamos During 1995

Los Alamos National Laboratory, Los Alamos, NM
LALP-96-117; 16 pp. (October 1996)

For the past twenty years the Los Alamos National Laboratory has published an annual environmental report. This pamphlet offers a synopsis that briefly explains important concepts, such as radiation, and provides a summary of the monitoring results and regulatory compliance status for the laboratory that are described in detail in the annual report. The information is organized in five sections: the fundamentals of radiation, risk estimates, environmental programs at the laboratory, environmental monitoring and environmental compliance.

1229 V18/022873

Surface Water Data at Los Alamos National Laboratory: 1995 Water Year

Shaull, D.A.; Alexander, M.R.; Reynolds, R.P.

Los Alamos National Laboratory, Los Alamos, NM
LA-13177-PR; 42 pp. (August 1996)

The principle investigators collected and computed surface water discharge data from 15 stream-gaging stations that cover most of Los Alamos National Laboratory. The United States Department of Interior Geological Survey, Water Resources Division, operates two of the stations under a subcontract; these are identified in the station manuscripts. Included in this report are data from one seepage run conducted in Los Alamos Canyon during the 1995 water year.

1230 V18/023508

Tritium Concentrations in Bees and Honey at Los Alamos National Laboratory: 1979-1996

Fresquez, P.R.; Armstrong, D.R.; Pratt, L.H.

Los Alamos National Laboratory, Los Alamos, NM
LA-13202-MS; 15 pp. (January 1997)

Honeybees are effective monitors of environmental pollution. The objective of this study was to summarize tritium (^3H) concentrations in bees and honey collected from within and around Los Alamos National Laboratory (LANL) over an 18-year period. Based on the long-term average, bees from nine out of eleven hives and honey from six out of eleven hives on LANL lands contained tritium that was significantly higher (p less than 0.05) than background. The highest average concentration of tritium in bees (435 pCi mL⁻¹) collected over the years was from LANL's Technical Area (TA) 54 - a low-level radioactive waste disposal site (Area G). Similarly, the highest average concentration of tritium in honey (709 pCi mL⁻¹) was collected from a hive located near three tritium storage ponds at LANL TA-53. The average concentrations of tritium in bees and honey from background hives was 1.0 pCi mL⁻¹ and 1.5 pCi mL⁻¹, respectively. Although the concentrations of tritium in bees and honey from most LANL and perimeter (White Rock/Pajarito Acres) areas were significantly higher than background, most areas, with the exception of TA-53 and TA-54, generally exhibited decreasing tritium concentrations over time.

1231 V18/021203

Use of Ecotoxicological Screening Action Levels in Ecological Risk Assessment at Los Alamos National Laboratory

Ferenbaugh, R.W.; Ebinger, M.H.; Gallegos, A.F.; Hansen, W.R.; Myers, O.; Wenzel, W.

Los Alamos National Laboratory, Los Alamos, NM
CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 180) (1995)

Regulatory drivers found in several environmental statutes require that ecological risk assessment and Natural Resource Damage Assessment be performed to assess potential environmental impact from contaminated sites and from proposed remedial alternatives. At Los Alamos National Laboratory, the initial phase of the ecological risk assessment process required preliminary evaluation of contaminated sites to determine whether potential for ecological impact exists. The preliminary evaluations were made using Ecotoxicological Screening Action Levels (ESALS) calculated as a function of reference toxicity dose, body weight, food/water/air intake, and fraction of soil intake with food. Reference toxicity doses were derived from the Environmental Protection Agency Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST) toxicology databases. Other parameters required for ESAL calculations were derived from physiological, metabolic, and behavioral data available in the literature. The Los Alamos ESALS were derived for groups of animals with similar behavioral patterns, which were identified from natural resource survey data collected at Los Alamos. Subsequent to development of Ecotoxicological Screening Action Levels, Hazard Quotients, which are ratios of soil concentrations to Ecotoxicological Screening Action Levels, were calculated for potential contaminants of concern. The Hazard Quotients were used to identify which potential contaminants of concern should be

evaluated further for ecological impact. There is potential for ecological impact when the Hazard Quotient is equal to or greater than one. (Complete text)

1232 V18/021199

Bayo Canyon/Radioactive Lanthanum (RaLa) Program

Dummer, J.E.; Taschner, J.C.; Courtright, C.C.

Los Alamos National Laboratory, Los Alamos, NM

LA-13044-H; 95 pp. (April 1996)

LANL conducted 254 radioactive lanthanum (RaLa) implosion experiments Sept. 1944-March 1962, in order to test implosion designs for nuclear weapons. High explosives surrounding common metals (surrogates for Pu) and a radioactive source containing up to several thousand curies of La, were involved in each experiment. The resulting cloud was deposited as fallout, often to distances of several miles. This report was prepared to summarize existing records as an aid in evaluating the off-site impact, if any, of this 18-year program. The report provides a historical setting for the program, which was conducted in Technical Area 10, Bayo Canyon about 3 miles east of Los Alamos. A description of the site is followed by a discussion of collateral experiments conducted in 1950 by U.S. Air Force for developing an airborne detector for tracking atmospheric nuclear weapons tests. All known off-site data from the RaLa program are tabulated and discussed. Besides the radiolanthanum, other potential trace radioactive material that may have been present in the fallout is discussed and amounts estimated. Off-site safety considerations are discussed; a preliminary off-site dose assessment is made. Bibliographical data on 33 persons important to the program are presented as footnotes.

1233 V18/022160

Brookhaven National Laboratory Environmental Monitoring Plan for Calendar Year 1996

Naidu, J.R.; Paquette, D.E.; Lee, R.J.

Brookhaven National Laboratory, Upton, NY

BNL-52511; 240 pp. (1996)

As required by DOE Order 5400.1, each U.S. Department of Energy (DOE) site, facility, or activity that uses, generates, releases, or manages significant quantities of hazardous materials shall provide a written Environmental Monitoring Plan (EMP) covering effluent monitoring and environmental surveillance. DOE/EH-0173T, Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, provides specific guidance regarding environmental monitoring activities. This report discusses inventories of specific types of effluents and effluent monitoring programs at specific facilities and gives descriptions of the components of the environmental program, e.g., groundwater monitoring and surface water monitoring. In addition soil, vegetation, and fauna sampling are discussed. Sections on off-site sampling, analysis methods, data management, and quality assurance are also included.

1234 V18/025415

Brookhaven National Laboratory Site Environmental Report for Calendar Year 1995

Naidu, J.R.; Paquette, D.E.; Schroeder, G.L.; Lee, R.J.

Brookhaven National Laboratory, Upton, NY

BNL-52522; 329 pp. (December 1996)

This report documents the results of the Environmental Monitoring Program at Brookhaven National Laboratory and summarizes information about environmental compliance for 1995. To evaluate the effect of Brookhaven National Laboratory's operations on the local environment, measurements of direct radiation and of a variety of radionuclides and chemical compounds in the ambient air, soil, sewage effluent, surface water, groundwater, fauna, and vegetation were made at the Brookhaven National Laboratory site and at adjacent sites. The report also evaluates the Laboratory's compliance with all applicable guides, standards, and limits for radiological and nonradiological emissions and effluents to the environment. Areas of known contamination are subject to Remedial Investigation/Feasibility Studies under the Interagency Agreement established by the Department of Energy, the Environmental Protection Agency, and the New York Department of Environmental Conservation. Except for identified areas of soils and groundwater contamination, the environmental monitoring data has continued to demonstrate that compliance was achieved with the applicable environmental laws and regulations governing emission and discharge of materials to the environment. Also, the data show that the environmental impacts at Brookhaven National Laboratory are minimal and pose no threat to the public nor to the environment.

1235 V18/022863

Summary of Proposed Approach for Deriving Cleanup Guidelines for Radionuclides in Soil at Brookhaven National Laboratory

Meinhold, A.F.; Morris, S.C.; Dionne, B.; Moskowitz, P.D.

Brookhaven National Laboratory, Upton, NY

BNL-63758; 38 pp. (November 1996)

Past activities at Brookhaven National Laboratory (BNL) resulted in soil and groundwater contamination. As a result, BNL was designated a Superfund site under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). BNL's Office of Environmental Restoration (OER) is overseeing environmental restoration activities at the Laboratory, carried out under an Interagency Agreement (IAG) with the United States Department of Energy (DOE), the United States Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC). With the exception of radium, there are no regulations to establish cleanup guidelines for radionuclides in soils at BNL. BNL must derive radionuclide soil cleanup guidelines for a number of Operable Units (OUs) and Areas of Concern (AOCs). These guidelines are required by DOE under a proposed regulation for radiation protection of public health and the environment (10 CFR Part 834) as well as to satisfy the requirements of CERCLA.

1236 V18/025357

Characterization and Remediation of Soil Prior to Construction of an Onsite Disposal Facility

Hunt, A.; Jones, G.; Janke, R.; Nelson, K.

Fluor Daniel Fernald, Cincinnati, OH; U.S. Department of

Energy, Washington, DC; Jacobs Engineering Group Inc., Cincinnati, OH

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (11 pp.) (1997)

During the production years at the Feed Materials Production Center (FMPC), the soil of the site and the surrounding areas was superficially impacted by airborne contamination. The DOE has completed the sitewide RI/FS process and has received approval of the final Records of Decision (RODs). The name of the facility was changed to the Fernald Environmental Management Project (FEMP) to emphasize the change in mission to environmental restoration. Remedial actions which address similar scopes of work or types of contaminated media have been grouped into remedial projects for the purpose of managing the remediation of the FEMP. The Soil Characterization and Excavation Project (SCEP) will address the remediation of FEMP soils, certain waste units, at- and below-grade material, and will certify attainment of the final remedial limits (FRLs) for the FEMP. The FEMP will be using an on-site facility for low level radioactive waste disposal. The facility will be an above-ground engineered structure constructed of geological material. The area designated for construction of the base of the on-site disposal facility (OSDF) is referred to as the "footprint". Prior to construction, the footprint must be free of contamination. Contaminated soil within the footprint must be identified and remediated. The success of characterization and remediation will be verified through a certification process required and approved by the regulatory agencies. Material exceeding the OSDF waste acceptance criteria (WAC) will be disposed of at an appropriate commercial or federal disposal facility. Excavation of Phase I of the first of seven remediation areas is complete. Certification and reseeded will be completed in the spring of 1997.

1237 V18/021206

DOE Picks Fluor for Fernald

Rubin, D.K.

ENR 229(8):9 (August 24, 1992)

This article is a discussion of the award of the Environmental Restoration Management contract at the Fernald site. This contract was awarded to a team led by Fluor Daniel and had a value of \$2.2B over a five year period, with a three-year option period potentially worth \$1.8B. Future competition for the Hanford ERM award is also discussed.

1238 V18/021200

Enhanced Work Planning for Reduction in Landlord Costs

Miller, L.K.; Houser, S.M.; Paine, D.; West, M.L.; Trygier, J.H.

Fernald Environmental Restoration Management Corporation, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH

FEMP-2492; CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration,

Tucson, AZ, February 25-29, 1996; (12 pp.) (1996)

The cost of Landlord services constitutes a major portion of the Fernald Environmental Management Project (FEMP) budget. In order to place more resources in the area of actual remediation and cleanup, the Fernald Environmental Restoration Management Corporation (FERMCO) has established a new enhanced work planning initiative through the Integrated Safe Shutdown, Waste Management, and Landlord (ISWL) Project Team. The ISWL Project Team is a planning and coordination group which meets weekly at no additional cost to the DOE; actual field work is funded and implemented through the remedial or operational projects. The purpose of this team is to address issues that will facilitate safe shutdown and/or reduction of utilities in facilities thereby decreasing the infrastructure costs and increasing integration/advanced planning between Waste Management, Safe Shutdown, and Landlord Programs. The ISWL Project Team is the key planning and integration link for near term (one month to one year) integration activities. The ISWL Team is planning for the coordination of integration activities which must be completed to support and facilitate the FEMP's (1) Safe Shutdown Program, (2) Utility Reduction Program, (3) Waste Programs Management, (4) remediation of all FEMP structures, and (5) ongoing remediation projects.

1239 V18/024264

Fernald Environmental Management Project: 1995 Site Environmental Report

Fluor Daniel Fernald, Cincinnati, OH

FEMP-2518; 260 pp. (June 1996)

The Fernald site continues to examine the air and liquid pathways as possible routes through which pollutants from past operations and current remedial activities may leave the site. This 1995 Site Environmental Report provides the general public as well as scientists and engineers with the results from the site's ongoing Environmental Monitoring Program. Also included in this report is information concerning the site's progress toward achieving full compliance with requirements set forth by DOE, US Environmental Protection Agency (U.S. Environmental Protection Agency), and Ohio EPA.

1240 V18/024265

Fernald Environmental Management Project: 1995 Site Environmental Report - Summary

Fluor Daniel Fernald, Cincinnati, OH

FEMP-2518 (Summary); 16 pp. (June 1996)

This report summarizes the 1995 Site Environmental Report for the Fernald site. It describes the Fernald site mission, exposure pathways, and environmental standards and guidelines. An overview is presented of the impact these activities have on the local environment and public health. Environmental monitoring activities measure and estimate the amount of radioactive and nonradioactive materials that may leave the site and enter the surrounding environment.

1241 V18/020872

Fernald Update Major Waste Disposition Issues

Daub, V.; Motl, G.P.; Rast, D.M.

Fernald Environmental Restoration Management Corporation, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH CONF-960443; Best of D&D - Creative, Comprehensive and Cost Effective, Proceedings of an American Nuclear Society Topical Meeting on Decontamination and Decommissioning, Chicago, IL, April 14-17, 1996. American Nuclear Society, La Grange, IL, 314 pp.; (pp. 233-235) (1996)

It is estimated that the cleanup of the Fernald Site will generate 104,000,000 cubic feet of low-level radioactive waste including construction debris, pit sludge, radium residue, and a huge volume of uranium contaminated soil. Since the larger waste disposition problems have been successfully addressed under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), this paper highlights the current waste disposition issues at the Fernald Environmental Management Project (FEMP). The issues include Nevada Test Site (NTS) volume restrictions, nuclear material disposition and Onsite Disposal Facility (OSDF) content.

1242

V18/025324

Fernald's Approved Ten Year Plan Lessons Learned and Future Challenges

Carr, D.; Hagen, T.; Reising, J.

Fluor Daniel Fernald, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

The Fernald Environmental Management Project (FEMP) is unique among DOE sites by virtue of successful efforts by Fluor Daniel Fernald and DOE-Fernald in developing and implementing the first approved, stakeholder-assisted final site closure vision, and initiating field activities supporting the EPA-approved Record of Decisions for final site remediation. DOE and Fluor Daniel Fernald have agreed in principle on a Ten Year Plan which accelerates all activities to remediate the site in approximately half of the target schedule, saving taxpayers more than \$3 billion in the process. Key elements of the current Ten Year Plan are discussed; lessons learned from the development and initial implementation of the plan are presented, and expectations about future challenges DOE and Fluor Daniel Fernald face are detailed. This information is directly applicable to other DOE sites and can be used to better achieve DOE's complex-wide vision for accelerated environmental restoration.

1243

V18/024245

Presidential Rapid Commercialization Initiative for Mixed Waste Solvent Extraction

Honigford, L.; Dilday, D.; Cook, D.; Sattler, J.

Fluor Daniel Fernald, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH

FEMP-2435; CONF-970335; Waste Management '97: Working

Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

Recently, the Fernald Environmental Management Project (FEMP) has made some major steps in mixed waste treatment which have taken it closer to meeting final remediation goals. However, one major hurdle remains for the FEMP mixed waste treatment program, and that hurdle is tri-mixed waste. Tri-mixed is a term coined to describe low-level waste containing Resource Conservation and Recovery Act (RCRA) hazardous constituents along with polychlorinated biphenyls (PCB). The prescribed method for disposal of PCBs is incineration. In mixed waste treatment plans developed by the FEMP with public input, the FEMP committed to pursue non-thermal treatment methods and avoid the use of incineration. Through the Superfund Innovative Technology Evaluation (SITE) Program, the FEMP identified a non-thermal treatment technology which uses solvents to extract PCBs. The technology belongs to a small company called Terra-Kleen Response Group, Inc. A question arose as to how can this new and innovative technology be implemented by a small company at a Department of Energy (DOE) facility. The answer came in the form of the Rapid Commercialization Initiative (RCI) and the Mixed Waste Focus Area (MWFA). RCI is a program sponsored by the Department of Commerce (DOC), DOE, Department of Defense (DOD), US EPA and various state agencies to aid companies to market new and innovative technologies.

1244

V18/020754

Remediation Activities at the Fernald Environmental Management Project (FEMP)

Walsh, T.J.; Danner, R.

Fernald Environmental Restoration Management Corporation, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management Project, Fernald, OH FEMP-2516; CONF-9606125; Proceedings of the Air and Waste Management (AWM) 1996 Annual Meeting, Nashville, TN, June 23-28, 1996; (11 pp.) (1996)

The Fernald Environmental Management Project (FEMP) is a United States Department of Energy (DOE) facility located in southwestern Ohio. The facility began manufacturing uranium products in the early 1950's and continued processing uranium ore concentrates until 1989. The facility used a variety of chemical and metallurgical processes to produce uranium metals for use at other DOE sites across the country. Since the facility manufactured uranium metals for over thirty years, various amounts of radiological contamination exists at the site. Because of the chemical and metallurgical processes employed at the site, some hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA) were also generated at the site. In 1989, the FEMP was placed on the National Priorities List (NPL) which requires cleanup of the facility's radioactive and chemical contamination under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This paper discusses the proposed remediation activities at the five Operable Units (OUs) designated at the FEMP. In addition, the paper also examines the ongoing CERCLA response actions and RCRA closure activities at the facility.

1245 V18/020751

Environmental Assessment and Planning at Mound - Environmental Monitoring Capabilities and Personnel Profiles

Monsanto Research Corporation, Mound, Miamisburg, OH
MLM-MU-80-66-0001; 40 pp. (1996)

Through its long experience with radioactive materials, Mound has developed a comprehensive, routine, offsite, environmental surveillance program to safeguard its employees, the physical plant, and the integrity of the surrounding environment from any potential adverse effects of its widely diverse operations. Effluent samples are analyzed for radiological and non-radiological parameters. The environment surrounding Mound Facility is continuously monitored - air, water, foodstuffs, vegetation, soil, and silt samples are analyzed to ensure that radioisotopic concentrations and other possible pollutants are well within the stringent standards adopted by the Department of Energy, the Environmental Protection Agencies (both federal and state), and various regional and local agencies. Moreover, this environmental surveillance program has been designed to ensure that the facility is designed, constructed, managed, operated, and maintained in a manner that continues to meet all federal, state, and local standards for environmental protection. Work in environmental science has been broadened to assess environmental factors associated with various aspects of the National Energy Plan. Both the management and staff at Mound have undertaken a firm commitment to make Mound's environmental monitoring capabilities available to agencies that have the responsibility for the resolution of important environmental issues.

1246 V18/021336

Mound 2000 Cleans Up Decision Making Process

EG&G Mound Applied Technologies, Inc., Miamisburg, OH
TIE Quarterly 4(4):6 (Spring 1996)

DOE's Mound Facility in Miamisburg, Ohio, doesn't conform to typical assumptions about the expanse of contamination at most Superfund sites. Rather than being dispersed over large areas, contamination at Mound occurs at small, separate release sites peppered across the facility. This pattern emerged after site personnel had completed reams of paperwork (six feet of shelf space for one operable unit alone) through the standard Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA) remedial investigation/feasibility study (RI/FS) process. DOE, the U.S. Environmental Protection Agency (EPA), and Ohio EPA (OEPA) use a modified Removal Site Evaluation (RSE) process, informally known as MOUND 2000 to accelerate the cleanup and to involve stakeholders earlier in the process. This RSE process is already saving time and dollars. The original six operable units at the Mound site were reexamined in light of preliminary characterization data and historical information. These six operable units were replaced by more than 400 potential release sites (PRS). Each PRS is evaluated individually with a focus on action, not study. If cleanup at a site is necessary, it is conducted through a CERCLA removal action instead of the much longer RI/FS process. If there's not enough information to determine if a given PRS poses a problem, the cost of collecting

data is weighed against the cost of performing removal action at the site. The most cost-effective method then becomes the method of choice for addressing site cleanup.

1247 V18/023418

Stakeholder Participation in the Mound Plant Environmental Monitoring Program

Bauer, R.L.

EG&G Mound Applied Technologies, Inc., Miamisburg, OH
CONF-9606116; Proceedings of an American Nuclear Society (ANS) Annual Meeting, Reno, NV, June 16-20, 1996. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 74:41-42 (1996)

The Mound Plant is a 306-acre U.S. Department of Energy (DOE) site located in southwest Ohio. Historically, the plant has researched, developed, and evaluated nuclear weapons components. This mission is nearing completion, and the site is on an accelerated schedule for environmental restoration. However, in support of remaining operations and decommissioning and decontamination projects, EG&G Mound continues to operate extensive networks of effluent and environmental monitors and samplers. The data generated by these networks are reported to stakeholders through formal and informal reports, newsletters, public meetings, press releases, and other mechanisms deemed appropriate. Among all of the Environmental Monitoring Program (EMP) results reported to stakeholders each year, regulators and area residents continue to demonstrate keen interest in the detection of radionuclides in the off-site environment. Technical exchanges on this subject have been held with the Ohio Environmental Protection Agency (OEPA), the Ohio Department of Health, and the Miamisburg Environmental Safety and Health Citizens Action Group. Exchanges held to date have focused on the water-sampling program; the air-sampling program will be studied subsequently.

1248 V18/021116

Portsmouth Site Annual Environmental Report Summary for 1994

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN;
Lockheed Martin Energy Systems, Inc., Portsmouth Site,
Piketon, OH

ES/ESH-64; POEF-3057; 13 pp. (March 1996)

This pamphlet contains summaries of the environmental programs at the Portsmouth site, including environmental monitoring and results and the impact of plant operations on the environment and the public for 1994. More detailed information on the material summarized in this pamphlet is available in the Portsmouth Site Annual Environmental Report for 1994. The data used to compile the site annual environmental report and this summary pamphlet are published in the Portsmouth Site Annual Environmental Data for 1994, which is a collection of tables containing effluent monitoring, environmental surveillance, and dose calculation data for 1994.

1249 V18/021117

Portsmouth Site Annual Environmental Report for 1994

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN;

Lockheed Martin Energy Systems, Inc., Portsmouth Site,
Piketon, OH

ES/ESH-63; POEF-3055; 169 pp. (March 1996)

This report summarizes the 1994 environmental monitoring of U.S. Department of Energy (DOE) activities at the Portsmouth site and its environs. This report consists of three separate documents: (1) A summary pamphlet for the general public; (2) A more detailed discussion of compliance status, data, and environmental impacts (this document); and (3) A volume of detailed data that is available upon request. The objectives of this report are to: (1) report compliance status during 1994, (2) provide information about the site and DOE operations, (3) report 1994 monitoring data for the installation and its environs that may have been affected by DOE operations on the site, (4) document information on input and assumptions used in calculations, (5) provide trend analyses (where appropriate) to indicate increases and decreases in environmental impact, and (6) provide general information on quality for the environmental monitoring program for DOE operations.

1250

V18/024089

**U.S. Department of Energy Portsmouth Annual
Environmental Data for 1995**

Lockheed Martin Energy Systems, Inc., Portsmouth Site,
Piketon, OH

POEF-LMES-86; 53 pp. (April 1997)

Environmental monitoring on the Portsmouth Gaseous Diffusion Plant site is conducted throughout the year. Monitoring ensures that the site is a safe place to work, that plant operations do not adversely affect neighboring communities, and that activities comply with federal and state regulations. This document is a compilation of the environmental monitoring data for calendar year 1995 and is intended as a tool for analysts in environmental monitoring, environmental restoration, and other related disciplines. The data in this document form the basis for the summary information in the Portsmouth Annual Environmental Report for 1995.

1251

V18/022382

**U.S. Department of Energy Portsmouth Site Annual
Environmental Data for 1994**

Lockheed Martin Energy Systems, Inc., Portsmouth Site,
Environmental Management Division, Piketon, OH;
Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

ES/ESH-65; POEF-3056; 55 pp. (March 1996)

Environmental monitoring on the Portsmouth Gaseous Diffusion Plant site and its surroundings is conducted throughout the year. Monitoring ensures that the site is a safe place to work, that plant operations do not adversely affect neighboring communities, and that activities comply with federal and state regulations. This document is a compilation of the environmental monitoring data for calendar year 1994 and is intended as a tool for analysts in environmental monitoring, environmental restoration, and other related disciplines. The data in this document form the basis for the summary information in the Portsmouth Site Annual Environmental Report for 1994 (ES/ESH-63, PEF-3055).

1252

V18/024090

**U.S. Department of Energy: Portsmouth - Annual
Environmental Report for 1995**

Lockheed Martin Energy Systems, Inc., Portsmouth Site,
Piketon, OH

POEF-LMES-85; 138 pp. (April 1997)

The Portsmouth plant is one of two U.S. Department of Energy (DOE)-owned, contractor-managed uranium enrichment facilities in operation. As of July 1, 1993, responsibility for implementing environmental compliance at the facility was split between DOE, as site owner, and the United States Enrichment Corporation (USEC), a government-owned corporation formed by the National Energy Policy Act of 1992, to take over the nation's uranium enrichment business. The management contractor for DOE is Lockheed Martin Energy Systems (formerly Martin Marietta Energy Systems), which is responsible for waste management, environmental restoration, removal of highly enriched uranium (HEU), and operation of nonleased facilities at the Portsmouth Gaseous Diffusion Plant (DOE/PORTS). Lockheed Martin Utility Services (formerly Martin Marietta Utility Services) provides management services for USEC. The Nuclear Regulatory Commission is scheduled to assume direct oversight of USEC operations in 1997. Until then, DOE is providing oversight of nuclear safety and safeguards and security. This report reviews the following subjects: (1) compliance with state and federal regulations and permitting requirements, (2) environmental program information, (3) effluent monitoring, (4) dose calculations, (5) groundwater issues and monitoring, and (6) quality assurance for sampling and analysis activities.

1253

V18/020740

**Audit of Groundwater Remediation Plans at the
Savannah River Site**

U.S. Department of Energy, Office of Inspector General,
Eastern Regional Audit Office, Oak Ridge, TN

ER-B-96-02; 16 pp. (June 11, 1996)

The Department of Energy was required to reduce groundwater contamination that represented a risk to human health or the environment. To achieve this goal, the Savannah River Operations Office (Savannah River) entered into several formal agreements with Federal and State regulators. The agreements described how Savannah River would reduce the level of contamination until the risks to human health and the environment were lowered to an acceptable level. The agreements called for decreasing groundwater contamination to levels that would comply with South Carolina groundwater regulations, which would allow a hypothetical future resident to someday live above the F and H Areas and drink the groundwater. Basing the agreements on drinking water standards was unreasonable because no one will likely live above these areas or drink the groundwater. The more stringent drinking water standards were included in the planning process because Savannah River had not developed a Land Use Plan that would permit rational decision making for the entire site. Lacking a Land Use Plan, the environmental regulators assumed, and Savannah River acceded to, the most stringent usage scenario, that the groundwater under the F and H Areas might one day be used as a source of drinking water. It will take more than one hundred years for the subterranean

groundwater to become safe enough for drinking water purposes. Consequently, Savannah River may continue to pursue expensive remediation projects for longer than would be necessary to protect human health and the environment. However, the cost impact of unnecessary clean-up activities is indeterminable because acceptable contamination limits would still have to be negotiated with the South Carolina Department of Health and Environmental Control.

1254 V18/025423

Audit of the Savannah River Site's Quality Control Program for Groundwater Sampling

U.S. Department of Energy, Office of Inspector General,
Eastern Regional Audit Office, Oak Ridge, TN

DOE/IG-0405; 10 pp. (May 20, 1997)

The Savannah River Site's groundwater remediation program was managed by the Department of Energy's management and operating contractor for the site, Westinghouse Savannah River Company (Westinghouse). One component of the remediation program was the quality control program. The goal of the groundwater quality control program was to ensure that the results of laboratory analyses of groundwater samples were accurate and precise so that they could be relied upon for making remediation decisions. The objective of this audit was to determine whether Westinghouse acquired the minimal number of laboratory analyses required to ensure that groundwater sampling results met this criteria. The audit found that Westinghouse required more quality control analyses than necessary to ensure that groundwater sampling results were accurate and precise. Recommendations for specific steps to reduce sample numbers were made.

1255 V18/021243

Decommissioning of Facilities at the Savannah River Site

Marek, J.M.; Street, G.H.

U.S. Department of Energy, Savannah River Operations
Office, Aiken, SC; Westinghouse Savannah River Company,
Aiken, SC

CONF-941148 (Vol. 1); DDER-'94: Decommissioning,
Decontamination, and Environmental Restoration at Contaminated
Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded
Topical Symposium of the American Nuclear Society Winter
Meeting, Washington, DC, November 13-18, 1994. American
Nuclear Society, Inc., La Grange Park, IL, Vol. 1, 323 pp.; (pp.
181-184) (1994)

The transition of surplus Defense Program facilities to
Environmental Management (EM) is underway at Savannah River
Site (SRS). Program status and requirements are described in this
paper. A flowsheet is given showing the process of SRS facilities
transition to EM.

1256 V18/022158

Definition of a Critical Confining Zone Using Surface Geophysical Methods

Eddy-Dilek, C.A.; Hoekstra, P.; Harthill, N.; Blohm, M.;
Phillips, D.R.

Westinghouse Savannah River Company, Aiken, SC;

Blackhawk Geosciences, Inc., Golden, CO

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.),
Proceedings of the Ninth Annual Symposium on the Application of
Geophysics to Engineering and Environmental Problems, Denver,
CO, April 15-May 1, 1996. Environmental and Engineering
Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 387-396)
(1996)

Definition of the hydrogeologic framework in layered sediments of
fluvial and deltaic origin is a difficult challenge for environmental
characterization and remediation programs due to the lithologic and
stratigraphic heterogeneities inherent in these settings. These
heterogeneities often control contaminant transport and the
effectiveness of remediation alternatives. Surface geophysical
surveys can be cost-effective methods for characterization, but
individual methods have inherent limitations in resolution and
sensitivity. A synergistic approach, utilizing two geophysical survey
methods was applied to define and examine the nature and extent of
a deep confining zone of regulatory importance, the Crouch Branch
Confining Unit, in Coastal Plain sediments at the Savannah River
Site. Time domain electromagnetics (TDEM) accurately maps the
overall conductance (product of thickness and electrical
conductivity) of a confining zone clay facies; from variations in
conductance, changes in lithology of the confining zone can be
inferred. Shear wave seismic reflection surveys map the depth to the
clay layers and the clay layer thickness, but provides little
information on the lithologic nature of the confining zone.
Integrated interpretation of the combined data set (including all
available borehole logs) allows for delineation of the lateral and
vertical extent of clay-dominated zones, sand-dominated zones, key
stratigraphic horizons, and erosional features associated with
unconformities. This approach has resulted in the collection of
critical information that will be used to optimize remedial system
design, representing a significant cost savings to environmental
restoration programs at the Savannah River Site.

1257 V18/020925

Driving Down the Cost of Cleanup: ER Initiatives and Innovation in Place at the Savannah River Site

Hoffman, W.D.

Westinghouse Savannah River Company, Aiken, SC

CONF-960212; Waste Management '96: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
February 25-29, 1996; (10 pp.) (1996)

This paper will describe how four (4) major initiatives developed at
the Savannah River Site (SRS) have combined to save millions in
their Environmental Restoration Program. The four initiatives are:
(1) streamlined sampling approaches; (2) approved standard designs
and remedies; (3) minimization of investigative derived wastes; and
(4) reduced groundwater monitoring requirements. Specifically
streamlined sampling approaches will show how early scoping of
waste site characterization has resulted in more efficient sampling
to reach a site profile. In addition, this initiative has generated the
grouping of sites into characterization envelopes which can be used
to further reduce sampling and facilitate the selection of a remedy.
SRS will share its experience in this area. The concept of the
Approved Standard Corrective Action Design (ASCAD tm) has been

developed at SRS and makes full use of streamlining. This concept is an innovative way of defining characterization conditions and matching them with standard environmental restoration remedies. SRS has this concept endorsed by its regulators and is using it. Minimizing the cost of investigative derived wastes is an area where SRS can show success in managing a complex-wide issue. Purge water from groundwater wells in radioactive and mixed waste burial grounds can be treated in a permitted on site facility. SRS will share this experience and has regulatory approval to move ahead with this initiative. Quarterly groundwater well monitoring requirements were costing the SRS ER Program over \$10 million annually. By focusing data needs and communicating with regulators, permit requirements have been changed to allow a more cost efficient program without significantly sacrificing environmental information. Other DOE Programs should benefit from this experience.

1258 V18/022919

Environmental Justice at the Savannah River Site

Flemming, G.R.; Hooker, K.L.

U.S. Department of Energy, Savannah River Operations Office, Aiken, SC

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:46 (1995)

Environmental justice is the conscious commitment to ensure that poor and/or minority communities are not disproportionately bearing adverse human health and environmental effects from the production, processing, or disposal of hazardous or toxic waste. To focus federal attention on assessing the environmental and human health conditions in minority and/or low-income communities surrounding federal facilities, on February 11, 1994, President Clinton signed Executive Order (EO) 12898 (Ref. 1). As part of the strategy to comply with EO 12898, the President required all federal agencies to develop localized strategies to ensure that their programs and policies are consistent with EO 12898. This would incorporate mechanisms for increasing public participation opportunities for involvement in the decision making, easier access to information, and the collection and analysis of economic, demographic, and food consumption data in surrounding communities. The U.S. Department of Energy (DOE) responded by issuing its Environmental Justice Strategy, although many of its field offices had been actively implementing activities in support of the executive order since its issuance. One DOE facility, the Savannah River Site (SRS), which is located in west central South Carolina, is making great strides toward implementing a successful public participation program, which includes environmental justice initiatives.

1259 V18/022959

Environmental Protection Department Environmental Monitoring Section - The Savannah River Site's Groundwater Monitoring Program: Volume 2 - First Quarter 1996, January Through March 1996

Westinghouse Savannah River Company, Aiken, SC; Exploration Resources, Inc., Athens, GA

ESH-EMS-960056; 636 pp. (August 1996)

Appendix B of this report presents the field and analytical results for groundwater samples collected during first quarter 1996. The results tables are presented in alphabetical order by well series and in numerical order within each series. The Site Index by Well Series section of this report contains the area name(s) for each series. The Field Notes section contains information on the inability to collect samples, unusual conditions, and samplers' observations.

1260 V18/021333

Expedited Site Characterization Reduces Costs and Schedule

U.S. Department of Energy, Office of Environmental Management, Washington, DC

TIE Quarterly 4(4):2 (Spring 1996)

The Expedited Site Characterization (ESC) process impressed personnel at DOE's Savannah River Site (SRS) last summer. "If it becomes widely known that we can use ESC to investigate waste sites for much less than what it's costing now, and in maybe three-fourths the time, and without sacrificing quality, I think we're going to have to explain to the public why we're not using it," commented Brian Hennessey, environmental restoration project manager at SRS where the ESC Process was used to characterize the D-Area Oil Seepage Basin.

1261 V18/022933

MAP: Management Action Plan [Rev. 4.0]

U.S. Department of Energy, Savannah River Operations Office, Aiken, SC

WSRC-MS-96-0054 (Rev. 4.0); 165 pp. (October 1, 1996)

The Management Action Plan (MAP) integrates environmental restoration activities at Savannah River Site (SRS) with operational activities and allows meaningful comparison against restoration programs complex-wide. The purpose of the SRS MAP is to describe the status of the program and to identify environmental restoration goals, strategies, and initiatives. The SRS MAP serves as the management framework for environmental restoration activities, stakeholder requirements, and recommendations and mission-oriented activities. This document will be updated on an annual basis. The MAP is a living document and will be formally change controlled throughout the year. As activities that impact the strategic direction of the Environmental Remediation program change, they will be documented for inclusion at the annual review. This annual review is assumed to conclude with a resubmittal to DOE-Headquarters and the Citizen's Advisory Board on March 30 of each year.

1262 V18/022163

Mapping of Impediments to Contamination Flow Using Multicomponent Reflection Seismology at the Savannah River Site

Dickenson, O.A.; Steensma, G.J.; Boyd, T.M.

Colorado School of Mines, Golden, CO

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering

Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 121-128) (1996)

A major obstacle to the remediation of contaminated aquifers at the Savannah River Site in Aiken, South Carolina is the presence of discontinuous sand and clay lenses that are difficult to map effectively using geologic and geophysical well logs. In order to map these discontinuous sand and clay lenses we acquire two perpendicular nine-component (9C) seismic lines, a 9C Vertical Seismic Profile (VSP), and p-wave and s-wave sonic logs in a borehole south of the Old Burial Ground at the Savannah River Site for which natural gamma ray and interpreted geology logs were available. P-wave reflections are interpreted as originating from the water table, the Tan Clay, the Green Clay, the top of the Ellenton Clay, and a calcareous sediment layer within the Barnwell/McBean aquifer. Along the east-west trending line, reflectors are generally continuous except for the occurrence of a discontinuity in the upper reflectors near the east end of the line. This discontinuity could be interpreted as a sediment slump feature, possibly related to the dissolution of the calcareous sediment layer, or as the eastern terminus of a large scour feature. Along the north-south trending line reflectors are spatially less continuous and are interpreted as being cut by several channel/scour features.

1263

V18/023403

Multisensor Environmental Monitoring Update of Savannah River Site Wetlands

Mackey, H.E., Jr.; Cristel, L.; Jensen, J.R., Jr.

Westinghouse Savannah River Company, Aiken, SC; EG&G Energy Measurements, Inc., Las Vegas, NV; University of South Carolina, Columbia, SC

CONF-9606116; Proceedings of an American Nuclear Society (ANS) Annual Meeting, Reno, NV, June 16-20, 1996. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 74:40-41 (1996)

The Savannah River Site (SRS) is a U.S. Department of Energy facility that encompasses an area of approximately 777 sq km (300 sq mi) near Aiken, South Carolina. SRS has been in use since the early 1950s in support of nuclear materials production. Five nuclear reactors, a coal-fired power plant, and extensive support facilities are present on the site. SRS has conducted, almost annually, multisensor surveys of one type or another since 1981 in support of various environmental assessment and monitoring programs at the site, especially as related to reactor operations and potential effects on wetlands, i.e., streams, swamps, and cooling lakes that received thermal effluents. These applications included: (a) thermal plume mapping and model verification in the Savannah River and two cooling lakes, Par Pond and L Lake, through the use of airborne multispectral scanner data (thermal channels) or dye dispersion studies (visible channels); and (b) both seasonal and annual monitoring of wetlands vegetation patterns and recovery with satellite and airborne multispectral scanner (MSS) systems. These wetlands surveys provide baseline and change detection maps for the projection of changes in either naturally recovering wetlands environments or at remediation sites.

1264

V18/025344

Radioactive Soil Consolidation at the Savannah River

Site

Hoffman, W.D.; Griffith, J.M.

Westinghouse Savannah River Company, Aiken, SC

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (6 pp.) (1997)

This paper was prepared in order to share evaluation of on-site disposal alternatives for low-level radioactive soils and debris from various Resource Conservation and Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste units within the Savannah River Site (SRS). Twenty RCRA/CERCLA waste units have been identified at SRS that contain low-level radioactive soils and debris and will be used as the baseline for disposal capacity evaluation. One remedial management option is to consolidate this material into one disposal facility constructed within the boundaries of SRS. The overall objectives of this paper were to provide decision makers adequate information to compare Soils/Debris Consolidation Facility (SDCF) alternatives, select the preferred SDCF option(s) to other remedial actions, including those involving treatment, that have been preliminarily identified for the individual SRS low-level radioactive RCRA/CERCLA waste units. The SDCF could provide for a reduction of receptor exposure to the contaminant source by decreasing the total radioactively contaminated area (footprint) at SRS requiring institutional controls, minimizing the number of radioactive waste sites requiring long-term monitoring and maintenance, and streamlining by using generic remedies for the number of candidate units.

1265

V18/024381

SRS Sees Funds at Work: Cleanup a Slow Process

Aiken Standard 128(129):4 (May 8, 1996)

If Congress and the public aren't convinced, officials say that 1996 will go down in history as a banner year for cleanup at the Savannah River Site. While 75 percent of the environmental remediation budget for 1995 at SRS was tied up in assessment and characterization of cleanup projects, in 1996 75 percent of the budget will be used in the field for actual cleanup. Remediation work accounts for roughly 10 percent of the total \$1.25 billion annual SRS budget for fiscal 1996. This two-part article discusses the increase in the amount of cleanup work being accomplished at SRS and which projects are moving ahead.

1266

V18/022938

Savannah River Site Environmental Data for 1995

Arnett, M.W.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-0077; 261 pp. (1995)

This document presents data from Savannah River Site routine environmental monitoring and surveillance programs. An attempt also has been made to include all available data from environmental research programs. The first section of the book is a collection of maps of radiological and nonradiological sampling locations. Next are a list of the media samples, along with the sample sizes and representative aliquots; minimum detectable concentrations for

gamma analysis of water and air samples; minimum detectable concentrations for gamma analysis of soil, food, fish and wildlife, and vegetation samples; minimum detectable concentrations for Environmental Monitoring Section radiological analyses; minimum detectable activities for radionuclides in settleable solids; and nonradiological environmental surveillance detection/report limits. Following the first sections are tables with radiological and nonradiological effluent monitoring results, radiological and nonradiological environmental surveillance results, dose estimates, and quality assurance data. Because of space requirements of data table columns, many abbreviations are used. To assist the reader, lists of radionuclide and chemical nomenclature and sampling location abbreviations are included following this introduction.

1267

V18/022939

Savannah River Site Environmental Report for 1995

Arnett, M. W.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-0075; 271 pp. (1995)

The Savannah River Site (SRS) conducts effluent monitoring and environmental surveillance to ensure the safety of the public and the well-being of the environment. U.S. Department of Energy (DOE) Order 5400.1, "General Environmental Protection Program," requires SRS to submit an environmental report documenting the impact of facility operations on the environment and on public health. The report's purpose is to present summary environmental data that characterizes site environmental management performance, confirms compliance with environmental standards and requirements, and highlights significant programs and efforts.

1268

V18/021537

Savannah River Site Integrated Stabilization Management Plan [Rev. 3]

Geddes, R.L.; Barone, A.; Shook, H.E.; Varner, C.E.; Rollins, R.

Westinghouse Savannah River Company, Aiken, SC

NMP-PLS-950068 (Rev. 3); 120 pp. (March 20, 1996)

On May 26, 1994, the Defense Nuclear Facilities Safety Board (DNFSB) issued Recommendation 94-1. The concern is that the halt in production of materials to be used in nuclear weapons froze the manufacturing pipeline in a state that, for safety reasons, should not be allowed to persist unremediated. This recommendation had eight specific sub-recommendations that dealt with the potential problems. Specifically, the Board expressed concern about certain liquids and solids containing fissile materials and other radioactive substances located in spent fuel storage pools, reactor basins, reprocessing canyons; and various other facilities once used for processing and weapons manufacture. The Westinghouse Savannah River Company and DOE-Savannah River acknowledges and shares the Board's concerns and has developed this Integrated Stabilization Management Plan (ISMP) to aggressively address these urgent problems in a systems engineering approach.

1269

V18/021329

Savannah River Site Wetland Mitigation Bank Plan**[Draft]**

Abernethy, R.K.; Danker, S.A.; Hooker, K.L.; Wein, G.R.; Hyatt, P.

Brown and Root Environmental, Aiken, SC; U.S. Department of Energy, Savannah River Operations Office, Aiken, SC

Report; 20 pp. (July 1995)

The U.S. Department of Energy-Savannah River Operations Office (DOE-SR) has entered into a Memorandum of Agreement (MOA) with the U.S. Army Corps of Engineers, Charleston District, Regulatory Branch (COE); the U.S. Environmental Protection Agency (EPA); the U.S. Department of the Interior, Fish and Wildlife Service (FWS); the National Marine Fisheries Service (NMFS); and the South Carolina Department of Natural Resources (SCDNR) to establish a Wetland Mitigation Bank (hereafter referred to as "The Bank") at the Savannah River Site (SRS). The Bank is being established to gain "credit" for current and future wetland restoration work not required as part of an existing mitigation action plan, and in expectation of future mitigation needs at SRS. Future projects, such as the remediation of waste sites and the repair and maintenance of the roads and bridges on SRS, will likely impact some wetland areas. By establishing a wetland mitigation bank prior to the impacts, DOE can incorporate mitigation efforts required for new projects with wetland restoration projects already underway. The Bank will save future remediation and construction projects requiring compensatory wetland mitigation the time and money needed to locate a suitable wetland for restoration and obtain approval for its use.

1270

V18/022162

Shallow Seismics When Access Across Contaminated Areas is Prohibited

Hasbrouck, J.C.

Rust Geotech, Inc., Grand Junction, CO; U.S. Department of Energy, Grand Junction Office, Grand Junction, CO

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 129-136) (1996)

Because of health hazards and possible breach of contaminant caps, waste-site managers are reluctant to grant permission to conduct geophysical surveys directly across repositories. Yet, they need to know if the integrity of confined aquifers is being maintained beneath these sites and if contaminant pathways may exist outward from these sites. One possible way to supply these needed answers is the use of three-dimensional (3D) seismic reflection surveys. These surveys can acquire data around the perimeter of a restricted-access area while lines that traverse the area may be selected for processing and interpretation. To evaluate the feasibility of this approach for an area where these problems exist, a three-dimensional, three-component (3D/3C) seismic survey was conducted at the U.S. Department of Energy's Savannah River Site along the survey lines. Both P- and S-wave seismic data were taken from a set of 13 source points along Line A at a separation of 12 m into a spread of 24 three-component, 40 Hz geophones along Line C. The geophones

were set at a perpendicular offset of 36 to 105 m from the center of the source point array. At each source point, a 9.1 kg hammer was repeatedly struck vertically and then horizontally in four directions against a firmly embedded steel fixture.

1271 V18/021201

Strategy for an Assessment of Cumulative Ecological Impacts

Boucher, P.B.; Collins, J.; Nelsen, J.

PRC Environmental Management, Inc., Aiken, SC; U.S. Department of Energy, Savannah River Operations Office, Aiken, SC

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (pp. 171-172) (1995)

The U.S. Department of Energy (DOE) has developed a strategy to conduct an assessment of the cumulative ecological impact of operations at the 300-square-mile Savannah River Site. This facility has over 400 identified waste units and contains several large watersheds. In addition to individual waste units, residual contamination must be evaluated in terms of its contribution to ecological risks at zonal and site-wide levels. DOE must be able to generate sufficient information to facilitate cleanup in the immediate future within the context of a site-wide ecological risk assessment that may not be completed for many years. The strategy superimposes a more global perspective on ecological assessments of individual waste units and provides strategic underpinnings for conducting individual screening-level and baseline risk assessments at the operable unit and zonal or watershed levels. It identifies ecological endpoints and risk assessment tools appropriate for each level of the risk assessment. In addition, it provides a clear mechanism for identifying clean sites through screening-level risk assessments and for elevating sites with residual contamination to the next level of assessment. Whereas screening-level and operable unit-level risk assessments relate directly to cleanup, zonal and site-wide assessments verify or confirm the overall effectiveness of remediation. The latter assessments must show, for example, whether multiple small areas with residual pesticide contamination that have minimal individual impact would pose a cumulative risk from bioaccumulation because they are within the habitat range of an ecological receptor. Complete text)

1272 V18/023583

Use of the Necessary and Sufficient Standards Closure Process on Environmental Restoration at the Savannah River Site

Bullington, M.; Barlow, M.

Westinghouse Savannah River Company, Aiken, SC

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:138 (1995)

Environmental restoration (ER) activities within the U.S.

Department of Energy (DOE) nuclear weapons complex are performed according to environmental regulations, national consensus standards, and DOE orders. At times though, combined application of these regulations, standards, and orders to ER activities causes duplication of effort or burdensome requirements, especially since most ER activities are relatively simple and have low hazard levels. The DOE orders are generally geared toward high-hazard nuclear facilities. To avoid this, activities need to be managed according to a set of necessary and sufficient (N&S) standards, which will lead to technically sound work being performed safely and more cost-effectively.

1273 V18/022937

Automated Radiological Scanning of Potentially Contaminated Railroad Crossties for Free-Release or Disposal [Rev. 1]

Hochel, R.C.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-0176 (Rev. 1); 10 pp. (June 1996)

The Savannah River Site (SRS) has accumulated approximately 300,000 crossties that have been replaced over a 40-year period of maintaining the site's 62 miles of railroad track. The ties reside in a pile on an open area of 2.3 acres near the site's F-Area facilities. A small fraction of the ties are potentially contaminated with radioactivity as a result of past site practices and service. Contamination was possible from occasional leaks in transport-casks moved by rail from the site's five nuclear materials production reactors to its two reprocessing facilities. Casks typically were filled with spent fuel, targets, and water from the reactor disassembly basins, which contained small amounts of fission and neutron activation product radioactivity normal to the operation of nuclear reactors. Free-release requires that the ties meet criteria specified in DOE order 5400.5. These criteria are usually met by hand-scans or surveys of items to be released, but this is obviously impractical considering the very large number of ties involved here. Fortunately, the scanning process can be automated. The remainder of this paper discusses the technical basis for meeting the release criteria, the radiation scanning equipment, scanning results, and some of the crosstie disposal options.

1274 V18/022580

Savannah River Technology Center: Quarterly Report - January-March 1996

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-0100-1; 54 pp. (1996)

This is the Savannah River Technology Center quarterly report for first quarter 1996.

1275 V18/023957

Oak Ridge K-25 Site Third Quarter 1992 Report on the Toxic Substances Control Act Federal Facilities Compliance Agreement for the Uranium Enrichment Facilities - July 1, 1992 Through September 30, 1992

Nolan, S.D.; Person, G.A.

Oak Ridge K-25 Site, Oak Ridge, TN

K/ER-53; 25 pp. (October 1992)

During 1990, the U.S. Department of Energy (DOE) began negotiating a Federal Facilities Compliance Agreement (FFCA) with the U.S. Environmental Protection Agency (EPA) to achieve compliance with the Toxic Substances Control Act (TSCA) requirements at the Oak Ridge, Paducah, and Portsmouth Uranium Enrichment (UE) gaseous diffusion plants. The FFCA was needed to bring the facilities into compliance with TSCA regulations for the management of polychlorinated biphenyls (PCBs). At the Oak Ridge K-25 Site, the TSCA FFCA for the UE facilities addresses the use of PCBs in ventilation duct gaskets, investigation of historic PCB disposal sites, PCB spill cleanup, air sampling, storage and disposal of shutdown transformers, lubrication oil, PCB-contaminated electrical cables, and workers safety measures. The FFCA was signed by EPA on February 20, 1992, which is the effective date of the agreement. The FFCA provides a negotiated schedule to clean up, remove, and properly manage the PCB wastes and contaminated items addressed in accordance with TSCA regulations.

1276

V18/022157

Applications of Low-Cost Radio-Controlled Airplanes to Environmental Restoration at Oak Ridge National Laboratory

Nyquist, J.E.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-9607137; Proceedings of a Meeting of the Association for Unmanned Vehicle Systems, Orlando, FL, July 15-19, 1996; (13 pp.) (1996)

The US DOE is endeavoring to clean up contamination created by the disposal of chemical and nuclear waste on the Oak Ridge Reservation (ORR), Tennessee, with an emphasis on minimizing off-site migration of contaminated surface and groundwater. The task is complicated by inadequate disposal records and by the complexity of the local geology. Remote sensing data, including aerial photography and geophysics, have played an important role in the ORR site characterization. Are there advantages to collecting remote sensing data using Unmanned Aerial Vehicles (UAV's)? This discusses the applications of UAV's being explored at Oak Ridge National Laboratory (ORNL) under the sponsorship of the Department of Energy's Office of Science and Technology. These applications are: aerial photography, magnetic mapping, and Very Low Frequency (VLF) electromagnetic mapping.

1277

V18/020960

Onsite Laboratory Support for the Oak Ridge National Laboratory Environmental Restoration Program

Burn, J.L.; Dillener, J.L.; Buckley, P.; Garber, R.W.

Bechtel Environmental, Inc., Oak Ridge, TN; CH2M Hill Inc., Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; T N and Associates, Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (5 pp.) (1996)

A remedial investigation/feasibility study was undertaken at Oak Ridge National Laboratory (ORNL). Bechtel National, Inc. and partners CH2M Hill, Ogden Environmental and Energy Services, and PEER Consultants have been contracted to Lockheed Martin Energy Systems, performing this work for ORNL's Environmental Restoration (ER) Program. An on-site Close Support Laboratory (CSL) established at the ER Field Operations Facility has evolved into a laboratory where quality analytical screening results can be provided rapidly (e.g., within 24 hours of sampling). Management of the CSL has been transitioned to T N and Associates this fiscal year. CSL capabilities include three basic areas: radiochemistry, chromatography, and wet chemistry. Besides environmental samples, the CSL routinely screens health and safety and waste management samples. The cost savings of the CSL are both direct and indirect. Direct cost savings are estimated based on comparable off-site quick-turnaround analytical costs. Indirect cost savings are estimated based on: reduction of costs and liability associated with shipping for off-site analyses, preparation for sampling, assistance to Health & Safety staff, use of CSL results to focus further sampling efforts, and sampling crew downtime. Lessons learned are discussed.

1278

V18/022882

Site Descriptions of Environmental Restoration Units at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Kuhaida, A.J., Jr.; Parker, A.F.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-391; 675 pp. (February 1997)

This document presents information on each of the 282 sites at Oak Ridge National Laboratory under the purview of the Environmental Restoration Program. The sites included in this document are those contained in Appendix C (revised February 13, 1996) of the Oak Ridge Reservation Federal Facility Agreement (FFA). "Contaminated Site Summary Sheets", revisions to the RFA Summary Sheets in the RCRA Facilities Assessment (ORNL 1987), serve as the basis for this document. Additional sites have been included and up-to-date information is provided on the history and current conditions for the sites. This document is not intended to be an official update of the RFA, rather it will serve as a primary reference source for each of the ER sites at the Oak Ridge National Laboratory.

1279

V18/023417

Strategic Plan Strategy of the Oak Ridge National Laboratory Environmental Restoration Program

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-276; 25 pp. (June 1995)

This report provides information about the use of an integrated strategic plan, strategy, and life-cycle baseline in the long range planning and risk process employed by the environmental restoration program at the Oak Ridge National Laboratory (ORNL). Long-range planning is essential because the ER Program encompasses hundreds of sites; will last several decades; and requires complex technology, management, and policy. Long-range planning allows a focused, cost-effective approach to identify and meet Program objectives. This is accomplished through a strategic plan, a strategy, and a life-cycle baseline. This long-range

methodology is illustrated below.

1280 V18/022265

Source Document for Waste Area Groupings at Oak Ridge National Laboratory, Oak Ridge, TN

Osborne, P.L.; Kuhaida, A.J., Jr.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-342; 285 pp. (September 1996)

This document serves as a source document for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and other types of documents developed for and pertaining to Environmental Restoration (ER) Program activities at Oak Ridge National Laboratory (ORNL). It contains descriptions of the: (1) regulatory requirements for the ORR ER Program, (2) Oak Ridge Reservation (ORR) ER Program, (3) ORNL site history and characterization, and (4) history and characterization of Waste Area Groupings (WAGs) 1-20. This document was created to save time, effort, and money for persons and organizations drafting documents for the ER Program and to improve consistency in the documents prepared for the program. By eliminating the repetitious use of selected information about the program, this document will help reduce the time and costs associated with producing program documents. By serving as a benchmark for selected information about the ER Program, this reference will help ensure that information presented in future documents is accurate and complete.

1281 V18/021305

Sampling and Analysis Plan for White Oak Creek Watershed Remedial Investigation Supplemental Sampling, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-369; 20 pp. (May 1996)

This Sampling and Analysis Plan (SAP) presents the project requirements for proposed soil sampling to support the White Oak Creek Remedial Investigation/Feasibility Study at Oak Ridge National Laboratory. During the Data Quality Objectives process for the project, it was determined that limited surface soil sampling is needed to supplement the historical environmental characterization database. The primary driver for the additional sampling is the need to identify potential human health and ecological risks at various sites that have not yet proceeded through a remedial investigation. These sites include Waste Area Grouping (WAG) 3, WAG 4, WAG 7, and WAG 9. WAG 4 efforts are limited to nonradiological characterization since recent seep characterization activities at the WAG have defined the radiological problem there.

1282 V18/021198

DOE Oak Ridge Environmental Restoration Program Technical Support: Contractor Monthly Project Status Report

Jacobs Engineering Group Inc., Oak Ridge, TN

DOE/OR/22028-T29; 80 pp. (April 1996)

This report contains the environmental restoration tasks performed by Jacobs Engineering Group, Inc. at the following sites: Oak Ridge National Laboratory; Oak Ridge K-25 site; Paducah Gaseous Diffusion Plant; and the Portsmouth Gaseous Diffusion Plant. In addition, this report also includes tasks that were performed off-site.

1283 V18/022949

1997 Remediation Effectiveness Report for the U.S. Department of Energy Oak Ridge Reservation, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; Advanced Integrated Management Services, Inc., Oak Ridge, TN

DOE/OR/01-1584&D1; 125 pp. (February 1997)

The Remediation Effectiveness Report (RER) is a Federal Facility Agreement (FFA) document that provides a comparison of pre- and post-remediation conditions at completed Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) action sites on the Oak Ridge Reservation (ORR). The RER will be updated on an annual basis to summarize relevant data and to add descriptions of new remediation activities. The RER will document project effectiveness in formal performance assessments; these assessments may lead to recommendations regarding either project requirements or monitoring approach. RER recommendations modify project requirements upon concurrence from parties to the FFA. A variety of vehicles have been employed to document CERCLA decisions on the ORR. These include Records of Decision (RODs), Action Memoranda (AMs), and Letters or Records of Agreement. AMs may govern either standard removals or time-critical (TC) removal actions. The RER provides a guide to the nomenclature and content of these documents. Performance assessments under the RER proceeds on two clearly delineated fronts: (1) success in meeting the explicit goals for selected remedies as indicated by explicitly required monitoring; and (2) additional monitoring information that may be useful in assessing actions, even if not specifically called for in decision documents. Monitoring data for each site are available on the Oak Ridge Environmental Information System.

1284 V18/022907

Anthropology and Decision Making About Chronic Technological Disasters: Mixed Waste Remediation on the Oak Ridge Reservation

Wolfe, A.K.; Schweitzer, M.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-9611117; Proceedings of the 1996 Annual Meeting of the American Anthropological Association, San Francisco, CA, November 20-24, 1996; (pp. 1-23) (1996)

This paper discusses two related case studies of decision making about the remediation of mixed (hazardous and radioactive) wastes on the Oak Ridge Reservation in Tennessee. The three goals of the paper are to: (1) place current decision-making efforts in the varied and evolving social, political, regulatory, economic, and technological contexts in which they occur; (2) present definitions and attributes of "successful" environmental decision making from the perspectives of key constituency groups that participate in decision making; and (3) discuss the role of anthropology in addressing environmental decision making. Environmental decision

making about remediation is extraordinarily complex, involving human health and ecological risks, uncertainties about risks, technological ability to clean up, the financial costs of clean up; multiple and sometimes conflicting regulations, social equity and justice considerations, and decreasing budgets. Anthropological theories and methods can contribute to better understanding and, potentially, to better decision making.

1285 V18/021205

Assessment of Ecological Risks to Wide-Ranging Wildlife Species on the Oak Ridge Reservation

Sample, B.E.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 168) (1995)

Ecological risk assessment at CERCLA sites generally focuses on species that may be definitively associated with a contaminated area. While appropriate for sites with single, discrete areas of contamination, this approach is not adequate for sites with multiple, spatially separated contaminated areas such as the Oak Ridge Reservation (ORR). Wide-ranging wildlife species may travel between and use multiple contaminated sites. These species may therefore be exposed to and be at risk from contaminants from multiple locations. Use of a site (and therefore exposure and risk) by wildlife is dependent upon the availability of habitat. Availability and distribution of habitat on the ORR was determined using satellite imagery. The proportion of habitat within contaminated areas was then determined by overlaying boundaries of contaminated areas (Operable Units or OUs) on the ORR habitat map. The likelihood of contaminant exposure was estimated by comparing the habitat requirements for wildlife species to the proportion of suitable habitat within OUs. OU-specific contaminant concentrations in surface water, soil, or biota were used to estimate the magnitude of risk presented by each OU. The proportion of ORR-wide population likely to be exposed was estimated using literature-derived population density data for each endpoint. At present, due to major data gaps (i.e., lack of data for all OUs, site-specific population density or habitat use data, etc.) uncertainty associated with conclusions is high. Results of this assessment must therefore be considered to be preliminary. (Complete text)

1286 V18/022351

Environmental Restoration Integrated Water Quality Program Plan, Oak Ridge, Tennessee

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; GRAM, Inc., Oak Ridge, TN

ES/ER/TM-205; 185 pp. (September 1996)

The Environmental Restoration (ER) Integrated Water Quality Program (IWQP) was established in 1996 to develop a consistent approach to long-term watershed-based monitoring across the Oak Ridge Reservation (ORR). This report, the ER IWQP Plan, describes the overall approach for a comprehensive surface water,

groundwater, and biological monitoring program to support watershed management decisions. Watersheds with documented impacts by contaminated inactive waste sites or adjacent to impacted watersheds are included in the IWQP. A summary of other ER monitoring activities and their relationship to IWQP monitoring is also provided in the Plan.

1287 V18/024067

Environmental Restoration Program FY 1994 Self-Assessment: Annual Performance Report - August 1993-September 1994

Oak Ridge National Laboratory, Environmental Restoration Division, Oak Ridge, TN

ES/ER/TM-147; 321 pp. (August 1992)

The Environmental Restoration (ER) Program FY 1994 Self Assessment Annual Performance Report summarizes the results of the ER Program self-assessment activities conducted over the period of August 1993 through September 1994. The report is prepared in accordance with the U.S. Department of Energy (DOE) Office of Environmental Restoration and Waste Management Self-Assessment Management Plan, Revision 0, and the Martin Marietta Energy Systems, Inc. (Energy Systems) Description of Self-Assessment Program, Revision 1, Y/EX-43. The major issues identified in the annual performance report are documented by the results of a wide range of independent and self-assessments, as cited in the self-assessment reports submitted by the ER Program organizational units. Also included within the report are descriptions of results from the ER Performance Planning for Improvement (PPI) activities and the ER initiative on the DOE-Headquarters (DOE-HQ) Data Quality Investigation (DQI). Noteworthy practices and cost savings for FY 1994 are presented.

1288 V18/022954

Environmental Restoration Program FY 1997 Management Action Process Document on the U.S. Department of Energy Oak Ridge Reservation

U.S. Department of Energy, Washington, DC; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

DOE/OR/01-1572&D1; 525 pp. (March 1997)

In November 1995, the U.S. Department of Energy (DOE) Oak Ridge Environmental Restoration (ER) Program commenced implementation of the Management Action Process (MAP) that was initiated by the DOE Headquarters Office of Environmental Restoration. In April of 1996, the first version of this MAP Document was issued and approved. In November of 1996, it was updated to reflect changes since April. This update communicates additional changes that have taken place since November, which include data contained in the February 1997 version of the draft Ten Year Plan. On February 28, 1997, DOE and the regulators agreed on FY 1997 regulatory milestones. These milestones are shown in Chapter 6 of this document. Chapter 6 also shows the FY+3 milestones for the ORR ER Program.

1289 V18/022349

Environmental Restoration Program Management Action Process Document on the U.S. Department of Energy Oak Ridge Reservation

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN
DOE/OR/01-1431&D2; 488 pp. (November 1996)

A critical mission of the U.S. Department of Energy (DOE) is planning, implementing, and completing environmental restoration programs at operating and inactive department facilities. An integral part of this mission is the safe and cost-effective environmental restoration of the Oak Ridge ER Program, located near Oak Ridge, Tennessee. This program involves restoration work at three major DOE installations constructed in the early to mid-1940s as research, development, and process facilities built in support of the Manhattan Project. These installations are the Oak Ridge K-25 Site (formerly Oak Ridge Gaseous Diffusion Plant), the Oak Ridge National Laboratory (ORNL), and the Oak Ridge Y-12 Plant (Y-12 Plant). In addition, the Oak Ridge Reservation (ORR) National Priorities List (NPL) site includes areas outside these installations-land used by the Oak Ridge Associated Universities as well as waterways that have been contaminated by releases from the DOE installations.

1290 V18/023952

Implementation of a Consolidated, Standardized Database of Environmental Measurements Data

James, T.L.; Zygmunt, B.C.

University of Tennessee, Energy, Environment, and Resources Center, Knoxville, TN; Oak Ridge National Laboratory, Computational Physics and Engineering Division, Oak Ridge, TN

ORNL/TM-13269; 35 pp. (October 1996)

The three U.S. Department of Energy installations on the Oak Ridge Reservation (Oak Ridge National Laboratory, Y-12 Plant, and K-25 Site) were established during World War II as part of the Manhattan Project that "built the bomb." That research and work in more recent years have resulted in the generation of radioactive materials and other toxic wastes. The U.S. Department of Energy's Oak Ridge Operations has been mandated by federal and state agreements to provide a consolidated repository of environmental data and is tasked to support environmental data management activities on the Oak Ridge Reservation and the Portsmouth, Ohio, and Paducah, Kentucky, plants. The Oak Ridge Environmental Information System (OREIS) was initiated to fulfill these requirements. Most OREIS data are generated by projects that deal with environmental compliance, surveillance, and remediation activities. The primary use of OREIS data is to provide access to project results by regulators. A secondary use is to serve as background data for other projects. This report discusses the benefits of a consolidated and standardized database; reasons for resistance to the consolidation of data; implementing a consolidated database, including attempts at standardization, deciding what to include in the consolidated database, establishing lists of valid values, and addressing quality assurance/quality control (QA/QC) issues; and the evolution of a consolidated database, which includes developing and training a user community, resolving configuration control issues, incorporating historical data, identifying emerging standards, and developing pointers to other data. OREIS is used to illustrate these topics.

1291 V18/022350

Oak Ridge Reservation Annual Site Environmental Report for 1995

Oak Ridge National Laboratory, Oak Ridge, TN; Oak Ridge K-25 Site, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

ES/ESH-69; 175 pp. (September 1996)

The Department of Energy currently oversees activities on the Oak Ridge Reservation, a government-owned, contractor-operated facility. The three sites that compose the reservation (the Y-12 Plant, Oak Ridge National Laboratory, and the K-25 Site) were established in the early 1940s as part of the Manhattan Project, a secret undertaking that produced the materials for the first atomic bombs. The reservation's role has evolved over the years, and it continues to adapt to meet the changing defense and energy needs of the United States. Both the work carried out for the war effort and subsequent research, development, and production activities have produced (and continue to produce) radiological and hazardous wastes.

1292 V18/020997

Oak Ridge Reservation Federal Facility Agreement Quarterly Report for the Environmental Restoration Program: Volume 3 - April-June 1996

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN

DOE/OR/01-1441/V3; 70 pp. (July 1996)

This report was prepared to satisfy requirements for progress reporting on Environmental Restoration Program (ER) activities as specified in the Oak Ridge Reservation Federal Facility Agreement (FFA) established between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation. The reporting period covered in this document is April-June 1996. This work was performed under Work Breakdown Structure 1.4.12.2.3.04 (Activity Data Sheet 8304). Publication of this document meets the FFA Appendix E milestone in which a quarterly activities report is required no later than 30 days following the end of the applicable reporting period. This document provides information about ER Program activities conducted on the Oak Ridge Reservation under the FFA. Specifically, it includes information on milestones selected for completion during the reporting period as well as scheduled for completion during the next reporting period (quarter), accomplishments of the ER Program, concerns related to program work, and scheduled activities for the next quarter. It also provides a listing of the identity and assigned tasks of contractors performing ER Program work under the FFA.

1293 V18/023963

Oak Ridge Reservation Federal Facility Agreement Quarterly Report for the Environmental Management Program: Volume 2 - January-March 1997

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; U.S. Department of Energy, Washington, DC

DOE/OR/01-1565/V2; 90 pp. (April 1997)

This quarterly progress report satisfies requirements for the

Environmental Management (EM) Program specified in the Oak Ridge Reservation (ORR) Federal Facility Agreement (FFA) established between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation (TDEC). The reporting period covered herein is January through March 1997. Sections 1.1 and 1.2 provide, respectively, the milestones scheduled for completion during the reporting period and a list of documents that have been proposed for transmittal during the following quarter but have not been approved as FY 1997 commitments.

1294

V18/022341

**Oak Ridge Reservation Federal Facility Agreement
Quarterly Report for the Environmental Restoration
Program: Volume 4 - July-September 1996**

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN
DOE/OR/01-1441/V4; 85 pp. (October 1996)

This quarterly progress report satisfies requirements for the Environmental Restoration (ER) Program that are specified in the Oak Ridge Reservation (ORR) Federal Facility Agreement (FFA) established between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation (TDEC). The reporting period covered herein is July through September 1996 [fourth quarter of fiscal year (FY) 1996]. Sections 1.1 and 1.2 provide, respectively, the milestones scheduled for completion during the reporting period and a list of documents that have been proposed for transmittal during the following quarter but have not been approved as FY 1997 commitments.

1295

V18/025010

**Oak Ridge Reservation Federal Facility Agreement
Quarterly Report for the Environmental Restoration
Program: Volume 2 - January-March 1995**

Martin Marietta Energy Systems, Inc., Environmental
Restoration Program, Oak Ridge, TN
DOE/OR/01-1347/V2; 51 pp. (April 1995)

This quarterly progress report satisfies requirements for the Environmental Restoration (ER) Program that specified in the Oak Ridge Reservation (ORR) Federal Facility Agreement (FFA) established between the U.S. Department of Energy and Conservation (TDEC). The reporting period covered herein is January through March 1995 (second quarter of FY 1995). Sections 1.1 and 1.2 provide respectively the milestones scheduled for completion during the reporting period and a list of documents that have been proposed for transmittal during the following quarter but have not been approved as FY 1995 commitments.

1296

V18/025011

**Oak Ridge Reservation Federal Facility Agreement
Quarterly Report for the Environmental Restoration
Program: Volume 3 - April-June 1995**

Lockheed Martin Energy Systems, Inc., Environmental
Restoration Division, Oak Ridge, TN
DOE/OR/01-1347/V3; 52 pp. (July 1995)

This quarterly progress report satisfies requirements for the

Environmental Restoration (ER) Program that are specified in the Oak Ridge Reservation (ORR) Federal Facility Agreement (FFA) established between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation (TDEC). The reporting period covered herein is April through June 1995 (third quarter of FY 1995). Sections 1.1 and 1.2 provide respectively the milestones scheduled for completion during the reporting period and a list of documents that have been proposed for transmittal during the following quarter have not been approved as FY 1995 commitments.

1297

V18/022738

Oak Ridge Strategy Accelerates Cleanup

Garland, S.B., II.; Boston, H.L.

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous
Waste Management, Proceedings of an International Topical
Meeting, Seattle, WA, August 18-23, 1996. American Nuclear
Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 836-843) (1996)

The strategy of the Oak Ridge Reservation Environmental Restoration Program is to accelerate the transition from characterization to remediation by making decisions at the watershed scale based on recommended land uses and historical data. Since the primary means of contaminant transport is via shallow groundwater to surface water, grouping contaminated sites by watersheds for characterization, decision-making, and remediation allows consistency and appropriateness in remedy selection. It also results in cost and schedule savings.

1298

V18/021078

**Preliminary Assessment of the Ecological Risks to
Wide-Ranging Wildlife Species on the Oak Ridge
Reservation - 1996 Update**

Sample, B.E.; Hinzman, R.L.; Jackson, B.L.; Baron, L.A.
Oak Ridge National Laboratory, Oak Ridge, TN
DOE/OR/01-1407&D2; 225 pp. (September 1996)

This document provides the Environmental Restoration Program with a preliminary evaluation of the ecological risks that contaminants on the Oak Ridge Reservation present to selected wide-ranging species. The reservation-wide ecological risk assessment is intended to serve several purposes, including identifying (1) which endpoints are significantly at risk, (2) which contaminants are responsible for this risk, and (3) which operable units (OUs) significantly contribute to risk. To address these issues, this report contains the following information: an evaluation of the potential use of OUs by 57 endpoint species; a preliminary ranking of OUs according to those that may present the greatest ecological risk; a preliminary assessment of risks to selected piscivorous wildlife; a preliminary assessment of risks to selected vermivorous, herbivorous, and predatory wildlife; and, a proposed revision schedule. These results will aid in the understanding of the magnitude of ecological risks to populations at larger spatial scales and will assist in the prioritization of source operable units for investigation and remediation.

1299 V18/022365

Public Involvement Plan for the Oak Ridge Reservation [D1]

Science Applications International Corporation, Oak Ridge, TN; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN
DOE/OR/01-1552&D1; 30 pp. (January 1997)

This plan was prepared in accordance with requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for establishing plans for Community Relations activities. Publication of this document meets a Federal Facility Agreement milestone of January 15, 1997. This document is an annual update of public involvement activities on the Oak Ridge Reservation. This document includes information on how the U.S. Department of Energy - Oak Ridge Operations Office prepares and executes Environmental Management community relations activities.

1300 V18/020998

Public Involvement Plan for the Oak Ridge Reservation [D3]

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

DOE/OR/01-1445&D3; 35 pp. (August 1996)

This Public Involvement Plan (the Plan) was prepared in accordance with requirements of CERCLA for writing community relations plans. This document includes information on how the DOE Oak Ridge Operations Office prepares and executes Environmental Management community relations activities. This plan is a user's guide to the public for getting involved in DOE environmental decisions, in Oak Ridge, Tennessee. The Plan focuses on DOE's Environmental Management public involvement activities. Appendices describe environmental management in Oak Ridge, community and regional overview, key laws, agreements and policy, and, principal contacts. The report is geared to public consumption and to encouraging public participation.

1301 V18/022287

Remediation Effectiveness Report for the U.S. Department of Energy, Oak Ridge Reservation, Oak Ridge, Tennessee

Lockheed Martin Energy Systems, Inc., Oak Ridge, TN
DOE/OR/01-1492&D1; 80 pp. (August 1996)

The Remediation Effectiveness Report (RER) is a Federal Facility Agreement deliverable and provides a comparison of pre- and post-remediation conditions at completed Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) action sites on the Oak Ridge Reservation (ORR). The RER will be updated on an annual basis to add new facilities and document the effectiveness of post-remedial activities. The focus of this RER is on the evaluation of the effectiveness of the remedial action (RA) systems at achieving: (1) the stated goals for the selected remedy as defined in the Record of Decision/Action Memorandum; and (2) secondary goals established as a result of the implementation of the actions. Monitoring data for each site is

available on the Oak Ridge Environmental Information System.

1302 V18/025512

Seismic Reflection Processing for Characterization of a Hazardous Waste Site

Liu, Z.M.; Doll, W.E.

University of Oklahoma, School of Geology and Geophysics, Norman, OK; Oak Ridge National Laboratory, Oak Ridge, TN

CONF-970344; SAGEEP '97, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Tenth Annual Symposium on the Application of Geophysics to Environmental and Engineering Problems, Reno, NV, March 23-26, 1997. Environmental and Engineering Geophysical Society, Wheat Ridge, CO; (9 pp.) (1997)

Seismic reflection data have been acquired by the Kansas Geological Survey near the Oak Ridge K-25 Plant on the Oak Ridge Reservation, Tennessee, to assist in the selection of groundwater monitoring well locations. The data were recorded in uncorrelated format to allow flexibility in enhancement of stacked images. During the summer of 1996, five of the thirteen seismic reflection lines acquired were processed. An unconventional correlation procedure, "Vibroseis Whitening" (VSW) has been applied to produce improved seismic sections. Refraction statics corrections, which remove the detrimental effect of an irregular weathered layer, have also been utilized to improve the seismic sections. The seismic data were stacked using the velocities obtained from a standard semblance velocity analysis tool. Locations and orientations of faults or fault zones can be interpreted from these stacked sections, and they are in agreement with the interpretations of the surface mapping in the area. This paper concludes that VSW and refraction statics can be important to near-surface swept source seismic data processing.

1303 V18/022388

Standard Process for the Roles and Responsibilities for Facility Reuse of DOE Oak Ridge Reservation Facilities

Loebl, A.S.; Trost, D.G.; Pastel, J.A.; Payne, S.G.; Fleenor, R.M.

Oak Ridge K-25 Site, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN
K/EMEF-12; 20 pp. (April 30, 1996)

The purpose of this report is to provide an understanding of the standard process for the lease or sale of facilities, equipment, and real property for the Oak Ridge Reservation (ORR). The objective of this process is to facilitate the reindustrialization of the ORR for the Department of Energy (DOE). The roles and responsibilities in this standard, as defined in the attached narrative and flow diagrams, were agreed upon among various representatives from the DOE-Oak Ridge Operations Office (DOE-ORO), Lockheed Martin Energy Systems, Inc. (LMES), and the Community Reuse Organization of East Tennessee (CROET).

1304 V18/020848

Survey of Protected Terrestrial Vertebrates on the Oak Ridge Reservation: Final Report [Rev. 1]

Mitchell, J.M.; Vail, E.R.; Webb, J.W.; Evans, J.W.; King,

A.L.; Hamlett, P.A.

Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN
ES/ER/TM-188/R1; 60 pp. (July 1996)

This document is the final report of protected terrestrial vertebrates on the Oak Ridge Reservation (ORR) conducted from October 1994 through May 1996. The surveys were undertaken to gain information that could help prevent or minimize the potential impacts of projects on the ORR to species listed by the state or federal government as endangered, threatened, or in need of management; federal species of concern were also included. The results of the survey will assist in the effective management of the natural resources of the ORR.

1305

V18/020986

Survey of Protected Vascular Plants on the Oak Ridge Reservation, Oak Ridge, Tennessee

Awl, D.J.; Pounds, L.R.; Rosensteel, B.A.; King, A.L.; Hamlett, P.A.

Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN
ES/ER/TM-194; 150 pp. (June 1996)

Vascular plant surveys were initiated during fiscal year 1992 by the environmentally sensitive areas program to determine the baseline condition of threatened and endangered (T&E) vascular plant species on the Oak Ridge Reservation (ORR). T&E species receive protection under federal and state regulations. In addition, the National Environmental Policy Act (NEPA) requires that federally-funded projects avoid or mitigate impacts to listed species. T&E plant species found on or near the U.S. Department of Energy's (DOE) Oak Ridge Reservation (ORR) are identified. Twenty-eight species identified on the ORR are listed by the Tennessee Department of Environment and Conservation as either endangered, threatened, or of special concern. Four of these have been under review by the U.S. Fish and Wildlife Service for possible listing (listed in the formerly-used C2 candidate category). Additional species listed by the state occur near and may be present on the ORR. A range of habitats support the rare taxa on the ORR: river bluffs, sinkholes, calcareous barrens, wetlands, utility corridors, and forests. The list of T&E plant species and their locations on the ORR should be considered provisional because the entire ORR has not been surveyed, and state and federal status of all species continues to be updated. The purpose of this document is to present information on the listed T&E plant species currently known to occur on the ORR as well as listed species potentially occurring on the ORR based on geographic range and habitat availability. For the purpose of this report, "T&E species" include all federal- and state-listed species, including candidates for listing, and species of special concern. For project planning purposes, this report is most useful in alerting planners and site managers that T&E species are known to exist in certain areas. Consideration of T&E plant habitats is an important component of resource management and land-use planning; protection of rare species in their natural habitats is the best method of ensuring their long-term survival.

1306

V18/022361

Terrestrial Habitat Mapping of the Oak Ridge

Reservation: 1996 Summary

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN
ES/ER/TM-201; 30 pp. (September 1996)

The U.S. Department of Energy is in the process of remediating historical contamination on the Oak Ridge Reservation (ORR). Two key components of the environmental restoration program are ecological risk assessment and monitoring to assure that cleanup goals are met. In 1994, a strategy was developed for implementation of ecological risk assessment on the ORR, and a specific program was initiated to implement this strategy for the terrestrial biota of the entire ORR. This program consists of three primary tasks: (1) development of a habitat map and habitat models for key species of interest; (2) preparation of an ecological risk assessment for the entire ORR, and (3) collection of data needed to support the ecological risk assessment and to provide a baseline against which to assess the effects of remedial actions.

1307

V18/025016

Treatment Plan for Aqueous/Organic/Decontamination Wastes Under the Oak Ridge Reservation FFCA Development, Demonstration, Testing, and Evaluation Program

Backus, P.M.; Benson, C.E.; Gilbert, V.P.

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/TM-12750; 45 pp. (August 1994)

The U.S. Department of Energy (DOE) Oak Ridge Operations Office and the U.S. Environmental Protection Agency (EPA) - Region IV have entered into a Federal Facility Compliance Agreement (FFCA) which seeks to facilitate the treatment of low-level mixed wastes currently stored at the Oak Ridge Reservation (ORR) in violation of the Resource Conservation and Recovery Act Land Disposal Restrictions. The FFCA establishes schedules for DOE to identify treatment for wastes, referred to as Appendix B wastes, that currently have no identified or existing capacity for treatment. A treatment methods plan which documents the evaluation and selection of appropriate treatment methods as well as the location and schedule for the waste treatment must be submitted to EPA by March 1995. A development, demonstration, testing, and evaluation (DDT&E) program was established to provide the support necessary to identify treatment methods for mixed waste meeting the Appendix B criteria. The Program has assembled project teams to address treatment development needs for major categories of the Appendix B wastes based on the waste characteristics and possible treatment technologies. The Aqueous, Organic, and Decontamination (A/O/D) project team was established to identify pretreatment options for aqueous and organic wastes which will render the waste acceptable for treatment in existing waste treatment facilities and to identify the processes to decontaminate heterogeneous debris waste. In addition, the project must also address the treatment of secondary waste generated by other DDT&E projects. This report details the activities to be performed under the A/O/D Project in support of the identification, selection, and evaluation of treatment processes. The goals of this plan are to: (1) determine the major aqueous and organic waste streams requiring treatment, (2) determine the treatment steps necessary to make the aqueous and organic wastes acceptable for

treatment in existing treatment facilities on the ORR or off-site, and (3) determine the processes necessary to decontaminate heterogeneous wastes that are considered debris.

1308 V18/020988

Gamma Radiological Surveys of the Oak Ridge Reservation, Paducah Gaseous Diffusion Plant, and Portsmouth Gaseous Diffusion Plant, 1990-93, and Overview of Data Processing and Analysis by the Environmental Restoration Remote Sensing Program, Fiscal Year 1995

Smyre, J.L.; Moll, B.W.; King, A.L.

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; Oak Ridge National Laboratory, Computational Physics and Engineering Division, Oak Ridge, TN

ES/ER/TM-173; 30 pp. (June 1996)

Three gamma radiological surveys have been conducted under auspices of the ER Remote Sensing Program: (1) Oak Ridge Reservation (ORR) (1992), (2) Clinch River (1992), and (3) Portsmouth Gaseous Diffusion Plant (PORTS) (1993). In addition, the Remote Sensing Program has acquired the results of earlier surveys at Paducah Gaseous Diffusion Plant (PGDP) (1990) and PORTS (1990). These radiological surveys provide data for characterization and long-term monitoring of U.S. Department of Energy (DOE) contamination areas since many of the radioactive materials processed or handled on the ORR, PGDP, and PORTS are direct gamma radiation emitters or have gamma emitting daughter radionuclides. High resolution airborne gamma radiation surveys require a helicopter outfitted with one or two detector pods, a computer-based data acquisition system, and an accurate navigational positioning system for relating collected data to ground location. Sensors measure the ground-level gamma energy spectrum in the 38 to 3,026 KeV range. Analysis can provide gamma emission strength in counts per second for either gross or total man-made gamma emissions. Gross count gamma radiation includes natural background radiation from terrestrial sources (radionuclides present in small amounts in the earth's soil and bedrock), from radon gas, and from cosmic rays from outer space as well as radiation from man-made radionuclides. Man-made count gamma data include only the portion of the gross count that can be directly attributed to gamma rays from man-made radionuclides. Interpretation of the gamma energy spectra can make possible the determination of which specific radioisotopes contribute to the observed man-made gamma radiation, either as direct or as indirect (i.e., daughter) gamma energy from specific radionuclides (e.g., cesium-137, cobalt-60, uranium-238).

1309 V18/024238

Fiscal Year 1995 Well Installation Program Summary Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

Y/SUB-95-99069C(Y24)/1; 205 pp. (September 1995)

This report summarizes the well installation activities conducted during the federal fiscal year (FY) 1995 drilling program at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee (including activities that

were performed in late FY 1994, but not included in the FY 1994 Well Installation Program Summary Report). Synopses of monitoring well construction/well development data, well location rationale, geological/hydrological observations, quality assurance/quality control methods, and health and safety monitoring are included. Three groundwater monitoring wells and two gas monitoring probes were installed during the FY 1995 drilling program. One of the groundwater monitoring wells was installed at Landfill VI, the other two in the Boneyard/Burnyard area. All of the groundwater monitoring wells were constructed with stainless steel screens and casings. The two gas monitoring probes were installed at the Centralized Sanitary Landfill II and were of polyvinyl chloride (PVC) screened construction. Eleven well rehabilitation/redevelopment efforts were undertaken during FY 1995 at the Y-12 Plant. All new monitoring wells and wells targeted for redevelopment were developed by either a 2.0-in. diameter swab rig or by hand bailing until nonspecific parameters (pH and specific conductance) attained steady-state levels. Turbidity levels were lowered, if required, to the extent practicable by continued development beyond a steady-state level of pH and conductance.

1310 V18/024242

Fiscal Year 1995 Well Plugging and Abandonment Program Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

Y/SUB-95-99069C(Y24)/2; 417 pp. (September 1995)

This report is a synopsis of the progress of the well plugging and abandonment program at the Y-12 Plant, Oak Ridge, Tennessee, from September 1994 through August 1995. A total of 67 wells, piezometers, and borings were plugged and abandoned during the period of time covered in this report. A well or boring was plugged and abandoned if: (1) its construction did not meet current standards (substandard construction); (2) it was irreparably damaged or had deteriorated beyond practical repair; (3) its location interfered with or otherwise impeded site operations, construction, or closure activities; or (4) special circumstances existed as defined on a case-by-case basis and approved by the Y-12 Plant Groundwater Protection Program (GWPP) Manager. This summary report contains: general geologic setting of the Y-12 Plant and vicinity; discussion of well plugging and abandonment methods, grouting procedures, and waste management practices (a Waste Management Plan for Drilling Activities is included in Appendix C); summaries of plugging and abandonment activities at each site; and quality assurance/quality control (QA/QC) and health and safety protocols used during the FY 1995 Plugging and Abandonment Program.

1311 V18/024241

Interpretation of Well Hydrographs in the Karstic Maynardville Limestone at the Oak Ridge Y-12 Plant

Shevenell, L.A.; McMaster, B.W.

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/SUB/96-SP912V/1; 138 pp. (June 1996)

The Maynardville Limestone in Oak Ridge, Tennessee underlies the southern portion of Bear Creek Valley (BCV), and is considered to be the primary pathway for groundwater leaving the Y-12 Plant boundaries. Sixty-seven percent of all wells drilled into the

Maynardville Limestone have intersected at least one cavity, suggesting karst features may be encountered throughout the shallow (less than 200 ft) portions of the Limestone. Because waste facilities at the Y-12 Plant are located adjacent to the Maynardville Limestone, contaminants could enter the karst aquifer and be transported in the conduit system. As part of an overall hydrologic characterization effort of this karst aquifer, 41 wells in the Maynardville Limestone were instrumented with pressure transducers to monitor water level changes (hydrographs) associated with rain events. Wells at depths between approximately 20 and 750 ft were monitored over the course of at least two storms in order that variations with depth could be identified. The wells selected were not exclusively completed in cavities but were selected to include the broad range of hydrologic conditions present in the Maynardville Limestone. Cavities, fractures and diffuse flow zones were measured at a variety of depths. The water level data from the storms are used to identify areas of quickflow versus slower flowing water zones. The data are also used to estimate specific yields and continuum transmissivities in different portions of the aquifer.

1312 V18/025516

Monitoring Well Inspection and Maintenance Plan Y-12 Plant, Oak Ridge, Tennessee (Revised)

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/TS-1215; 88 pp. (September 1996)

Inspection and maintenance of groundwater monitoring wells is a primary element of the Oak Ridge Y-12 Plant Groundwater Protection Program (GWPP). This document is the revised groundwater monitoring well inspection and maintenance plan for the U.S. Department of Energy (DOE) Y-12 Plant in Oak Ridge, Tennessee. The plan provides a systematic program for: (1) inspecting the physical condition of monitoring wells at the Y-12 Plant and (2) identifying maintenance needs that will extend the life of each well and ensure that representative groundwater quality samples and hydrologic data are collected from the wells. Original documentation for the Y-12 Plant GWPP monitoring well inspection and maintenance program was provided in a separate document. The original revision of the plan specified that only a Monitoring Well Inspection/Maintenance Summary need be updated and reissued each year. Rapid growth of the monitoring well network and changing regulatory requirements have resulted in constant changes to the status of wells (active or inactive) listed on the Monitoring Well Inspection/Maintenance Summary. As a result, a new mechanism to track the status of monitoring wells has been developed, and the plan revised to formalize the new business practices.

1313 V18/024014

Oak Ridge Y-12 Plant Groundwater Protection Program Management Plan

AJA Technical Services, Inc., Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/SUB/96-KDS15V/1; 88 pp. (June 1996)

The Oak Ridge Y-12 Plant (Y-12 Plant) is owned and operated by the United States Department of Energy (DOE) and managed by Lockheed Martin Energy Systems, Inc., (Energy Systems) under contract DE-AC05-84OR21400. The Y-12 Plant Groundwater

Protection Program (GWPP), which was initiated in 1975, provides for the protection of groundwater resources consistent with Federal, State, and local regulations, and in accordance with DOE orders and Energy Systems policies and procedures. This document provides formal structure to the GWPP to ensure internal consistency and ease of external review. The plan meets the requirements for a Groundwater Protection Management Program and an Groundwater Monitoring Plan as described in DOE Order 5400.1, and provides the principal tool for effective overall management of the GWPP.

1314 V18/024239

Results of Calendar Year 1995 Well Inspection and Maintenance Program Y-12 Plant, Oak Ridge, Tennessee

McMaster, B.W.

University of Tennessee, Department of Civil Engineering, Knoxville, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/TS-1538; 359 pp. (July 1996)

This document is a compendium of results of the 1995 Monitor Well Inspection and Maintenance Program at the US Department of Energy's Oak Ridge Y-12 Plant. This report documents the work relating to well inspections and maintenance requests. Inspections are implemented in order to better assess the condition and maintenance needs of wells that are actively being monitored. Currently this approach calls for inspecting all wells on a routine (annual or triennial) basis which are: (1) in an active sampling program; (2) included in a hydrologic study; or (3) not in service, but not scheduled for plugging and abandonment. Routine inspections help to ensure that representative groundwater samples and hydrologic data are being collected, and contribute to the effective longevity of each well. This report formally presents well inspection and maintenance activities that were conducted at the Y-12 Plant from August through December 1995.

1315 V18/022997

Amarillo National Resource Center for Plutonium: Quarterly Technical Progress Report - August 1, 1996-October 31, 1996

Amarillo National Resource Center for Plutonium, Amarillo, TX

DOE/AL/85832-T11; 171 pp. (November 26, 1996)

This report from the Amarillo National Resource Center for Plutonium describes progress in the following areas: electronic resource library; the senior technical review group; environment, health, and safety and remedial action activities; communications, education, and training; and plutonium and other materials.

1316 V18/021530

Draft Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components: Volume I - Main Report

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM

DOE/EIS-0225-D (Vol. 1); 579 pp. (March 1996)

As a successor agency to the Atomic Energy Commission, the Department of Energy (DOE) is required by the Atomic Energy Act of 1954, as amended, to provide for the safety and reliability of the Nation's nuclear weapon stockpile. Through Presidential direction and Congressional authorization and appropriation, the Department is given certain nuclear weapon stockpile requirements for the current and future years. These requirements relate to the development, production, assembly, disassembly, safety, reliability, and effectiveness of the Nation's nuclear weapons. Pantex Plant, northeast of Amarillo, Texas, is where DOE fulfills many of its responsibilities regarding the production of high explosives (HE) components for nuclear weapons; assembly, modification, and disassembly of nuclear weapons; and maintenance and monitoring of the nuclear weapon stockpile. This draft environmental impact statement describes the impacts from continued operations at the Pantex Plant as well as the other alternatives.

1317 V18/025515

They're Not Going to Come to You: Public Involvement in the Pantex Plant EIS

Knapp, K.

Mason and Hanger-Silas Mason Company, Inc., Amarillo, TX

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1665-1667) (1996)

The entire approach to public involvement for the Pantex Site-Wide Environmental Impact Statement (EIS) centered around two ideas: being proactive and being innovative. Traditional public involvement methods were discarded to bring new life and, hopefully, new interest in Public Participation. These new ideas were bold and strayed far from the traditional approach federal agencies have historically taken. The stakeholders have accepted the changes with enthusiasm, and results have been favorable. The goal was, and continues to be, to go where the people are and to make information available to the Public that is understandable, timely, and accurate. Plant management has carefully combined electronic print media, and public information sessions, speakers bureau activities, employee public speaking and media training, and media seminars to form a comprehensive program to bring the Pantex EIS message to the stakeholders. The starting point was the preparation and implementation of the Stakeholder Involvement Plan (SIP). The SIP was flexible, and designed to accommodate all levels of interest, describing a variety of activities and information sources, and enabling stakeholders to be involved according to their interests and availability. Stakeholders are able to increase or decrease their participation over the EIS period and have both formal and informal opportunities to suggest how EIS materials and activities can be more useful to them.

1318 V18/024257

Remedial Action Report for Monticello, Utah: Vicinity Properties National Priority List Site - Operable Unit A
MACTEC Environmental Remediation Restoration Services LLC, Grand Junction, CO

GJO-96-1-TAR; GJO-MRAP-28; 49 pp. (January 1997)

Uranium and vanadium milling activities were conducted by and for the US Atomic Energy Commission in Monticello, Utah, between 1942 and 1959, which resulted in the production of mill tailings containing radioactive materials. The tailings were wind blown and used to a limited extent for construction purposes in the Monticello area. In 1984, the US Department of Energy Grand Junction Office implemented the Monticello Vicinity Properties Project to isolate tailings-related sources from the environment and thereby prevent them from causing harm to human health or the environment. Remedial action is complete at Operable Unit A of the Monticello Vicinity Properties Project, which consists of 104 properties within the city limits of Monticello, Utah. These properties have been reconstructed and, pending the outcome of possible postconstruction activities on six properties, can be recommended for certification of conformance to project guidelines.

1319 V18/021816

Careful Where You Dig at Former Nuclear Weapons Site

Kelly, D.S.; Nawarynsky, D.A.

Westinghouse Hanford Company, Richland, WA; ICF Kaiser Hanford Company, Richland, WA

Pacific Builder & Engineer (July 8, 1996):3-6 (July 8, 1996)

The U.S. Department of Energy Hanford Site in southeast Washington is an excavator's nightmare. It's one of the country's oldest nuclear sites, with facilities that were built in the rush to win World War II and the decades-long arms race that followed. In 1989 when the Cold War ended, Hanford began its metamorphosis from a top-secret defense site to the nation's largest and most complex nuclear waste cleanup project. National defense urgency, combined with past environmental and as-built standards, had left a legacy of chemical discharges and semi-hidden utilities. Also, the cleanup mission included a new interest in privatization and outsourcing for engineering and services. This brought an influx of new contractors and personnel with no Hanford Site work experience. Along with the surge of cleanup activity came the realization that the locations of underground hazards identified on as-built drawings were approximate at best. The consequences of digging in the wrong place can be severe. A series of excavation-related events, including a near-miss in which a buried 13.8 kilovolt cable was severed, caused Hanford Site contractors to re-examine their excavation safety practices. As part of the hazardous waste cleanup effort, federal and state regulators agreed on the types and timing of the work. Strict schedules and budgets had to be maintained because of penalties associated with missing legally enforceable milestones. Strategies had to be developed for locating, identifying and documenting the underground hazards.

1320 V18/023032

Decision Process for Hanford Sitewide Groundwater Remediation

Chiaromonte, G.R.

Bechtel Hanford, Inc., Richland, WA

BHI-00455; 29 pp. (June 1996)

This document describes a decision process for planning future

investigations and remediating contaminated groundwater at the Hanford Site in Richland, Washington. This decision process details the following: identifies key decisions and activities; defines the criteria used in making each decision; and defines the logic that links the decisions and the activities in a stepwise manner.

1321

V18/023551

Development of Surface Barriers at the Hanford Site

Wing, N.R.; Gee, G.W.

IT Hanford, Inc., Richland, WA; Pacific Northwest Laboratory, Richland, WA

CONF-941124; *Insitu Remediation: Scientific Basis for Current and Future Technologies*, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 427-440) (1994)

Engineered barriers are being developed to isolate wastes disposed of near the earth's surface at the Hanford Site in Richland, Washington. The isolation barriers use engineered layers of natural materials to create an integrated structure with redundant protective features. For example, current designs incorporate a capillary barrier as well as a low-permeability asphalt component. The natural construction materials (e.g., fine soil, sand, gravel, riprap, asphalt) have been selected to optimize barrier performance and for longevity. The objective of current designs is to use natural materials to develop a maintenance-free surface barrier that isolates wastes for a minimum of 1000 yr by limiting water drainage to near-zero amounts; reducing the likelihood of plant, animal, and human intrusion; controlling the exhalation of noxious gases; and minimizing erosion-related problems. A multiyear barrier development program was organized in 1985 to develop, test, and evaluate the effectiveness of various barrier designs. A team of engineers and scientists from the Pacific Northwest Laboratory (PNL) and Westinghouse Hanford Company (WHC) is directing the barrier development effort. Kaiser Engineers Hanford Company (KEH) has provided design support for barrier-related projects. Most recently, KEH (in conjunction with WHC and PNL) developed the definitive design drawings and construction specifications for a prototype barrier. Construction on the prototype barrier began in late 1993 and was completed in 1994. This presentation will provide an overview of the barrier development work being conducted at the Hanford Site. Highlights of progress made on key tasks and activities will be summarized.

1322

V18/022845

Development of a Risk-Based Approach to Hanford Site Cleanup [August 1996]

Hesser, W.A.; Triplett, M.B.; Honeyman, J.O.

Pacific Northwest National Laboratory, Richland, WA; Westinghouse Hanford Company, Richland, WA

CONF-960804 (Vol. 3); *Spectrum '96: Nuclear and Hazardous Waste Management*, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 2189-2194) (1996)

In response to a request from Mr. Thomas Grumbly, Assistant

Secretary of Energy for Environmental Management, the Hanford Site contractors developed a set of risk-based cleanup strategies that: (1) protect the public, workers, and environment from unacceptable risks; (2) are executable technically; and (3) fit within currently expected annual funding profiles. These strategies were developed because: (1) the U.S. Department of Energy and Hanford Site budgets are being reduced, (2) stakeholders are dissatisfied with the perceived rate of cleanup, (3) the U.S. Congress and the U.S. Department of Energy are increasingly focusing on risk and risk-reduction activities, (4) the present strategy is not integrated across the Site and is inconsistent in its treatment of similar hazards, (5) the present cleanup strategy is not cost-effective from a risk-reduction or future land use perspective, and (6) the milestones and activities in the Tri-Party Agreement cannot be achieved with an anticipated funding of 1.05 billion dollars, or less, annually. This analysis produced a framework and a set of tools that are available for dealing with changes to anticipated funding levels, changes in risk cleanup standards, and Congressional initiatives and inquiries. The tools include land-supply curves, cost profiles, risk profiles, mortgage-reduction curves, and minimum operations costs. This paper describes the methodology used to develop mortgage-based, risk-based, and land-based cleanup strategies and how those strategies differ in terms of the work to be performed, its sequence, and the resulting end states.

1323

V18/021027

Development of a Risk-Based Approach to Hanford Site Cleanup [February 1996]

Hesser, W.A.; Triplett, M.B.; Honeyman, J.O.

Pacific Northwest National Laboratory, Richland, WA; Westinghouse Hanford Company, Richland, WA

CONF-960212; *Waste Management '96: Working Towards a Cleaner Environment*, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (13 pp.) (1996)

In response to a request from Mr. Thomas Grumbly, Assistant Secretary of Energy for Environmental Management, the Hanford Site contractors developed a set of risk-based cleanup strategies that: (1) protect the public, workers, and environment from unacceptable risks; (2) are executable technically; and (3) fit within currently expected annual funding profile. These strategies were developed because: (1) the U.S. Department of Energy and Hanford Site budgets are being reduced, (2) stakeholders are dissatisfied with the perceived rate of cleanup, (3) the U.S. Congress and the U.S. Department of Energy are increasingly focusing on risk and risk-reduction activities, (4) the present strategy is not integrated across the Site and is inconsistent in its treatment of similar hazards, (5) the present cleanup strategy is not cost-effective from a risk-reduction or future land use perspective, and (6) the milestones and activities in the Tri-Party Agreement cannot be achieved with an anticipated funding of 1.05 billion dollars, or less annually. The risk-based strategies described in this paper were developed through a systems analysis approach that: (1) analyzed the cleanup mission; (2) identified cleanup objectives, including risk reduction, land use, and mortgage reduction; (3) analyzed the existing baseline cleanup strategy from a cost and risk perspective; (4) developed alternatives for accomplishing the cleanup mission; (5) compared those alternatives against cleanup objectives; and (6)

produced conclusions and recommendations regarding the current strategy and potential risk-based strategies. This analysis produced a framework and a set of tools that are available for dealing with changes to anticipated funding levels, changes in risk cleanup standards, and Congressional initiatives and inquires. The tools include land-supply curves, cost profiles, risk profiles, mortgage-reduction curves, and minimum operations costs. This paper describes the methodology used to develop mortgage-based, risk-based, and land-based cleanup strategies and how these strategies differ in terms of the work to be performed, its sequence, and the resulting end states. Some of the principal findings are: (1) A 50 percent reduction in the cost of cleanup must be immediately achieved and sustained to meet existing commitments and schedules with the project budget. This reduction would require significant savings from some combination of privatization, productivity enhancements, and regulatory relief. (2) The Hanford Site committed, nondiscretionary costs necessary to maintain safe operations are estimated to be 500 to 700 million dollars annually. (3) The value of alternative future land uses should be balanced against the cost required to achieve the cleanup levels necessary to enable those uses. Achieving unrestricted use of all Hanford Site land is not economically feasible given the expected annual funding profile of \$1.05 billion (or less) and the limitations of cleanup technology. (4) Four decisions are critical to any risk-based strategy due to their huge costs and risk implications. These decisions are: (1) retrieval/treatment versus in-place disposal of tank waste, (2) retrieval/treatment versus in-place disposal of solid waste, (3) entombment versus removal of major facilities and reactors, and (4) treatment and restoration versus restricted access to groundwater. The innovative methodology developed in this paper has considerable merit and is recommended for use in development of a Complex-wide cleanup strategy. Hanford managers are applying the results, especially in guidance to contractors for prioritizing the FY96 multi-year program plans and in taking new positions on key decisions, such as cleaning up to less-than-residential standards and treating waste in place instead of retrieving it.

1324 V18/022149

Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan, Summary

U.S. Department of Energy, Washington, DC
DOE/EIS-0222D (Summary); 47 pp. (August 1996)

This document analyzes the potential environmental impacts associated with establishing future land-use objectives for the US Department of Energy's Hanford Site. Impact analysis is performed by examining the consequences (primarily from remediation activities) of the actions determined necessary to achieve a desired future land-use objective. It should be noted that site-specific decisions regarding remediation technologies and remediation activities would not be made by this document, but rather by processes specified in the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and the Resource Conservation and Recovery Act of 1976. To facilitate the establishment of future land-use objectives, the Hanford Site was divided into four geographic areas: (1) Columbia River; (2) reactors on the river; (3) central plateau; and (4) all other areas. The future land-use alternatives considered in detail for each of the geographic

areas are as follows: Columbia River - unrestricted and restricted; reactors on the river - unrestricted and restricted; central plateau - exclusive; all other areas - restricted. A No-Action Alternative also is included to provide a baseline against which the potential impacts of the proposed actions can be assessed.

1325 V18/022150

Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan: Volume 1

U.S. Department of Energy, Washington, DC
DOE/EIS-0222D (Vol. 1); 601 pp. (August 1996)

This document analyzes the potential environmental impacts associated with establishing future land-use objectives for the US Department of Energy's Hanford Site. Impact analysis is performed by examining the consequences (primarily from remediation activities) of the actions determined necessary to achieve a desired future land-use objective. It should be noted that site-specific decisions regarding remediation technologies and remediation activities would not be made by this document, but rather by processes specified in the Comprehensive Environmental Response, Compensation and Liability Act of 1980 and the Resource Conservation and Recovery Act of 1976. To facilitate the establishment of future land-use objectives, the Hanford Site was divided into four geographic areas: (1) Columbia River; (2) reactors on the river; (3) central plateau; and (4) all other areas. The future land-use alternatives considered in detail for each of the geographic areas are as follows: Columbia River - unrestricted and restricted; reactors on the river - unrestricted and restricted; central plateau - exclusive; all other areas - restricted. A No-Action Alternative also is included to provide a baseline against which the potential impacts of the proposed action can be assessed.

1326 V18/022151

Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan: Volume 3

U.S. Department of Energy, Washington, DC
DOE/EIS-0222D (Vol. 3); 322 pp. (August 1996)

This volume of the Environmental Impact Statement contains ten appendices. These appendices contain the ecological risk assessment methodology and calculations; the strategy for remediation of contaminated groundwater; a description of the reference barrier and potential quarry sites that could be used to supply materials for barriers; the methodology for estimating socio-economic impacts; the methodology for evaluation of air quality impacts; an assessment of costs and physical impacts; the calculation of estimated industrial health and safety occupational losses; a floodplains and wetlands impact assessment; information about Hanford waste sites; and US EPA guidance on using land-use decisions in remediation.

1327 V18/022152

Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan: Volume 4

U.S. Department of Energy, Washington, DC

DOE/EIS-0222D (Vol. 4); 254 pp. (August 1996)

The US Department of Energy (DOE) is preparing this Hanford Site Comprehensive Land Use Plan (Comprehensive Plan), Appendix M to address future land uses for the Hanford Site. The DOE has integrated this land-use planning initiative with the development of the Hanford Remedial Action-Environmental Impact Statement (HRA-EIS) to facilitate and expedite land-use and remediation decision making, reduce time and cost of remediation, and optimize the usefulness of the planning process. The HRA-EIS is being developed to evaluate the potential environmental impacts associated with remediation, create a remedial baseline for the Environmental Restoration Program, and provide a framework for future uses at the Hanford Site. This Comprehensive Plan identifies current assets and resources related to land-use planning, and provides the analysis and recommendations for future land uses and accompanying restrictions at the Hanford Site over a 50-year period. This Comprehensive Plan relies on the analysis of environmental impacts in the HRA-EIS. The National Environmental Policy Act of 1969 (NEPA) Record of Decision (ROD) issued for the HRA-EIS will be the decision process for finalization and adoption of this Comprehensive Plan. The HRA-EIS and this Comprehensive Plan will provide a basis for remediation decisions to be identified and contained in site- and area-specific Comprehensive Environmental Response, Compensation and Liability Act of 1980 ROD.

1328

V18/022153

Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan: Volume 2

U.S. Department of Energy, Washington, DC

DOE/EIS-0222D (Vol. 2); 718 pp. (August 1996)

This appendix discusses the scope of actions addressed in the Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan. To address the purpose and need for agency action identified in Chapter 2.0 of the Hanford Remedial Action-Environmental Impact Statement (HRA-EIS), the scope includes an evaluation of the potential environmental impacts associated with the remedial actions to be conducted by the US Department of Energy (DOE) under the provisions of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement). These remedial actions would bring the Hanford Site into compliance with the applicable requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA). The DOE program responsible for conducting remedial actions at the Hanford Site is referred to as the Richland Environmental Restoration (ER) Project. The Richland ER Project encompasses the following projects: radiation area remedial actions and underground storage tanks (UST); RCRA closures; single-shell tank (SST) closures; past-practice waste site operable unit (source and groundwater) remedial actions; surplus facility decommissioning; and waste storage and disposal facilities.

1329

V18/022161

Electrical Resistivity Tomography at the DOE Hanford

Site

Narbutovskih, S.M.; Halter, T.D.; Sweeney, M.D.; Daily, W.D.; Ramirez, A.L.

Westinghouse Hanford Company, Richland, WA; Lawrence Livermore National Laboratory, Livermore, CA

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 773-782) (1996)

Recent work at the DOE Hanford site has established the potential of applying Electrical Resistivity Tomography (ERT) for early leak detection under hazardous waste storage facilities. Several studies have been concluded to test the capabilities and limitations of ERT for two different applications. First, field experiments have been conducted to determine the utility of ERT to detect and map leaks from underground storage tanks during waste removal processes. Second, the use of ERT for long term vadose zone monitoring has been tested under different field conditions of depth, installation design, acquisition mode/equipment, and infiltration chemistry. This work involves transferring the technology from Lawrence Livermore National Laboratory (LLNL) to the Resource Conservation and Recovery Act (RCRA) program at the DOE Hanford Site. This paper covers field training studies relevant to the second application for long term vadose zone monitoring. Electrical resistivity tomography is a cross-borehole, imaging technique for mapping subsurface resistivity variations. Electrodes are placed at predetermined depths in an array of boreholes. Electrical current is introduced into one electrode pair located in one borehole while the resulting voltage change is detected between electrode pairs in other boreholes similar to a surface dipole-dipole array. These data are tomographically inverted to image temporal resistivity contrasts associated with an infiltration event. Thus a dynamic plume is spatially mapped as a function of time. As a long-term vadose zone monitoring method, different field conditions and performance requirements exist than those for short term tank leak detection. To test ERT under these conditions, two vertical electrode arrays were constructed to a depth of 160 feet with a linear surface array between boreholes.

1330

V18/021531

Environmental Analytical Laboratory Quality Assurance Plan

Stacey, C.

Bechtel Hanford, Inc., Richland, WA

BHL-00635; 42 pp. (December 1995)

The Environmental Analytical Laboratory (EAL) management's policy provides analytical data that meets the requirements of each client. The EAL management provides precise, accurate, and complete documentation that ensures concise understanding of the client's objectives. Management will ensure that facilities, staff, instruments, and documentation are used and maintained to maximize laboratory use and data integrity. This document outlines the organization and Quality Assurance (QA) function, describes and depicts lines of authority, and lists the duties within the organization. It also provides guidance for preparing standard

operating procedures that outline the detailed methods of operations and analyses.

1331 V18/023224

Environmental Monitoring to Assess Contamination at a Nuclear Production Site in the United States

Gray, R.H.

Pacific Northwest Laboratory, Office of Hanford Environment, Richland, WA

CONF-9210194; Proceedings of an International Symposium on Environmental Contamination in Central and Eastern Europe, Budapest, Hungary, October 12-16, 1992, 968 pp.; (pp. 517-519) (1992)

Environmental monitoring has been conducted at the U.S. Department of Energy's Hanford Site for almost 50 years. Concentrations of airborne radionuclides at the Site perimeter, and nonradiological water quality in the Columbia River are in compliance with applicable standards. Radionuclide levels in foodstuffs irrigated with river water taken downstream of the Site, onsite wildlife samples, and soils and vegetation from both onsite and offsite locations are generally attributable to worldwide fallout. The radiological dose potentially received by a hypothetical maximally exposed individual was 0.02 mrem in 1991. The average per capita whole-body effective dose, based on a population of 340,000 living within 80 km of the Site, was less than 0.01 to 0.03 mrem annually from 1985 through 1991. Hanford Site serves as a refuge for plant and animal populations that have been eliminated or reduced on surrounding areas. Chinook salmon continue to spawn in the Hanford Reach of the Columbia River and attract bald eagles; an elk herd, established by immigration in 1972, is increasing; nesting Canada geese, great blue heron, mule deer, and coyotes are common.

1332 V18/020750

Environmental Restoration Contract Radiological Controls Performance Indicator Report for 1st Quarter '96

Shea, K.R.

Bechtel Hanford, Inc., Richland, WA

BHI-00814-01; 16 pp. (May 1996)

This report documents Environmental Restoration Disposal Team performances as measured by selected performance indicators. This report addresses the first quarter of fiscal year 1996 and includes for comparison data from the second, third, and fourth quarters of fiscal year 1995.

1333 V18/023587

Environmental Restoration Contract Radiological Controls Performance Indicator Report for 2nd Quarter 1996

Shea, K.R.; Shockley, V.E.

Bechtel Hanford, Inc., Richland, WA

BHI-00814-02; 14 pp. (October 1996)

This report documents Environmental Restoration Contractor Team performance as measured by selected performance indicators

for the second quarter of Calendar Year 1996 and includes comparison data from the second, third, and fourth quarters of Calendar Year 1995, and first quarter of Calendar Year 1996. The decreasing trend of collective dose indicates the results of effective work planning and extensive dose reduction techniques. Planning of work, especially high dose rate work, has helped reduce collective dose and meet As Low As Reasonably Achievable (ALARA) expectations.

1334 V18/025513

Functional Design Criteria for FY 1993-2000 Groundwater Monitoring Wells

Williams, B.A.

Westinghouse Hanford Company, Richland, WA

WHC-SD-EN-FDC-002 (Rev. 1); 38 pp. (January 1996)

The purpose of this revision is to update the Line Item Project 93-L-GFW-152 Functional Design Criteria (FDC) to reflect changes approved in change control M-24-91-6, Engineering Change Notices (ECNs) and expand the scope to include subsurface investigations along with the borehole drilling. This revision improves the ability and effectiveness of maintaining RCRA and Operational groundwater compliance by combining borehole and well drilling with subsurface data gathering objectives. The total projected number of wells to be installed under this project has decreased from 200 and the scope has been broadened to include additional subsurface investigation activities that usually occur simultaneously with most traditional borehole drilling and monitoring well installations. This includes borehole hydrogeologic characterization activities, and vadose monitoring. These activities are required under RCRA 40 CFR 264 and 265 and WAC 173-303 for site characterization, groundwater and vadose assessment, and well placement.

1335 V18/023624

Groundwater Well Services Site Safety and Health Plan

Tuttle, B.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00830; 31 pp. (August 1996)

This Site Specific Health and Safety Plan covers well servicing in support of the Environmental Restoration Contractor (ERC) Groundwater Project. Well servicing is an important part of environmental restoration activities supporting several pump and treat facilities and assisting in evaluation and servicing of various groundwater wells throughout the Hanford Site. Remediation of contaminated groundwater is a major part of the ERC project. Well services tasks help enhance groundwater extraction/injection as well as maintain groundwater wells for sampling and other hydrologic testing and information gathering.

1336 V18/023552

Hanford Permanent Isolation Barrier Program: Asphalt Technology Development

Freeman, H.D.; Romine, R.A.

Pacific Northwest Laboratory, Richland, WA

CONF-941124; Insitu Remediation: Scientific Basis for Current and

Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 491-505) (1994)

An important component of the Hanford Permanent Isolation Barrier is the use of a two-layer, composite asphalt system, which provides backup water diversion capabilities if the primary capillary barrier fails to meet infiltration goals. Because of asphalt's potential to perform to specification over the 1000-yr, minimum-design-life criterion, a composite asphalt barrier [hot-mix asphalt concrete (HMAC)/fluid-applied, polymer-modified asphalt] is being considered as an alternative to the bentonite clay/high-density polyethylene barriers for the low-permeability component of the Hanford Permanent Isolation Barrier. The feasibility of using asphalt as a long-term barrier is currently being studied. Information that must be known is the ability of asphalt to retain desirable physical properties over a period of at least 1000 yr. This paper presents our approach for performing accelerated aging tests and evaluating the performance of samples under "aged" conditions. The results of these tests will be compared with asphalt artifact analogs and the results of modeling the degradation of the selected asphalt composite to make life-cycle predictions.

1337 V18/023400

Hanford Site Background: Part 2 - Soil Background for Radionuclides

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-12; 71 pp. (September 1996)

This report documents the range of radionuclide background activity that occurs in soils and sediments on the Hanford Site (located in Richland, Washington) and in associated environments. The characterization of background activity in soil and groundwater is an important component in environmental restoration activities, as it can be used to identify contamination, establish cleanup goals, evaluate restoration alternatives, and assess risk and cleanup levels. Background conditions are also useful for establishing pre-operational conditions for new and existing facilities. The sitewide approach has been determined as a technically viable and cost-effective method for evaluating background conditions at the Hanford Site, as opposed to establishing background concentrations at each individual waste unit.

1338 V18/023409

Hanford Site Environmental Report for Calendar Year 1994

Dirkes, R.L.; Hanf, R.W.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (June 1995)

Sections from this report that are within the scope of this database have been indexed separately.

1339 V18/023412

Hanford Site Environmental Report for Calendar Year 1994: Community-Operated Environmental Surveillance Program

Dirkes, R.L.; Hanf, R.W.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 99-100) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the environmental surveillance activities with which citizens living near the Hanford Site have been participating. Local teachers have been managing and operating three special radiological air sampling stations located in Richland, Basin City, and Franklin County, Washington. Other expansion efforts of this program are also described.

1340 V18/023414

Hanford Site Environmental Report for Calendar Year 1994: Compliance Status

Black, D.G.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 21-34) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the activities conducted to ensure that the Hanford Site is in compliance with federal environmental protection statutes and related Washington State and local environmental protection regulations and the status of Hanford's compliance with these requirements. Environmental permits required under the environmental protection regulations are discussed under the applicable statute.

1341 V18/023415

Hanford Site Environmental Report for Calendar Year 1994: Current Issues and Actions

Black, D.G.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 35-46) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the progress that has been made toward achieving full regulatory compliance at the Hanford Site. Ongoing compliance self-assessments, implementation of the Tri-Party Agreement, and public meetings continue to identify environmental compliance issues. These issues are discussed openly with the regulatory agencies and with the public to ensure that all environmental compliance issues are addressed.

1342 V18/023413

Hanford Site Environmental Report for Calendar Year 1994: Environmental Compliance and Cleanup

Black, D.G.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 17-20) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the roles of the principal agencies, organizations, and public in environmental compliance and cleanup of the Hanford Site. Regulatory oversight, the Federal Facility Agreement and Consent Order, the role of Indian tribes, public participation, and CERCLA Natural Resource Damage Assessment Trustee Activities are all discussed.

1343 V18/023416

Hanford Site Environmental Report for Calendar Year 1994: Environmental Occurrences

Black, D.G.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 47-50) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the onsite and offsite releases of radioactive and regulated materials. The specific agencies notified of the releases depended on the type, amount, and location of the individual occurrences. The more significant of these off-normal environmental occurrences are summarized in this section.

1344 V18/023422

Hanford Site Environmental Report for Calendar Year 1994: Introduction to the Hanford Site

Cushing, C.E.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 5-7) (June 1995)

This section of the 1994 Hanford Site Environmental Report discusses the Site mission and provides general information about the site. The U.S. DOE has established a new mission for Hanford including: management of stored wastes, environmental restoration, research and development, and development of new technologies. The Hanford Reservation is located in south central Washington State just north of the confluence of the Snake and Yakima Rivers with the Columbia River. The approximately 1,450 square kilometers which comprises the Hanford Site, with restricted public access, provides a buffer for the smaller areas within the site which have historically been used for the production of nuclear materials, radioactive waste storage, and radioactive waste disposal.

1345 V18/023419

Hanford Site Environmental Report for Calendar Year 1994: Major Operations and Activities

Black, D.G.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 9-12) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the major operations and activities on the site. These operations and activities include site management, waste management, environmental restoration and corrective actions, and research and technology development.

1346 V18/023411

Hanford Site Environmental Report for Calendar Year 1994: Near-Facility Environmental Monitoring

Schmidt, J.W.; Johnson, A.R.; Markes, B.M.; McKinney, S.M.; Perkins, C.J.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 61-80) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the routine near-facility environmental monitoring

programs which are presently being conducted at the Hanford Site. Several types of environmental media are sampled near nuclear facilities to monitor the effectiveness of waste management and restoration activities, and effluent treatment and control practices. These media include air, surface water and springs, surface contamination, soil and vegetation, investigative sampling (which can include wildlife), and external radiation. Sampling and analysis information and analytical results for 1994 for each of these media are summarized in this section. Additional data and more detailed information may be found in Westinghouse Hanford Company Operational Environmental Monitoring Annual Report, Calendar Year 1994.

1347 V18/023410

Hanford Site Environmental Report for Calendar Year 1994: Site Environmental Programs

Schmidt, J.W.; Hanf, R.W.

Pacific Northwest Laboratory, Richland, WA

PNL-10574; 375 pp. (pp. 13-14) (June 1995)

This section of the 1994 Hanford Site Environmental Report summarizes the site environmental programs. Effluent monitoring and environmental surveillance programs monitor for impacts from operations in several areas. The first area consists of the point of possible release into the environment. The second area consists of possible contamination adjacent to DOE facilities, and the third area is the general environment both on and off the site.

1348 V18/020662

Hanford Sitewide Groundwater Flow and Transport Model Calibration Report

Law, A.G.; Panday, S.; Denslow, C.W.; Fecht, K.R.; Knepp, A.J.

Bechtel Hanford, Inc., Richland, WA

BHI-00608; 148 pp. (April 1996)

This report presents the results of the development and calibration of a three-dimensional, finite element model (VAM3DCG) for the unconfined groundwater flow system at the Hanford Site. This flow system is the largest radioactively contaminated groundwater system in the United States. Eleven groundwater plumes have been identified containing organics, inorganics, and radionuclides. Because groundwater from the unconfined groundwater system flows into the Columbia River, the development of a groundwater flow model is essential to the long-term management of these plumes. Cost effective decision making requires the capability to predict the effectiveness of various remediation approaches. Some of the alternatives available to remediate groundwater include: pumping contaminated water from the ground for treatment with reinjection or to other disposal facilities; containment of plumes by means of impermeable walls, physical barriers, and hydraulic control measures; and, in some cases, management of groundwater via planned recharge and withdrawals. Implementation of these methods requires a knowledge of the groundwater flow system and how it responds to remedial actions.

1349 V18/021533

Hanford Sitewide Groundwater Remediation -

Supporting Technical Information

Chiaramonte, G.R.

Bechtel Hanford, Inc., Richland, WA

BHI-00464; 91 pp. (May 1996)

The Hanford Sitewide Groundwater Remediation Strategy was issued in 1995 to establish overall goals for groundwater remediation on the Hanford Site. This strategy is being refined to provide more detailed justification for remediation of specific plumes and to provide a decision process for long-range planning of remediation activities. Supporting this work is a comprehensive modeling study to predict movement of the major site plumes over the next 200 years to help plan the remediation efforts. The information resulting from these studies will be documented in a revision to the Strategy and the Hanford Site Groundwater Protection Management Plan. To support the modeling work and other studies being performed to refine the strategy, this supporting technical information report has been produced to compile all of the relevant technical information collected to date on the Hanford Site groundwater contaminant plumes. The primary information in the report relates to conceptualization of the source terms and available history of groundwater transport, description of the contaminant plumes, rate of movement based on the conceptual model and monitoring data, risk assessment, treatability study information, and current approach for plume remediation.

1350

V18/023404

Hanford Sitewide Groundwater Remediation Strategy: Groundwater Contaminant Predictions

Chiaramonte, G.R.; Denslow, C.W.; Knepp, A.J.; Landon, R.D.; Panday, S.

Bechtel Hanford, Inc., Richland, WA

BHI-00469; 232 pp. (May 1996)

Since the shutdown of the last major operating plants in 1987, the mission of the Hanford Site has changed from nuclear materials production to environmental restoration and waste management. The principal goals of the ongoing cleanup programs include the protection of the Columbia River and control of the spread of groundwater contamination.

1351

V18/025517

Hanford: Nuclear Waste in the USA

Zorpette, G.

Spektrum der Wissenschaft 4:36-42 (April 1997)

The USA must pay billions of dollars for removal and safe storage of the radioactive waste from their nuclear weapons factories. However, at Hanford - a plant with particularly high contamination levels - nobody knows how long it will take to do this or whether it is possible at all. (This document is in German).

1352

V18/022076

Impacts on Health and Safety from Transfer/Consolidation of Nuclear Materials and Hazardous Chemicals

Gallucci, R.H.V.

Pacific Northwest Laboratory, Richland, WA

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 468-473) (1994)

Environmental restoration plans at the U.S. Department of Energy (USDOE) Hanford Site call for transfer/consolidation of "targets/threats," namely nuclear materials and hazardous chemicals. Reductions in the health and safety hazards will depend on the plans implemented. Pacific Northwest Laboratory (PNL) estimated these potential impacts, assuming implementation of the current reference plan and employing ongoing risk and safety analyses. The results indicated the potential for "significant" reductions in health and safety hazards in the long term (greater than 25 years) and a potentially "noteworthy" reduction in health hazard in the short term (less than or equal to 25 years).

1353

V18/023554

Influence of Small-Mammal Burrowing Activity on Water Storage at the Hanford Site

Landeem, D.S.

Westinghouse Hanford Company, Richland, WA

CONF-941124; In situ Remediation: Scientific Basis for Current and Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 523-543) (1994)

This paper summarizes the activities that were conducted in support of long-term surface barrier development program by Westinghouse Hanford Company to determine the degree that small-mammal burrow systems affect the loss or retention of water in the soils at the Hanford Site in Washington state. An animal intrusion lysimeter facility was constructed, consisting of two outer boxes buried at grade, which served as receptacles for six animal intrusion lysimeters. Small burrowing animals common to the Hanford Site were introduced over a 3- to 4-month period. Supplemental precipitation was added monthly to three of the lysimeters with a rainfall simulator ("rainulator"). Information collected from the five tests indicated that: (1) during summer months, water was lost in all the lysimeters, including the supplemental precipitation added with the rainulator; and (2) during winter months, all lysimeters gained water. The data indicate little difference in the amount of water stored between control and animal lysimeters. The overall water loss was attributed to surface evaporation, a process that occurred equally in control and treatment lysimeters. Other causes of water loss are a result of: (1) constant soil turnover and subsequent drying, and (2) burrow ventilation effects. This suggests that burrow systems will not contribute to any significant water storage at depth and, in fact, may enhance the removal of water from the soil.

1354

V18/021202

Integrated Ecological and Human Health Risk Assessments for the U.S. Department of Energy's

Hanford Site

Duke, C.S.; Nazarali, A.M.; Dean, L.N.

CommonSense Environmental, Cincinnati, OH; Advanced Sciences, Inc., Richland, WA

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 169) (1995)

Assessment of ecological and human health risk over large spatial scales benefits from a common contaminant data set and subdivision of the site into smaller pieces. Two integrated, modular risk assessments were prepared for the U.S. Department of Energy's Hanford Site, near Richland, WA. The Site covers an area of about 143,000 ha. Two environmental impact statements focus on remediation of more than 1,100 past practice waste sites and remediation of high-level nuclear wastes stored in 177 tanks. The past-practice sites are distributed over a large fraction of the site. The tanks are located in the Central Plateau, an area of about 50,000 ha. Contaminant data are available primarily as waste inventories, rather than as environmental media concentrations. To cope with large physical scales and limited data, source terms were estimated from waste inventory data aggregated within. (Complete text)

1355 V18/021028

Integrating CERCLA and RCRA to Better Manage Hanford's Environmental Restoration Waste

Janaskie, M.T.

U.S. Department of Energy, Germantown, MD

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (4 pp.) (1996)

The Environmental Restoration (ER) Program at the Richland Operations Office and the Office of Northwestern Area Programs at Headquarters, EM-44, have worked together successfully with regulators and stakeholders to establish a disposal facility at the Hanford site capable of managing Hanford's environmental restoration waste. The Environmental Restoration Disposal Facility (ERDF) is a technically sound, cost-effective, and "environmentally-friendly" disposal facility that is the result of an innovative integration of CERCLA and RCRA requirements. Most importantly, in this instance, the integration of CERCLA and RCRA requirements represents a new paradigm in project management, one that exemplifies the phrase "better, faster, cheaper".

1356 V18/023420

Interface Control Document between the Tank Waste Remediation System and the Solid Waste Disposal Division

Duncan, D.R.

Westinghouse Hanford Company, Richland, WA

WHC-SD-WM-PICD-003; 36 pp. (December 6, 1995)

This document discusses the interface between the Tank Waste Remediation System (TWRS) and the Solid Waste Division (SWD).

1357 V18/022066

Interim Stabilization of Waste Sites Using Recycled Concrete

Hayward, W.M.; Osborne, W.L.

IT Hanford, Inc., Richland, WA; Bechtel Hanford, Inc., Richland, WA

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 359-361) (1994)

The Hanford Site, operated by the U.S. Department of Energy, occupies about 560 square miles in southeastern Washington State. The site was established in 1943 to produce plutonium for nuclear weapons using production reactors and chemical processing plants. That mission has now ended, and the site in the early stages of a several-decade cleanup program to address the legacy of retired production facilities and the radioactive and chemical wastes that remain in storage or have been disposed to the soil column. One important element of this cleanup program is the stabilization and maintenance of the individual soil waste sites and burial grounds until the regulatory and technical requirements for final remediation are executed. Several methods currently are used to stabilize sites that have loose surface contamination. These include stabilization with clean soil followed by revegetation; stabilization by application of shotcrete with or without a chemical biobarrier; and stabilization with soil or rock, then application of a soil sterilant herbicide. The specific method is determined on a site-by-site basis. Another element of the cleanup is the maintenance and decommissioning of the surplus production facilities. There are 109 major facilities currently awaiting decontamination and decommissioning. In addition, there are numerous general purpose facilities that are also no longer needed. The construction materials from these facilities, if processed, can become a resource for other needs. This report describes an example of a waste material, in the form of crushed concrete, that was utilized to interim stabilize two radioactive waste sites.

1358 V18/022159

Pathway Analysis and Exposure Assessment: MEPAS Modeling for Nonradiological Chemical Contaminants at the Hanford Site

Blanton, M.L.; Dirkes, R.L.; Buck, J.W.; Cooper, A.; Castieton, K.; Glantz, C.S.

Pacific Northwest Laboratory, Richland, WA

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental

Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 278) (1995)

A Chemical Pathway Analysis and Exposure Assessment was performed by the Surface Environmental Surveillance Project (SESP). The SESP monitors air, surface water, sediment, agricultural products, vegetation, soil, and wildlife in order to assess onsite or offsite environmental impacts and offsite human health risk at the Hanford Site. The objectives of this study are (1) determine if a nonradiological chemical monitoring program is warranted for the Hanford Site; (2) ensure that the surveillance parameters such as media, sampling location, and analytes are chosen in a manner that is scientifically sound and cost-efficient; and (3) identify specific nonradiological chemicals of concern (COC) for the Hanford Site. The basis for identification of COC for the Hanford Site was an extensive literature review. The model was also used to predict COC concentrations required onsite to achieve an offsite cancer incidence of $10(E-6)$ and a hazard quotient of 1.0. This study indicated that nonradiological chemical contamination occurring onsite does not pose a significant offsite human health risk. The highest cancer incidence to the offsite maximally exposed individual from COC was from arsenic [$1.76 \times 10(E-10)$]; the highest hazard quotient was chromium VI [$1.48 \times 10(E-04)$].

1359 V18/022767

Progress and Future Directions for Remediation of Hanford Facilities and Contaminated Sites

McClain, L.K.; Nemec, J.F.

U.S. Department of Energy, Richland Operations Office, Richland, WA; Bechtel Hanford, Inc., Richland, WA
CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1205-1209) (1996)

A great deal of physical progress is being made in the Hanford Environmental Restoration (ER) Project, which is responsible for the portion of work at Hanford that deals with contaminated soil and groundwater, and with inactive nuclear facilities. This work accounts for 10 to 15 percent of the Hanford site budget. (Other U.S. Department of Energy (DOE) programs and contractors are responsible for the high-level liquid waste in underground storage tanks and the spent nuclear fuel.) The project "closed the circle" on environmental restoration at Hanford this summer when the Environmental Restoration Disposal Facility (ERDF) went into operation and began receiving wastes being excavated from contaminated areas in Hanford's "100 Area" along the Columbia River. With this milestone event, environmental restoration at Hanford now has a clear path forward: (1) Waste areas along the Columbia River have been identified, volume estimates are being refined, and excavation has started; (2) The million-cubic-yard capacity ERDF is receiving waste from excavation in the 100 Area; (3) Deactivation of the N Reactor will be completed within a year; (4) Numerous other facilities in the 100 Area are being decommissioned, eliminating hazards and reducing the costs of surveillance and maintenance (S&M); (5) A demonstration of long-term protective storage for one of the reactor blocks is in progress; (6) A comprehensive groundwater treatment strategy is in place. This paper describes the Hanford ER project, the progress

being made, and the management techniques that are making the project successful.

1360 V18/023947

Report on Inspection of the Performance Based Incentive Program at the Richland Operations Office

U.S. Department of Energy, Office of Inspector General, Washington, DC

DOE/IG-0401; 120 pp. (March 10, 1997)

The purpose of this inspection was to review the processes used by the Department of Energy's Richland Operations Office in implementing and administering a Performance Based Incentives Program (PBI) at the Hanford Site. In reviewing the PBI Program at Richland, the following items were evaluated: (1) the Department of Energy's policies and guidance on the establishment and implementation of PBI Programs at the Department's Operations Offices; (2) the guidance developed by the Richland Operations Office for the administration of the Richland PBI Program; (3) the process used by Richland to nominate and select projects for the PBI Program; and (4) The PBI objectives established for specific projects and the justification for specific PBI award amounts. The inspection found that the PBI Program has not always made the best use of incentive dollars paid to the Management and Operating Contractor.

1361 V18/021532

Richland Environmental Restoration Project Management Action Process Document [Rev. 1]

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-96-09 (Rev. 1); 200 pp. (April 1996)

A critical mission of the U.S. Department of Energy (DOE) is the planning, implementation, and completion of environmental restoration programs at DOE facilities. An integral part of this mission involves the safe and cost-effective environmental restoration of the Hanford Site. For over 40 years the Hanford Site supported United States national defense programs, largely through the production of nuclear materials. One legacy of historical Hanford Site operations is a significant waste inventory of radioactive and/or regulated chemical materials. Releases of these materials have, in some cases, contaminated the Hanford Site environment. The DOE Richland Operations Office (RL) is responsible for protecting human health and the environment from potential Hanford Site environmental hazards by identifying, assessing, and mitigating risks posed by contaminated sites.

1362 V18/023588

Site-Specific Waste Management Instruction for the Onsite Measurements Services Organization

Parker, D.L.

Bechtel Hanford, Inc., Richland, WA

BHI-00931; 14 pp. (October 1996)

This Site-Specific Waste Management Instruction (SSWMI) provides guidance for the management of waste generated as a result of field screening measurements performed by the Onsite

Measurements Services Organization. Because this report is not project specific, it is not possible to designate waste streams through this document, other than to assess whether the analyses themselves will cause a waste stream to be designated. Generally, field screening methodologies that do not create dangerous waste are employed instead of those that create dangerous waste. The analyses within the scope of this SSWMI are as follows: VOC analyses of water samples using aqueous headspace analyses; VOC analyses of air samples using soil gas analytical techniques; total uranium analyses of water samples using kinetic phosphorescence analyses; chromatographic analyses of water samples using a colorimetric method based on AccuVac ampuls manufactured by the Hach Company; nitrate analyses of water samples using paper test strips; conductivity analyses of water samples using electrodes; and sulfate analyses of water samples using a colorimetric method based on AccuVac ampuls.

1363 V18/022572

State of Washington Radiation Guidance for Hanford

Jaquish, R.E.; Erickson, J.L.

Washington State Department of Health, Olympia, WA
CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):54-55c (June 1996)

Cleanup of the U.S. Department of Energy's Hanford site is being managed through the Hanford Federal Facility Agreement and Consent Order known as the Tri-Party Agreement. The participants are the U.S. Department of Energy, the U.S. Environmental Protection Agency, and the State of Washington, with the Department of Ecology being the lead for the State of Washington. Through a memorandum of understanding the Department of Health is designated as the primary state agency for protection of human health and the environment from ionizing radiation. As part of this responsibility, the Department of Health is developing radiation cleanup guidance for Hanford cleanup. Another reason for developing State guidance is that there are no federal regulations that provide guidance on residual radioactivity on lands that will be released for public use. The U.S. Nuclear Regulatory Commission and the U.S. Environmental Protection Agency both have prepared draft regulations, but the issuance of these is uncertain. The state guidance is compatible with draft federal guidance and includes numerical guidance for residual contamination, modeling parameters, look-up tables, and land use categories. This guidance will apply until such a time as they are superseded by applicable federal regulations or the state environmental radiation standard.

1364 V18/023553

Summary of Methods to Develop a Representative Equation for Soil Loss from the Hanford Permanent Isolation Barrier

Gilmore, B.G.; Walters, W.H.

Pacific Northwest Laboratory, Richland, WA

CONF-941124; In situ Remediation: Scientific Basis for Current and Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH,

Part 1, 704 pp.; (pp. 507-522) (1994)

Above-ground, mounded earth and rock structures are proposed as one method of isolating shallow waste-burial areas at the Hanford Site. A design for this type of structure, referred to as the Hanford Permanent Isolation Barrier (HPIB), is currently being developed and tested. The design objectives are to limit the movement of contaminants by water infiltration, to decrease intrusion by plants and burrowing animals, to reduce the potential for human intrusion, and to prevent the release of noxious gases for at least 1000 yr. As part of the HPIB testing program, field studies were conducted to evaluate the use of rock mulch and vegetation to reduce erosion of the soil cover from rainfall-runoff processes and to explore the use of available mathematical models to predict long-term erosion rates. Field plots were constructed to test combinations of rock mulch and vegetation by applying high-intensity rainfall to the plots with a rainfall simulator. Tests on a control plot of bare native soil were included. The results indicated that vegetation cover was the most dominant factor in reducing water erosion by decreasing the rainfall and runoff energy for particle detachment and transport. The rock mulch also reduced erosion but was not as effective as the vegetation. The test results were used to investigate the applicability on the universal soil loss equation and the modified universal soil loss equation for predicting long-term soil erosion of the HPIB cover. The two equations are only marginally applicable because the predictive capability is questionable, primarily due to the short slope length (35 ft) of the test plot data. Future work will involve the development of a model using the kinematic wave equation, which will provide predictive capability over longer slope lengths.

1365 V18/022156

Superfund Explanation of Significant Difference for the Record of Decision (EPA Region 10): Hanford (100, 200, 300 and 1100 Areas) (USDOE), Benton County, WA, July 30, 1996

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ESD/R10-96/145; 25 pp. (November 1996)

The ROD for the Environmental Restoration Disposal Facility (ERDF) provides for disposal of remediation waste from CERCLA past-practice units. Because of the similarity of contaminants and waste types, it has become apparent that ERDF disposal is an option that should be available in evaluating cleanup options for RCRA past-practice operable units and closing treatment, storage, and disposal facilities (TSDs) at Hanford, as well as for CERCLA past-practice units. Waste generated during past-practice investigations should also be available for disposal in the ERDF. In addition, leachate generated at ERDF can be used to help suppress fugitive dust and aid in waste compaction at ERDF.

1366 V18/025338

Innovative Regulatory and Contracting Strategies for Hanford's Environmental Restoration Disposal Facility (ERDF)

Janaskie, M.T.

U.S. Department of Energy, Germantown, MD

CONF-970335; Waste Management '97: Working Towards a

Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (3 pp.) (1997)

The Environmental Restoration (ER) Program at the Richland Operations Office and the Office of Northwestern Area Programs at Headquarters, EM-44, have worked together with the site regulators and stakeholders during the past several years to establish the Environmental Restoration Disposal Facility (ERDF) at the Hanford site. The purpose of the ERDF project was to plan and design a disposal facility that was capable of managing all of Hanford's current and future environmental restoration waste, yet protect the environment and was still cost efficient. In pursuing the goal for a "better, faster, cheaper" disposal facility, the ER program turned to innovative regulatory and contracting strategies to complete the project. For the regulatory strategy, the Environmental Restoration (ER) program worked with regulators and stakeholders to secure a CERCLA ROD for the ERDF by integrating RCRA and NEPA requirements into the CERCLA process. When it was time to construct the facility and consider how best to operate it, ER employed a unique contracting strategy which subcontracted out the construction, operations and waste transportation functions of the project to private sector firms.

1367 V18/023450

Site Specific Waste Management Instructions for Loading and Shipment of Containerized Investigation Derived Waste to the Environmental Restoration Disposal Facility (ERDF) [Rev. 1]

Corriveau, C.E.; Wolf, D.M.

Bechtel Hanford, Inc., Richland, WA

BHI-00907 (Rev. 1); 19 pp. (August 1996)

This Site Specific Waste Management Instruction (SSWMI) provides guidance for management of containerized investigation-derived waste (IDW) being loaded and transported to the Environmental Restoration Disposal Facility (ERDF). Requirements and responsibilities for designating waste, preparing waste profiles, and managing the waste are provided. The SSWMI outlines the waste management practices that will be performed in the field to implement Federal, state, and US Department of Energy (DOE) requirements. Additional guidance for waste packaging, marking, labeling, and shipping, is provided for information; however, the US Department of Transportation (DOT) requirements have precedence.

1368 V18/021536

Close-Out Report Fitzner-Eberhardt Arid Lands Ecology Reserve Remedial Action, Hanford, Washington

Bechtel Hanford, Inc., Richland, WA

DOE/RL-94-140; 16 pp. (April 1996)

The Fitzner-Eberhardt Arid Lands Ecology (ALE) Reserve consists of 312 sq. km (120 sq. mi) of shrub-steppe land on the western edge of the Hanford Site. It is located south of Highway 240 and east of the point where the Yakima River borders the site. The land was set aside as a natural research area in 1967 by the Atomic Energy Commission. Historically tribal land, the area was homesteaded by pioneers before it was taken by the federal government in 1943 as a

security buffer to protect the Hanford Site defense production facilities. One antiaircraft artillery battery (later converted to a Nike missile site) was located on this land; plutonium production plants or storage facilities were never built there. A more complete account can be found in the Preliminary Assessment Screening (PAS) Report for the Arid Lands Ecology Reserve, Hanford. With the recent change in mission at the Hanford Site from plutonium production to environmental cleanup, much attention has been given to releasing clean tracts of land for other uses. The ALE Reserve is one such tract of land. The existing areas of contamination in the ALE Reserve were considered to be small. In March 1993, the U.S. Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) signed an Agreement in Principle in which they agreed to expedite cleanup of the ALE Reserve. Cleanup activities and a draft close-out report were to be completed by October 1994. Additionally, DOE proposed to mitigate hazards that may pose a physical threat to wildlife or humans.

1369 V18/022588

Ecosystem Monitoring Two Department of Energy Sites
Gray, R.

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 299) (1995)

The US Department of Energy's Hanford Site was established in southeastern Washington to produce plutonium during World War II. The Pantex Plant in the Texas Panhandle, originally used for loading conventional ammunition shells and bombs, was rehabilitated and enhanced in the 1950s to assemble nuclear weapons. Environmental monitoring has been ongoing at both locations for several decades. Monitoring objectives are to detect and assess potential impacts of facility operations on air, surface and ground waters, foodstuffs, fish, wildlife, soils, and vegetation. Currently, measured concentrations of airborne radionuclides around the perimeters of both sites are below applicable guidelines. Concentrations of radionuclides and nonradiological water quality in the Columbia River at Hanford, and radiological and nonradiological water quality in the Ogallala Aquifer beneath the Pantex Plant are in compliance with applicable standards. Foodstuffs irrigated with river water downstream from the Hanford Site show levels of radionuclides that are similar to those found in foodstuffs from control areas. The low levels of Cs-137 and Sr-90 in some onsite Hanford wildlife samples and concentrations of radionuclides in soils and vegetation from onsite and offsite at both locations are typical of those attributable to naturally occurring radioactivity and to worldwide fallout. The calculated dose potentially received by a maximally exposed individual (i.e., based on hypothetical, worst-case assumptions for all routes of exposure) at both sites in 1993 was less than 0.03 mrem. Ironically, by virtue of its size (1450 km sq [560 mi sq]), restricted public access, and conservative use of undeveloped land, the Hanford Site has provided a sanctuary for plant and animal populations that have been eliminated from, or

greatly reduced on, surrounding agricultural and range lands. Ongoing studies will determine if this is also true at Pantex Plant.

1370 V18/023584

Long-Term Environmental Monitoring at Two U.S. Department of Energy Nuclear Sites

Gray, R.H.

Battelle Pantex, Amarillo, TX

CONF-951023 (Vol. 8); WEFTEC '95, Proceedings of the 68th Annual Conference and Exposition of the Water Environment Federation, Miami Beach, FL, October 21-25, 1995. Water Environment Federation, Alexandria, VA, Vol. 8, 498 pp.; (p. 480) (1995)

The U.S. Department of Energy's Hanford Site was established in southeastern Washington during the 1940s to produce plutonium during World War II. The Pantex Plant in the Texas Panhandle was originally used by the U.S. Army for loading conventional ammunition shells and bombs. The Plant was rehabilitated and enhanced in the 1950s to assemble nuclear weapons. Environmental monitoring has been ongoing at both locations for several decades. Monitoring objectives are to detect and assess potential impacts of facility operations on air, surface and ground waters, foodstuffs, fish, wildlife, soils, and vegetation. Currently, measured concentrations of airborne radionuclides around the perimeters of both sites are below applicable guidelines. The low levels of Cs-137 and Sr-90 in some onsite Hanford wildlife samples and concentrations of radionuclides in soils and vegetation from onsite and offsite at both locations are typical of those attributable to naturally occurring radioactivity and to worldwide fallout. Ironically, by virtue of its size (1,450 sq km [560 sq mi], restricted public access, and conservative use of undeveloped land, the Hanford Site has provided a sanctuary for plant and animal populations that have been eliminated from, or greatly reduced on, surrounding agricultural and range lands. Ongoing studies will determine if this is also true at Pantex Plant. The Hanford Reach of the Columbia River and its islands and the Pantex Plant with its playas both serve as refuges for raptorial birds and migratory waterfowl. In addition, the Hanford Reach serves as a migration route for several species of salmon, and chinook salmon and steelhead trout spawn there. Bald eagles congregate along the Hanford Reach in the fall and winter to feed on the spawned-out carcasses of salmon and on wintering waterfowl. (Complete text)

1371 V18/023585

Albeni Falls Wildlife Management Plan - Final Environmental Assessment

U.S. Department of Energy, Bonneville Power Administration, Portland, OR

DOE/EA-2939; 69 pp. (November 1996)

Bonneville Power Administration (BPA) proposes to fund the development and implementation of the Albeni Falls Wildlife Management Plan (Plan). The Plan guides the development of wildlife mitigation projects in the Lake Pend Oreille, Idaho, vicinity that are approved by the Northwest Power Planning Council (Council). Development and implementation of the Plan is a cooperative effort led by an Interagency Work Group that includes the Idaho Department of Fish and Game (IDFG); United States Fish

and Wildlife Service (USFWS); United States Forest Service (USFS); United States Army Corps of Engineers (CQE); the Kalispel Tribe; and the Upper Columbia United Tribes (UCUT). The proposed action would enable the Interagency Work Group to protect and enhance a variety of wetland and riparian habitats, restore 28,587 habitat units lost as a result of the construction and operation of Albeni Falls Dam, and implement long-term wildlife management activities at selected sites within the overall study area. This Environmental Assessment (EA) examines the potential environmental effects of protecting and enhancing wildlife habitat in selected portions of a 225,077 ha (556,160 acre) study area surrounding Lake Pend Oreille in Bonner County, and 7,770 ha (19,200 acre) area surrounding Spirit and Twin lakes, in Kootenai County, Idaho. Four proposed activities are analyzed: habitat protection; habitat improvement; operation and maintenance (O&M); and monitoring and evaluation (M&E).

1372 V18/023586

Albeni Falls Wildlife Management Plan - Preliminary Environmental Assessment

U.S. Department of Energy, Bonneville Power Administration, Portland, OR

DOE/EA-1099; 62 pp. (April 1996)

Bonneville Power Administration (BPA) proposes to fund the development and implementation of the Albeni Falls Wildlife Management Plan. Approved by the Northwest Power Planning Council (Council) in 1990, the project is a cooperative effort with the Interagency Work Group that includes the Idaho Department of Fish and Game (IDFG); United States Fish and Wildlife Service (USFWS); United States Forest Service (USFS); United States Army Corps of Engineers (COE); the Kalispel Tribe; and the Upper Columbia United Tribes (UCUT). The proposed action would enable the Interagency Work Group to protect and enhance a variety of wetland and riparian habitats, restore 28,587 habitat units lost as a result of the construction and operation of Albeni Falls Dam, and implement long-term wildlife management activities at selected sites within the overall study area. This Environmental Assessment (EA) examines the potential environmental effects of protecting and enhancing wildlife habitat in selected portions of a 225,077 hectare (556,160 acre) study area surrounding Lake Pend Oreille in Bonner County, and 7,770 hectare (19,200 acre) area surrounding Spirit and Twin lakes, in Kootenai County, Idaho. Four proposed activities are analyzed: habitat protection; habitat enhancement; operation and maintenance (O&M); and monitoring and evaluation (M&E).

1373 V18/022346

Conceptual Model Development for the Oak Ridge Reservation Environmental Restoration Program, Oak Ridge, Tennessee

Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN

ES/ER/TM-209; 15 pp. (November 1996)

Conceptual models are simplified representations of information that focus attention on the defining characteristics of a situation or location. They may take various forms, including cartoon renderings of cross sections or plan views, box-and-arrow schematic

diagrams, statistical summary tables, or generalized mathematical relationships. The content of a conceptual model is defined by the purpose the model is intended to serve. The Environmental Restoration (ER) Program uses conceptual models to summarize project area inventories, identify contaminant transport pathways, assess exposure pathways, and analyze the consequences of remedial actions.

1374

V18/022567

Dose Assessment Activities in the Republic of the Marshall Islands

Simon, S.L.; Graham, J.C.

Nationwide Radiological Study, Majuro, Midway Islands

Health Physics 71(4):438-456 (October 1996)

Dose assessments, both retrospective and prospective, comprise one important function of a radiological study commissioned by the Republic of the Marshall Islands (RMI) government in late 1989. Estimating past or future exposure requires the synthesis of information from historical data, results from a recently completed field monitoring program, laboratory measurements, and some experimental studies. Most of the activities in the RMI to date have emphasized a pragmatic rather than theoretical approach. In particular, most of the recent effort has been expended on conducting an independent radiological monitoring program to determine the degree of deposition and the geographical extent of weapons test fallout over the nation. Contamination levels on 70% of the land mass of the Marshall Islands were unknown prior to 1994. The environmental radioactivity data play an integral role in both retrospective and prospective assessments. One recent use of dose assessment has been to interpret environmental measurements of radioactivity into annual doses that might be expected at every atoll. A second use for dose assessment has been to determine compliance with dose action level for the rehabilitation of Rongelap Island. Careful examination of exposure pathways relevant to the island lifestyle has been necessary to accommodate these purposes. Finally, an examination is underway of gummed film, fixed-instrument, and aerial survey data accumulated during the 1950's by the Health and Safety Laboratory of the U.S. Atomic Energy Commission. This article gives an overview of these many different activities and a summary of recent dose assessments.

1375

V18/022324

Environmental Assessment, Finding of No Significant Impact, and Response to Comments: Solid Residue Treatment, Repackaging, and Storage

U.S. Department of Energy, Rocky Flats Field Office, Golden, CO

DOE/EA-1120; 75 pp. (April 1996)

From its founding in 1952 through the cessation of production in 1989, the United States Department of Energy's (DOE) Rocky Flats Plant (now the Rocky Flats Environmental Technology Site [the Site]) produced components for nuclear weapons. Some of those components were made of plutonium. As a result of the processes used to recover and purify plutonium and manufacture the components, a variety of materials became contaminated with plutonium. If the level of contamination were low, the material was considered waste. However, if the concentration of plutonium in the

material exceeded the "economic discard limit," the materials were classified as "residue" rather than "waste" and were stored for later recovery of the plutonium. While large quantities of residues were processed, others, primarily those more difficult to process, accumulated at the Site in storage. Nearly all of the residues are in a condition or container that does not meet the Site's interim safe storage criteria. The variances include relatively large quantities of plutonium in many of the drums, levels of radiation at drum surfaces and temperatures generated by radioactive decay that exceed interim safe storage criteria, the presence of liquids, respirable fines, and possibly corrosive and pyrophoric materials in the drums. In addition, most residues do not meet federal requirements for offsite shipment. The subject of this document is how best to make residues safe for storage until their final disposition can be decided and implemented. How and where that final disposition is to be made will be decided through such analyses as the Waste Isolation Pilot Project Supplemental Environmental Impact Statement

1376

V18/024120

Los Alamos Activities at Rocky Flats

Los Alamos National Laboratory, Los Alamos, NM

LALP-96-30; 1 p. (1996)

Los Alamos scientists and engineers continue to provide Rocky Flats with technical assistance for their environmental restoration and waste management efforts. To clean up plutonium, Los Alamos reviewed all existing treatability and investigative technologies and studies that addressed plutonium-contaminated soil. Los Alamos evaluated these technologies and studies then recommended treatment/storage/disposal options for the contaminated soils at Rocky Flats. Another major environmental concern at Rocky Flats is the existence of approximately 25,000 kg. of depleted uranium chips contained in 125 drums. To remediate this site, Los Alamos developed an aqueous process for the controlled oxidation of uranium chips. Residue stabilization is an issue at Rocky Flats and other government and industry sites. Los Alamos researchers have assisted with the stabilization of plutonium residues in a number of forms, including ceramics, spent salts, ash, combustibles, graphite, and wet and inorganic compounds.

1377

V18/022321

Lower Red River Meadow Stream Restoration Project: Preliminary Report

Bonneville Power Administration, Portland, OR

DOE/EA-1027; 45 pp. (May 1996)

As part of a continuing effort to restore anadromous fish populations in the South Fork Clearwater River basin of Idaho, Bonneville Power Administration (BPA) proposes to fund the Lower Red River Meadow Restoration Project (Project). The Project is a cooperative effort with the Idaho Soil and Water Conservation District, Nez Perce National Forest, Idaho Department of Fish and Game (IDFG), and the Nez Perce Tribe of Idaho. The proposed action would allow the sponsors to perform stream bank stabilization, aquatic and riparian habitat improvement activities on IDFG's Red River Management Area and to secure long-term conservation contracts or agreements for conducting streambank and habitat improvement activities with participating private landowners located in the Idaho County, Idaho, study area.

1378 V18/023495

Offsite Environmental Monitoring Report: Radiation Monitoring Around United States Nuclear Test Areas - Calendar Year 1993

Chaloud, D.J.; Daigler, D.M.; Davis, M.G.

U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, Washington, DC

EPA/402/R-96/007; 184 pp. (June 1996)

This report describes the Offsite Radiation Safety Program conducted during 1993 by the Environmental Protection Agency's (EPA's) Environmental Monitoring Systems Laboratory - Las Vegas (EMSL-LV). This laboratory operates an environmental radiation monitoring program in the region surrounding the Nevada Test Site (NTS) and at former test sites in Alaska, Colorado, Mississippi, Nevada, and New Mexico. The surveillance program is designed to measure levels and trends of radioactivity, if present, in the environment surrounding testing areas to ascertain whether current radiation levels and associated doses to the general public are in compliance with existing radiation protection standards. The surveillance program additionally has the responsibility to take action to protect the health and well being of the public in the event of any accidental release of radioactive contaminants. Offsite levels of radiation and radioactivity are assessed by sampling milk, water, and air; by deploying thermoluminescent dosimeters (TLDs) and using pressurized ionization chambers (PICs); by biological monitoring of foodstuffs including animal tissues and food crops; and by measurement of radioactive material deposited in humans.

assessment point of preference to be used in conjunction with the data quality objectives process to determine area of concern remedial action objectives and devise a sampling and analysis plan to achieve those objectives.

1379 V18/022344

Risk Assessment Strategy at DOE-ORO

Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN

ES/ER/TM-180; 225 pp. (September 1996)

In an effort to ensure the development and implementation of risk assessment methodologies and guidance in support of the U.S. Department of Energy Oak Ridge Operations (DOE-ORO), the preparation of a risk assessment strategy document was determined to be the most expedient, cost-effective measure that could be undertaken to ensure that all risk assessments and risk-related activities are carried out in a consistent and technically defensible manner. To standardize the risk assessment process and the format for the presentation of risk assessment results, the proposed risk assessment strategy has incorporated existing federal guidance, comments provided by state and federal regulators on previously submitted risk assessment reports, and the most up-to-date scientific findings related to the evaluation of human health and the environment. The proposed risk assessment strategy emphasizes using existing environmental data in baseline risk assessments to aid in identifying chemicals of potential concern, areas of concern that could pursue a no further investigation determination, and areas of concern that may warrant early response actions or potential remedial actions. This document focuses on the baseline risk assessment and relies on existing U.S. Environmental Protection Agency (EPA) risk assessment guidance to provide specific details on conducting baseline risk assessments. This document is intended to provide the DOE-ORO, the EPA, and state agencies with a risk

**U.S. DEPARTMENT OF ENERGY (DOE)
ONSITE REMEDIAL ACTION PROJECTS**

1380 V18/021121

Hydrogeologic Investigation of the Advanced Coal Liquefaction Research and Development Facility, Wilsonville, Alabama

Gardner, F.G.; Kearn, P.M.; Mumby, M.E.; Rogers, S.
Oak Ridge National Laboratory, Grand Junction, CO
ORNL/TM-13134; 115 pp. (August 1996)

A hydrogeologic site characterization was conducted at the former Advanced Coal Liquefaction Research and Development facility in Wilsonville, Alabama, by the Oak Ridge National Laboratory Grand Junction Office for the U.S. Department of Energy Pittsburgh Energy Technology Center. This characterization provided baseline environmental information necessary for closeout of facility operations. The hydrogeologic assessment was non-routine because of the unusual structural complexity of the subsurface. Bedrock drilling demonstrated that both an overturned fold and a strike-slip are present beneath the site. Moreover, the site is also underlain by limestone that contains solution cavities. However, it was determined that potential groundwater contamination in the residuum is not a threat to the environment and that groundwater in the limestone aquifers is not flowing toward potential receptors.

1381 V18/021688

Rocketdyne Division Annual Site Environmental Report: Santa Susana Field Laboratory and Desoto Sites 1995

Rockwell International Corporation, Rocketdyne Division,
Canoga Park, CA
RI/RD-96-140; 114 pp. (July 30, 1996)

This annual report discusses environmental monitoring at two manufacturing and test operations sites operated in the Los Angeles area by the Rocketdyne Division of Rockwell International Corporation (Rocketdyne). These are identified as the Santa Susana Field Laboratory (SSFL) and the DeSoto site. The sites have been used for manufacturing, R&D, engineering, and testing in a broad range of technical fields, primarily rocket engine propulsion and nuclear reactor technology. The DeSoto site essentially comprises office space and light industry with no remaining radiological operations, and has little potential impact on the environment. The SSFL site, because of its large size (2,668 acres), warrants comprehensive monitoring to assure protection of the environment. SSFL consists of four administrative areas used for research, development, and test operations as well as a buffer zone. A portion of Area I and all of Area II are owned by the U.S. Government and assigned to the National Aeronautics and Space Administration (NASA). A portion of Area IV is under option for purchase by the Department of Energy (DOE).

1382 V18/022880

Purge Water Minimization at LEHR

Schalla, R.

Pacific Northwest National Laboratory, Richland, WA
PNNL-11406; 56 pp. (November 1996)

The field demonstration described in this report is being conducted

as part of the Environmental Restoration Program at the Laboratory for Energy-Related Health Research (LEHR). As part of an ongoing technical support mission to achieve excellence and efficiency in environmental restoration activities at LEHR, DOE requested Pacific Northwest National Laboratory's (PNNL's) guidance to identify the most efficient way of reducing purge water extracted by sampling pumps while still obtaining representative samples from LEHR monitoring wells. The purpose of this particular demonstration is to determine to what extent reduction of purge waste is possible with the PurgeLess (U.S. Patent 5,450,900) device (a well volume isolation system) and proper purging practices (purge rate, duration, pump intake deployment, etc.) to obtain representative samples year round for all parameters of interest. Specifically, the goal is to minimize the production of waste water from purging by demonstrating this new and innovative technology coupled with recommended practices based on current research of purging and sampling practices and actual field data including time series sampling of contaminants of concern. The primary radiological and chemical constituents of concern in the groundwater at LEHR are: chloroform, tritium, hexavalent chromium, and nitrate. Therefore, the time series sampling was directed toward analysis of these constituents. It is important to ensure that high quality groundwater samples that are representative of ambient aquifer conditions are collected.

1383 V18/025402

Lessons Learned and Current Strategy for Groundwater Cleanup at Lawrence Livermore National Laboratory

Copeland, A.B.

Lawrence Livermore National Laboratory, Livermore, CA
CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (7 pp.) (1997)

Lawrence Livermore National Laboratory (LLNL) has recently completed the cleanup and closure of a gasoline spill site. Innovative thermal methods were shown to quickly and effectively clean the contaminated site. At the LLNL Livermore Site, a geographically widespread problem is the presence of solvent plumes. Pump and treat is effective in cleanup of solvent plume regions distant from the source, but a more aggressive approach is needed for the source region itself.

1384 V18/022935

Bulging of Cans Containing Plutonium Residues: Summary Report

Van Konynenburg, R.A.; Wood, D.H.; Condit, R.H.; Shikany, S.D.

Lawrence Livermore National Laboratory, Livermore, CA
UCRL-ID-125115; 35 pp. (March 1996)

In 1994, two cans in the Lawrence Livermore National Laboratory Plutonium Facility were found to be bulging as a result of the generation of gases from the plutonium ash residues contained in the cans. This report describes the chronology of this discovery, the response actions that revealed other pressurized cans, the analysis of the causes, the short-term remedial action, a follow-up

inspection of the short-term storage packages, and a review of proposed long-term remedial options.

1385 V18/025522

Title I Conceptual Design for Pit 6 Landfill Closure at Lawrence Livermore National Laboratory Site 300

MacDonnell, B.A.; Obenauf, K.S.

Golder Associates, Inc., Alameda, CA; Lawrence Livermore National Laboratory, Livermore, CA

UCRL-CR-124994-I; 170 pp. (August 1996)

The objective of this design project is to evaluate and prepare design and construction documents for a closure cover cap for the Pit 6 Landfill located at Lawrence Livermore National Laboratory Site 300. This submittal constitutes the Title I Design (Conceptual Design) for the closure cover of the Pit 6 Landfill. A Title I Design is generally 30 percent of the design effort. Title II Design takes the design to 100 percent complete. Comments and edits to this Title I Design will be addressed in the Title II design submittal. Contents of this report are as follows: project background, design issues and engineering approach, design drawings, calculation packages, construction specifications outline, and construction quality assurance plan outline.

1386 V18/022368

Characterization, Minimization, and Disposal of Radioactive Hazardous, and Mixed Wastes During Cleanup and Transition of the Tritium Research Laboratory (TRL) at Sandia National Laboratories/California (SNL/CA)

Garcia, T.B.; Gorman, T.P.

Sandia National Laboratories, Livermore, CA

SAND97-8004; 80 pp. (December 1996)

This document provides an outline of waste handling practices used during the Sandia National Laboratory/California (SNL/CA), Tritium Research Laboratory (TRL) Cleanup and Transition project. Here we provide background information concerning the history of the TRL and the types of operations that generated the waste. Listed are applicable SNL/CA site-wide and TRL local waste handling related procedures. We describe personnel training practices and outline methods of handling and disposal of compactible and non-compactible low level waste, solidified waste water, hazardous wastes and mixed wastes. Waste minimization, reapplication and recycling practices are discussed. Finally, we provide a description of the process followed to remove the highly contaminated decontamination systems. This document is intended as both a historical record and as a reference to other facilities who may be involved in similar work.

1387 V18/024260

Rulison Site Corrective Action Report

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-453; 254 pp. (September 1996)

Project Rulison was a joint US Atomic Energy Commission (AEC) and Austral Oil Company (Austral) experiment, conducted under the

AEC's Plowshare Program, to evaluate the feasibility of using a nuclear device to stimulate natural gas production in low-permeability gas-producing geologic formations. The experiment was conducted on September 10, 1969, and consisted of detonating a 40-kiloton nuclear device at a depth of 2,568 m below ground surface (BGS). This Corrective Action Report describes the cleanup of petroleum hydrocarbon- and heavy-metal-contaminated sediments from an old drilling effluent pond and characterization of the mud pits used during drilling of the R-EX well at the Rulison Site. The investigation activities described in this report were conducted during the autumn of 1995, concurrent with the cleanup of the drilling effluent pond. This report describes the activities performed during the soil investigation and provides the analytical results for the samples collected during that investigation.

1388 V18/021207

Methods and Results of an Evaluation of Aquatic Receptor Risk at the Rocky Flats Environmental Technology Site, Golden, Colorado

Klima, K.E.

CH2M Hill Inc., Englewood, CO

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 171) (1995)

The Rocky Flats Environmental Technology Site (RFETS) has historically released radionuclide chemicals of potential concern into the surrounding environment. The off-site environment was evaluated for Pu-239, 240 and Am-241 occurrence. An evaluation of exposure and effects to the aquatic ecology within off-site areas including: Standley Lake, Great Western Reservoir, Mower Reservoir and portions of Big Dry Creek, Walnut Creek, and Woman Creek was performed for the completion of an Ecological Risk Assessment. Collocated sampling activities were performed for surface water, sediment, benthic macroinvertebrates and fish. Results of the analytical data were used to assess ongoing exposure and effects. Data collected to determine effects (chemical content of fish tissue, diversity and density of macroinvertebrate populations) provided some of the necessary information needed to evaluate risk. However, due to conditions of interfering stressor effects, a quantitative evaluation of exposure through modeling techniques was also required to assess risk attributable to chemical of potential concern (COPC) occurrence. This paper presents the methods and results of both the effects and exposure assessment techniques applicable for this site and for the determination of risk. (Complete text)

1389 V18/022909

Soil Gas Analysis Using Onsite GC/MS and Sorbent Traps

Stuber, H.A.; Alai, A.; Watson, R.; Stewart, E.; Spencer, S.; Anderson, G.

Walsh Environmental Scientists and Engineers, Boulder, CO; Jacobs Engineering Group Inc., Denver, CO; EG&G, Denver,

CO

CONF-950868; ER '95: Committed to Results, Proceedings of a U.S. Department of Energy Environmental Remediation Conference, Denver, CO, August 13-18, 1995; (four 3.5" diskettes) (1995)

A large-scale soil gas investigation (nearly 1,500 locations) was completed at the DOE's Rocky Flats Environmental Technology Site (RFETS) site using sorbent trapping in the field, and thermal desorption and gas chromatography/mass spectroscopy (GC/MS) in a mobile laboratory. One liter samples of soil gas were drawn through hollow steel rods driven to depth and concentrated on sorbent traps. Internal Standard (IS) and Surrogate compounds were introduced to sample tubes before analysis for quantitation and quality assurance/quality control (QA/QC). Various halogenated, hydrocarbon, and oxygenated organic compounds were quantitatively determined. Numerous Individual Hazardous Substance Sites (IHSS) were found to contain contaminants which were not correctly identified by conventional GC methods or required confirmational analysis. The approach produced low detection limits (0.02 to 0.10 ug/L for all target analytes) and positive identification and quantitation of both target and non-target analytes. The Level II data quality objectives (DQOs) of the investigation were exceeded with definitive mass spectral identification of target and non-target analytes, with IS verification of recovery on each sample, with an expanded calibration range achieved with variable (.010 to 1 liter) sample volumes, and with field and laboratory blank and duplicate analyses. Cost savings over off-site, conventional GC/MS analyses were substantial. The results suggest on-site GC/MS is practical and cost effective for soil gas analysis, and offers significant advantages over other GC methods.

1390

V18/022089

Conceptual Engineered Cover Design for the Solar Evaporation Ponds at the Rocky Flats Environmental Technology Site

Nixon, P.; Stenseng, S.; Ogg, R.; Austin, M.

Parsons Environmental Services, Inc., Denver, CO; EG&G Rocky Flats, Inc., Golden, CO

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 379-384) (1994)

The Rocky Flats Environmental Technology Site, located outside of Denver, Colorado, operated several lined Solar Evaporation Ponds (SEPs) from 1953 until 1986 for the disposal of liquid radioactive and hazardous waste. The U.S. Department of Energy (DOE) has signed an Interagency Agreement (IAG) with the Colorado Department of Health, and the U.S. Environmental Protection Agency, and has agreed to close the SEP through an Interim Measures/Interim Remedial Action accelerated program. The DOE is considering an alternative to consolidate contaminated liner materials, SEP sludge, debris, and soil media under an engineered cover. The regulatory agencies may approve this alternative if DOE demonstrates that it would protect human health

and the environment for a 1000-yr period as required by the Colorado hazardous landfill siting regulations. The DOE utilized research results from the Hanford and Los Alamos sites to design an engineered cover for the SEPs that would fulfill the regulatory requirements. This paper presents the conceptual design of the engineered cover.

1391

V18/022595

Conceptual Engineered Cover Design for the Solar Evaporation Ponds at the Rocky Flats Plant

Nixon, P.; Stenseng, S.; Ogg, R.; Austin, M.

Parsons Environmental Services, Inc., Denver, CO; EG&G Rocky Flats, Inc., Golden, CO

CONF-941124; Insitu Remediation: Scientific Basis for Current and Future Technologies, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 625-632) (1994)

The Rocky Flats Plant, located outside of Denver, Colorado, operated several lined Solar Evaporation Ponds (SEP) from 1953 until 1986 for the disposal of liquid radioactive and hazardous waste. The US Department of Energy (DOE) has signed an Interagency Agreement with the Colorado Department of Health and the US Environmental Protection Agency, agreeing to close the SEP through an Interim Measures/Interim Remedial Action accelerated program. The DOE is considered an alternative: to consolidate contaminated liner materials, debris, and soil media under an engineered cover. The regulatory agencies may approve this alternative if DOE demonstrates that it would protect human health and the environment for a 1,000-yr period as required by the Colorado hazardous landfill siting regulations. The DOE utilized research results from the Hanford and Los Alamos sites to design an engineered cover for the SEP that would fulfill the regulatory requirements. This paper presents the conceptual design of the engineered cover.

1392

V18/021380

Environmental Perspective of the Operable Unit 2 at the Rocky Flats Plant, Colorado

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Journal of Geological Education 42:151-161 (1994)

This paper is a synthesis of some of the publicly available Environmental Restoration (ER) Program documents from the U.S. Department of Energy (DOE) Rocky Flats Plant (RFP), Colorado. Information is presented on the ongoing site-wide geologic characterization program, with emphasis on descriptions of the local bedrock, surface alluvium, soils, and hydrology of the Operable Unit (OU) 2 Site. These studies will be used to define potential pathways of contaminants from waste repositories to human receptors near the Rocky Flats Plant. A review of historic waste locations, the range of waste materials, and historic

waste-management practices at RFP's OU 2 Site demonstrates to the geologic community the complexity and magnitude of required cleanup activities at one small site. Waste organic compounds, as well as radioactive and mixed wastes, were generated during the fabrication of nuclear weapons components at RFP and other Department of Defense (DOD) and DOE facilities. These wastes are buried in a number of locations at RFP, including the OU 2 Site. Most of the Phase I and II Comprehensive Environmental, Response, Compensation, and Liability Act (CERCLA) Remedial Investigations of the OU 2 Site have been completed. Environmental geologic research findings at the OU 2 Site are presented for educational purposes to the geologic community. This information is presented as an interdisciplinary case study to educate the public in environmental research findings at the DOE laboratories and for students pursuing careers in environmental science/engineering.

1393 V18/025383

Trenches T-3 and T-4 Source Removal Project at Rocky Flats

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Rocky Mountain Remediation Services, LLC, Golden, CO;
Morrison Knudsen Environmental Services, Denver, CO

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

The Trenches T-3 and T-4 Source Removal Project performed by Rocky Mountain Remediation Services under subcontract to Kaiser-Hill at the Rocky Flats Environmental Technology Site involved the excavation and treatment by thermal desorption of approximately 2,902 cubic meters of soil and debris contaminated with volatile organic compounds (VOCs). The trenches contained soil, drum carcasses, and miscellaneous debris contaminated with VOCs which were contributing to groundwater contamination. Primary contaminants of concern were tetrachloroethene, trichloroethene, and carbon tetrachloride, as well as low level radiological contamination. The project was scoped, planned, and executed within a single fiscal year and saved \$2 million and 33 months over the originally proposed remedy. Several factors were instrumental in successful completion of the project. Integration of union labor forces and subcontracted personnel and services was the primary key to the project. The use of an on-site laboratory and a modified analytical method allowed for near real time analytical results to both guide the excavation and verify treatment effectiveness greatly reduced downtime during project execution. Also, negotiations with the Environmental Protection Agency and the Colorado Department of Public Health and Environment for establishing realistic cleanup criteria and accepting simplified field sampling techniques facilitated timely completion of the project.

1394 V18/023297

Assessment of Hydrologic Transport of Radionuclides from the Rio Blanco Underground Nuclear Test Site, Colorado

Chapman, J.; Earman, S.; Andricevic, R.

Nevada University, Water Resources Center, Las Vegas, NV

DOE/NV/11508-19; 25 pp. (October 1996)

The U.S. Department of Energy (DOE) is operating an environmental restoration program to characterize, remediate, and close non-Nevada Test Site locations that were used for nuclear testing. Evaluation of radionuclide transport by groundwater from these sites is an important part of the preliminary risk analysis. These evaluations are undertaken to allow prioritization of the test areas in terms of risk, provide a quantitative basis for discussions with regulators and the public about future work at the sites, and provide a framework for assessing data needs to be filled by site characterization. The Rio Blanco site in west-central Colorado was the location of the simultaneous underground detonation of three 30-kiloton nuclear devices in 1973. The devices were located 1780, 1899, and 2039 m below ground surface in the Fort Union and Mesaverde formations. Although all the bedrock formations at the site are thought to contain water, those below the Green River Formation (below 1000 m depth) are also gas-bearing, and have very low permeabilities. The transport scenario evaluated was the migration of radionuclides from the blast-created cavity through the Fort Union Formation. Transport calculations were performed using the solute flux method, with input based on the limited data available for the site. Model results suggest that radionuclides from the test are contained entirely within the area currently administered by DOE. This modeling was performed to investigate how the uncertainty in various physical parameters affect radionuclide transport at the Rio Blanco site, and to serve as a starting point for discussion regarding further investigation at the site; it was not intended to be a definitive simulation of migration pathways or radionuclide concentration values. Given the sparse data, the modeling results may differ significantly from reality. If needed, confidence in transport predictions can be increased by obtaining more site data, including ascertaining the amount of radionuclides which would have been available for transport (i.e., not trapped in melt glass or vented during gas flow testing), and the hydraulic properties of the Fort Union Formation.

1395 V18/020959

Cost-Effective Approaches to Successful Remediation of Unexploded Ordnance (UXO) at the Idaho National Engineering Laboratory (INEL)

Smith, T.J.; Clayton, H.

Idaho National Engineering Laboratory, Idaho Falls, ID

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (5 pp.) (1996)

Unexploded ordnance (UXO) and explosively contaminated soils were remediated at the Idaho National Engineering Laboratory (INEL). A Geographical Information System (GIS) was used to map areas of contamination and a Global Positioning System (GPS) was used to identify the location of ordnance explosive waste (OEW). Using these systems has improved the accuracy of the data collected. A central demolition site was used instead of the traditional method of detonating unexploded ordnance in place. Field screening of explosive contaminated soils was performed instead of using a more expensive laboratory analysis. In addition, an Air Force remote excavator was used to remediate potentially sensitized ordnance disposal pits in a cooperative technical

demonstration arrangement with the Department of Defense (DoD) and the Department of Energy (DOE). The use of these methods and technologies has resulted in an enhanced remediation process and significant cost savings. The next phase of ordnance work at the INEL will involve using a computer-based site statistical sampling model for UXO estimation entitled SiteStats. This model will eliminate the need for labor-intensive field searches to estimate ordnance concentrations.

1396

V18/021550

ICPP Environmental Monitoring Report: CY-1995

Lockheed Idaho Technologies Company, Idaho Falls, ID
INEL-96/0186; 52 pp. (April 1996)

Summarized in this report are the data collected through Environmental Monitoring programs conducted at the Idaho Chemical Processing Plant (ICPP) by the Environmental Protection Department. The ICPP is responsible for complying with all applicable federal, state, local and DOE rules, regulations, and orders. Radiological effluent and emissions are regulated by the DOE in accordance with the Derived Concentration Guides (DCGs). The State of Idaho regulates nonradiological waste resulting from the ICPP operations including airborne, liquid, and solid waste. The Environmental Department updated the Quality Assurance (QA) Project Plan for Environmental Monitoring activities during the third quarter of 1992. QA activities have resulted in the ICPP's implementation of the Environmental Protection Agency (EPA) rules and guidelines pertaining to the collection, analyses, and reporting of environmentally related samples. Where no EPA methods for analyses existed for radionuclides, Lockheed Idaho Technologies Company (LITCO) methods were used.

1397

V18/020958

CERCLA Feasibility Study Planning and Integration for Remediation of the Radioactive Waste Management Complex Subsurface Disposal Area at the INEL

Shapiro, C.; Huntley, R.M.; Barnes, C.; Garcia, K.; Rush, S.
Idaho National Engineering Laboratory, Idaho Falls, ID;
Rocky Mountain Environmental Associates, Inc., Idaho Falls, ID

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (9 pp.) (1996)

This paper summarizes the strategy and supporting activities for developing proposed alternatives for remediation of the Subsurface Disposal Area (SDA) at the Radioactive Waste Management Complex (RWMC). These activities are being described to illustrate one approach to tackling a complex, comprehensive clean-up decision using an interim action as a vehicle for focusing the technology evaluations. Prior to the start of this feasibility study the interim action was initiated to clean-up part of the SDA, Pit 9. The Pit 9 clean-up comprises remote retrieval under containment, physical separation processes, soil treatment, and stabilization via thermal treatment. The cost of the Pit 9 interim action is estimated to be approximately \$260 million. While this is clearly a significant investment it represents only a small portion of the potential cost of remediating the SDA if exsitu treatment is needed. The feasibility

study will include detailed evaluations using Pit 9 processes as representative processes for an alternative of retrieval and exsitu treatment, along with other alternatives that will make up the remainder of the evaluations.

1398

V18/023444

Design of Remotely Operated Excavation Equipment for Idaho National Engineering Laboratory's (INEL's) Pit 9 Yemington, C.R.

Sonsub, Inc., Houston, TX

CONF-9606116; Proceedings of an American Nuclear Society (ANS) Annual Meeting, Reno, NV, June 16-20, 1996. ANS, La Grange Park, IL; Transactions of the American Nuclear Society 74:340-341 (1996)

Pit 9 is a 379-ft-long, 120-ft-wide subsurface waste disposal site used from 1967 until 1969. Approximately 4250 cu m (150000 cu ft) of radioactively contaminated waste from the U.S. Department of Energy's (DOE's) Rocky Flats Plant and DOE's Idaho National Engineering Laboratory (INEL) were placed in pit 9. A nominally 2.4-m (8-ft)-thick waste zone sits atop about 1 m of soil and is covered by about 2 m of overburden soil. The site is being remediated per a record of decision signed by the DOE, the state of Idaho Department of Health and Welfare, and the U.S. Environmental Protection Agency. Remediation includes excavation down to a rock layer about 6.5 m (17 to 20 ft) below grade. Excavation will be done by remotely operated equipment working under containment. Design and performance of the remotely operated equipment are described in this paper.

1399

V18/020963

Retrieval System for the INEL Pit 9 Remediation Yemington, C.R.; Burt, B.

Sonsub, Inc., Houston, TX; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (9 pp.) (1996)

The world's largest remotely operated mobile work system is being built to excavate landfills. This 1,500 ton, self propelled machine is 260 feet long, 100 feet wide, and 60 feet high, and can span landfills up to 120 foot wide. It is designed to separate waste from the soil, package them separately for transport to processing, and backfill the pit while maintaining double containment and negative internal pressure. An inert atmosphere can be maintained inside the system if needed to prevent ignition of pyroforic materials. The first application of this system is to be excavation of Pit 9, a 379 foot long by 120 foot wide waste burial site at the United States Department of Energy's Radioactive Waste Management Complex at the Idaho National Engineering Laboratory. Pit 9 was used as a waste disposal site between November 1967 and June 1969 and is being remediated in accordance with a Record of Decision signed by the United States Department of Energy, the United States Environmental Protection Agency, and state of Idaho Department of Health and Welfare. The mobile work system is operated entirely by remote control. Seven remotely operated tool systems operate

within the enclosure. Two use neutron radiation detection instruments to look into the dig face for radiation sources strong enough to require special handling. Two soil retrieval tools use brushes to dig out the soil and expose the waste. Two grapple tools gather and size reduce the waste and box it for transport to a processing area. The seventh tool system is designed to do routine maintenance on the other tools, resolve contingency situations, take samples, and excavate items which require special handling. The telerobotic tools are monitored by software which prevents the tools from colliding and allows digging only in areas which have passed survey by the criticality control survey instruments. A thousand foot fiber optic umbilical connects the mobile work system to consoles located in a control room well away from the excavation area. Advanced telemetry systems relay commands from the consoles and provide the operators with video and feedback from an extensive array of instruments which monitor the status and activities of the equipment. The remotely operated work systems separate the excavated soil and waste, package them separately in steel boxes, check the boxes to ensure that radiation levels are safe for downstream handling, and load the boxes on special trucks. Specially designed, remotely operated equipment keeps the outside of each box clean as the boxes are filled, closed, and air-locked into trucks for transport to a processing area.

1400 V18/022721

Engineered Barrier for the Stationary Low-Power Reactor No. 1 Burial Ground

Hiaring, C.M.; Jorgensen, D.K.; Rothermel, J.S.; Cotten, G.B.

Lockheed Idaho Technologies Company, Idaho Falls, ID; Parsons Engineering Science, Inc., Idaho Falls, ID

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 345-353) (1996)

The SL-1 burial ground at the DOE Idaho National Engineering Laboratory was constructed in 1961 to dispose of radioactively contaminated debris, soils, and gravel generated by the destruction of a small nuclear reactor. The INEL was officially placed on the National Priorities List in November 1989. Consequently, remediation of the SL-1 burial ground falls under the purview of CERCLA. The SL-1 burial ground consists of three excavations, in which a total volume of 99,000 cubic feet of contaminated material was deposited. The excavations ranged from 8 to 14 feet in depth and at least 2 feet of clean backfill was placed over each excavation. Shallow mounds of soil over the excavations were added at the completion of cleanup activities in September 1962. Results of the baseline risk assessment indicate that the direct human exposure pathway dominates the overall risk for the burial grounds. The primary contributor to this risk is cesium-137 and its progeny. Based upon consideration of the requirements of CERCLA, on detailed analysis, and on public comments, the DOE, the EPA, and the State of Idaho have selected containment by capping with an engineered long-term barrier comprised primarily of natural materials as the preferred alternative. The cover will be designed to maintain effective long-term isolation of contaminants. The number and thickness of layers designed in the cover were dependant on local climatic and geographic conditions, including

precipitation rate, freeze, depth, indigenous plant and animal species, and local topography. The engineered lifetime of the cap is a minimum of 400 years. Surface-water diversion measures, including contouring and grading, will be used as necessary to direct runoff away from the burial ground and into nearby, naturally occurring drainage formations.

1401 V18/022897

Summary of Analytical Results for Hydrologic Studies of Wells Open Through Large Intervals of the Snake River Plain Aquifer at the Idaho National Engineering Laboratory

McCurry, M.; Welhan, J.A.

Idaho State University, Idaho Falls, ID; Idaho Geological Survey, Idaho Falls, ID

DOE/ID/13042-51; 56 pp. (July 1996)

This report summarizes results of groundwater analyses for samples collected from wells USGS-44, -45, -46, and -59 in conjunction with the INEL Oversight Program straddle-packer project between 1992 and 1995. The purpose of this project was to develop and deploy a high-quality straddle-packer system for characterization of the three-dimensional geometry of solute plumes and aquifer hydrology near the Idaho Chemical Processing Plant (ICPP). Principle objectives included: (1) characterizing vertical variations in aquifer chemistry; (2) documenting deviations in aquifer chemistry from that monitored by the existing network, and (3) making recommendations for improving monitoring efforts. A comprehensive database of all measured geochemical parameters gathered during the study is included on an enclosed DOS-formatted disk, as a Microsoft [C] Excel 5 spreadsheet.

1402 V18/024252

Consensus Implementation of a Groundwater Remediation Project at the Idaho National Engineering Laboratory

Hastings, K.R.; Carlson, D.S.

U.S. Department of Energy, Idaho Operations Office, Idaho Falls, ID; Lockheed Martin Idaho Technologies Company, Idaho Falls, ID

INEL-96/00231; CONF-9608181; Enviroisig 96, Proceedings of a Conference, Denver, CO, August 26-30, 1996; (9 pp.) (1996)

Because of significant characterization uncertainties existing when the Record of Decision was signed and the unfavorable national reputation of groundwater pump and treat remediation projects, the Test Area North (TAN) groundwater ROD includes the evaluation of five emerging technologies that show potential for treating the organic contamination in situ or reducing the toxicity of contaminants above ground. Treatability studies will be conducted to ascertain whether any may be suitable for implementation at TAN to yield more timely or cost effective restoration of the aquifer. The implementation approach established for the TAN groundwater project is a consensus approach, maximizing a partnership relation with stakeholders in constant, iterative implementation decision making.

1403 V18/021211

Ecological Risk Assessment Screening for a Hazardous Waste Site: Results for a Waste Area Group at the INEL

VanHorn, R.L.; Hampton, N.L.; Mooney, E.J.

Idaho National Engineering Laboratory, Idaho Falls, ID;
Dames & Moore, Denver, CO

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 180) (1995)

A screening-level ecological risk assessment (SLERA) was performed using guidance developed specifically for CERCLA driven risk assessment at the Idaho National Engineering Laboratory (INEL). The guidance parallels EPA's framework and incorporates unique approaches to address contaminant issues specific to INEL waste area groups (WAGS) including: the use of existing information to screen sites and contaminants, identification and evaluation of ecological receptors using functional groups, and the use of ecologically-based screening levels for identifying contaminants of potential concern. The SLERA results for INEL's Waste Area Group 2 will be presented and discussed. (Complete text)

1404

V18/023452

Superfund Record of Decision (EPA Region 10): Idaho National Engineering Laboratory (USDOE), Operable Unit 26 (Stationary Low-Power Reactor-1 and Boiling Water Reactor Experiment-I Burial Grounds), Idaho Falls, ID, December 1, 1995

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ROD/R10-96/147; 110 pp. (March 1997)

This document presents the selected remedial action for the Stationary Low-Power Reactor-1 (SL-1) burial ground, the Boiling Water Reactor Experiment-I (BORAX-I) burial ground, and 10 no action sites in Waste Area Group 5. Actual or threatened releases of hazardous substances from the SL-1 and BORAX-I burial grounds, if not addressed by implementing the response action selected in this Record of Decision, may present a current or potential threat to public health, welfare, or the environment. The 10 no action sites do not present a threat to human health or the environment.

1405

V18/021571

Environmental Assessment: Closure of the Waste Calcining Facility (CPP-633), Idaho National Engineering Laboratory

Idaho National Engineering Laboratory, Idaho Falls, ID
DOE/EA-1149; 86 pp. (July 1996)

The U.S. Department of Energy (DOE) proposes to close the Waste Calcining Facility (WCF). The WCF is a surplus DOE facility located at the Idaho Chemical Processing Plant (ICPP) on the Idaho National Engineering Laboratory (INEL). Six facility components in the WCF have been identified as Resource Conservation and Recovery Act (RCRA)-units in the INEL RCRA Part A application. The WCF is an interim status facility.

Consequently, the proposed WCF closure must comply with Idaho Rules and Standards for Hazardous Waste contained in the Idaho Administrative Procedures Act (IDAPA) Section 16.01.05. These state regulations, in addition to prescribing other requirements, incorporate by reference the federal regulations, found at 40 CFR Part 265, that prescribe the requirements for facilities granted interim status pursuant to the RCRA. The purpose of the proposed action is to reduce the risk of radioactive exposure and release of hazardous constituents and eliminate the need for extensive long-term surveillance and maintenance. DOE has determined that the closure is needed to reduce potential risks to human health and the environment, and to comply with the Idaho Hazardous Waste Management Act (HWMA) requirements.

1406

V18/021542

HWMA Closure Plan for the Waste Calcining Facility at the Idaho National Engineering Laboratory

Lockheed Idaho Technologies Company, Idaho Falls, ID
INEL-96/0189; 51 pp. (May 1996)

The Waste Calcining Facility (WCF) calcined and evaporated aqueous wastes generated from the reprocessing of spent nuclear fuel. The calciner operated from 1963 to 1981, primarily processing high level waste from the first cycle of spent fuel extraction. Following the calciner shutdown the evaporator system concentrated high activity aqueous waste from 1983 until 1987. In 1988, US Department of Energy Idaho Operations Office (DOE-ID) requested interim status for the evaporator system, in anticipation of future use of the evaporator system. The evaporator system has not been operated since it received interim status. At the present time, DOE-ID is completing construction on a new evaporator at the New Waste Calcining Facility (NWCFF) and the evaporator at the WCF is not needed. The decision to not use the WCF evaporator requires Lockheed Idaho Technologies Company (LITCO) and DOE-ID to close these units. After a detailed evaluation of closure options, LITCO and DOE-ID have determined the safest option is to fill the voids (grout the vessels, cells and waste pile) and close the WCF to meet the requirements applicable to landfills. The WCF will be covered with a concrete cap that will meet the closure standards. In addition, it was decided to apply these closure standards to the calcining system since it is contained within the WCF building. The paper describes the site, waste inventory, closure activities, and post-closure care plans.

1407

V18/022325

Preliminary Engineering Report: Contaminated Groundwater Seeps, 317/319/ENE Area

Argonne National Laboratory, Environmental Management Operations, Argonne, IL
ANL/EM/RP-91327; 72 pp. (October 1, 1996)

When the Resource Conservation and Recovery Act Facility Investigation (RFI) in the 317/319/ENE Area of Argonne National Laboratory-East (ANL-E) was being completed, groundwater was discovered moving to the surface through series of seeps. The seeps are located approximately 600 ft south of the ANL fence line in Waterfall Glen Forest Preserve. Samples of this water were collected and analyzed for selected parameters. Two of five seeps sampled were found to contain detectable levels of contaminants. Three

chemical species were identified: chloroform (14-25 $\mu\text{g/L}$, carbon tetrachloride (56-340 $\mu\text{g/L}$, and tetrachloroethylene (3-6 $\mu\text{g/L}$). The other seeps did not contain detectable levels of volatile organic compounds (VOCs). The water issuing from these two contaminated seeps flows into a narrow ravine, where it is visible as a trickle of water flowing through sand and gravel deposits on the floor of the ravine. Approximately 100-ft downstream of the seep area, the contaminated water is no longer visible, having drained back into the soil in the bed of the ravine.

1408 V18/021009

Surveillance of Site A and Plot M: Report for 1995

Golchert, N.W.

Argonne National Laboratory, Environmental Management Operations, Argonne, IL

ANL-96/2; 65 pp. (June 1996)

The results of the environmental surveillance program conducted at Site A/Plot M in the Palos Forest Preserve area for 1995 are presented. The surveillance program is the ongoing remedial action that resulted from 1976-1978 radiological characterization of the site. That study determined that very low levels of hydrogen-3 (as tritiated water) had migrated from the burial ground and were present in two nearby hand-pumped picnic wells. The current program consists of sample collection and analysis of air, surface and subsurface water, and bottom sediment. The results of the analyses are used to (1) monitor the migration pathway of water from the burial ground (Plot M) to the hand-pumped picnic wells, (2) establish if buried radionuclides other than hydrogen-3 have migrated, and (3) generally characterize the radiological environment of the area. Hydrogen-3 in the Red Gate Woods Picnic wells was still detected this year, but the average and maximum concentrations were significantly less than found earlier. Tritiated water continues to be detected in a number of wells, boreholes, dolomite holes, and a surface stream. For many years it was the only radionuclide found to have migrated in measurable quantities. Analyses since 1984 have indicated the presence of low levels of strontium-90 in water from a number of boreholes next to Plot M. The available data does not allow a firm conclusion as to whether the presence of this nuclide represents recent migration or movement that may have occurred before Plot M was capped. The results of the surveillance program continue to indicate that the radioactivity remaining at Site A/Plot M does not endanger the health or safety of the public visiting the site, using the picnic area, or living in the vicinity.

1409 V18/020766

Groundwater Hydrology Study of the Ames Chemical Disposal Site

Stickel, T.

Ames Laboratory, Ames, IA

IS-T-1769; 128 pp. (May 9, 1996)

The Ames Laboratory Chemical Disposal Site is located in northwestern Ames, Iowa west of Squaw Creek. From 1957 to 1966, Ames Laboratory conducted research to develop processes to separate uranium and thorium from nuclear power fuel and to separate yttrium from neutron shielding sources. The wastes from

these processes, which contained both hazardous and radiological components, were placed into nine burial pits. Metal drums, plywood boxes, and steel pails were used to store the wastes. Uranium was also burned on the ground surface of the site. Monitoring wells were placed around the waste burial pits. Groundwater testing in 1993 revealed elevated levels of Uranium 234, Uranium 238, beta radiation, and alpha radiation. The north side of the burial pit had elevated levels of volatile organic compounds. Samples in the East Ravine showed no volatile organics; however, they did contain elevated levels of radionuclides. These analytical results seem to indicate that the groundwater from the burial pit is flowing down hill and causing contamination in the East Ravine. Although there are many avenues for the contamination to spread, the focus of this project is to understand the hydrogeology of the East Ravine and to determine the path of groundwater flow down the East Ravine. The groundwater flow data along with other existing information will be used to assess the threat of chemical migration down the East Ravine and eventually off-site. The primary objectives of the project were as follows: define the geology of the East Ravine; conduct slug tests to determine the hydraulic conductivity of both oxidized and unoxidized till; and develop a three-dimensional mathematical model using ModIME and MODFLOW to simulate groundwater flow in the East Ravine.

1410 V18/022064

Selection of a Method for Disposing of Leachate Grout Cockrell, R.G.

Cockrell & Associates, Inc., Greensboro, NC

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 416-423) (1994)

A major component of the selected remedy for the remediation of the Maxey Flats Disposal Site (MFDS) in eastern Kentucky is the removal, solidification, and on-site disposal of trench leachate, which is contaminated with radioactive waste. The leachate will be solidified with a commercial grout mix in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements. This paper reports on a study performed to select the best of six methods considered for the disposal of the leachate grout. The selected method, disposal in earth mounded concrete bunkers constructed above grade, has the concurrence of the U.S. Environmental Protection Agency (EPA), the Commonwealth of Kentucky (Commonwealth), and the Potentially Responsible Parties (PRPs) for the remediation of the MFDS.

1411 V18/022322

Environmental Assessment: Refurbishment of Uranium Hexafluoride Cylinder Storage Yards C-745-K, L, M, N, and P and Construction of a New Uranium Hexafluoride Cylinder Storage Yard (C-745-T) at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Jacobs Engineering Group Inc., Kevil, KY; U.S. Department

of Energy, Oak Ridge Operations Office, Paducah Site Office, Paducah, KY

DOE/EA-1118; 175 pp. (July 1996)

The U.S. Department of Energy (DOE) has completed an environmental assessment (DOE/EA-1118) entitled Refurbishment of Uranium Hexafluoride (UF₆) Cylinder Storage Yards C-745-K, L, M, N, and P and Construction of a New Uranium Hexafluoride Cylinder Storage Yard (C-745-T) at the Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky. Based on the results of the analysis reported in the EA, DOE has determined that the proposed action is not a major Federal action that would significantly affect the quality of the human environment within the context of the National Environmental Policy Act of 1969 (NEPA). Therefore, preparation of an environmental impact statement (EIS) will not be necessary, and DOE is issuing this Finding of No Significant Impact (FONSI). Additionally, pursuant to Executive Order 11990 and DOE Regulation 10 CFR 1022, Compliance with Floodplain/Wetlands Environmental Review Requirements, it is reported in this EA that the loss of less than one acre of wetlands at the proposed project site would not be a significant adverse impact.

1412

V18/022575

Summary of Events and Geotechnical Factors Leading to Decommissioning of the Strategic Petroleum Reserve (SPR) Facility at Weeks Island, Louisiana

Neal, J.T.; Bauer, S.J.; Ehgartner, B.L.

Sandia National Laboratories, Albuquerque, NM

SAND96-2263; 44 pp. (October 1996)

A sinkhole discovered over the edge of the Strategic Petroleum Reserve storage facility at Weeks Island Salt Dome, Louisiana, led to decommissioning the site during 1995-1998, following extensive diagnostics in 1994. The sinkhole resulted from mine-induced fractures in the salt which took many years to develop, eventually causing fresh water to leak into the storage chamber and dissolve the overlying salt, thus causing overburden collapse into the void. Prior to initiating the oil removal, a freeze wall was constructed at depth around the sinkhole in 1995 to prevent water inflow; a freeze plug will remain in place until the mine is backfilled with brine in 1997-8, and stability is reached. Residual oil will be removed; environmental monitoring has been initiated and will continue until the facility is completely plugged and abandoned, and environmental surety is achieved.

1413

V18/021267

Salmon Site - Characterization of Contamination Associated with an Underground Nuclear Detonation

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CONF-950917 (Vol. 2); ICEM '95, Proceedings of the Fifth International Conference on Radioactive Waste Management and Environmental Remediation, Vol. 2: Management of Low-Level Waste and Remediation of Contaminated Sites and Facilities, S. Slate, R. Baker and G. Benda (eds.), Berlin, Germany, September 3-7, 1995. American Society of Mechanical Engineers, New York, NY, 913 pp.; (pp. 1585-1589) (1995)

The Salmon Site, located in south central Mississippi, in the southeastern United States, was used for two nuclear explosive tests and two methane/oxygen explosive tests between 1964 and 1970. The tests were conducted in the Tatum Salt Dome, 823 meters (m) below the ground surface. In 1972, the land surface was remediated, the site was decommissioned, and the Long-Term Hydrologic Monitoring Program was initiated to collect surface water and groundwater samples from the site and surrounding areas annually. In 1978, the U.S. Department of Energy (DOE) installed a groundwater monitoring well in each aquifer over the salt dome, and extensive aquifer testing was conducted. Low, but above background, tritium concentrations were found in the Half Moon Creek Alluvial Aquifer, 3 m to 9 m below ground surface, and the Local Aquifer, 46 m to 61 m below the ground surface. Radioactivity above background was not found in the other four aquifers over the dome. In 1989, local citizens and political representatives raised concerns about the integrity of the shot cavity and whether there were hazardous substances in the near surface disposal and drilling mud pits. To respond to these concerns, a remedial investigation/feasibility study (RI/FS) was started at the Salmon Site. The shot cavity is 823 m below the ground surface, which has presented an interesting problem as to the best approach for characterizing the contamination. Examination of the problem shows that the most likely migration pathway is for contaminated groundwater to be pushed up an abandoned emplacement hole or re-entry boring as the salt stock closes in and pressurizes the shot cavity. Based on this scenario, the best way to determine whether leakage is occurring is to sample the aquifers over the dome. To do this, three wells are planned to be installed in each aquifer to collect representative soil and groundwater samples and to conduct aquifer testing to determine aquifer hydraulic properties. After evaluating the nature and extent of contamination, contaminant fate and transport modeling will be conducted. Surface contamination has resulted from site activities subsequent to the weapons testing and are not a result of a release during the actual testing. The old drilling mud pits and disposal areas have been investigated using surface geophysical methods, followed by soil and biota sampling and cone penetrometer testing. Based on the results of this testing, a number of shallow monitoring wells will be installed around the contaminated locations. An initial round of groundwater, soil, surface water sediment, and biota sampling was conducted in the spring of 1993. Low concentrations of chemical constituents were detected in all of the potential source areas, and above background concentrations of tritium were detected in the Half Moon Creek Alluvial Aquifer and the Local Aquifer at surface ground zero. After the additional wells are installed and soil and groundwater samples are collected and analyzed, and aquifer testing is completed, fate and transport modeling will be conducted, followed by a baseline risk assessment to determine whether additional remediation is needed.

1414

V18/022467

Innovation and Regulation at the Department of Energy's Kansas City Plant: Coupling Innovative Technology with a Petition for Alternate Concentration Limits

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Oak Ridge National Laboratory, Grand Junction, CO; AlliedSignal Aerospace, Kansas City, MO

CONF-9505101; Challenges and Innovations in the Management of Hazardous Waste, Proceedings of a Conference, Washington, DC, May 10-12, 1995; (pp. 439-449) (1995)

Hazardous materials were spilled in the 1940s and 1950s at the U.S. Department of Energy (DOE) Kansas City Plant (KCP). When remediation of the site was initiated, it was recognized that clay soils mitigated environmental risks and prevented application of most remedial methods. Regulatory personnel were informed that groundwater standards could not be achieved and that alternate concentration limits (ACLs) would be requested. Personnel from Oak Ridge National Laboratory (ORNL) and the KCP are using innovative technologies to support the ACL approach. For example, the colloidal borescope, developed with funds from the DOE Office of Technology Development (OTD), was used to evaluate the effects of building drains and utilities on groundwater flow. Because the contaminant source consists of dense non-aqueous phase liquids (DNAPL), a potential flaw in the ACL petition is uncertainty regarding the amount of contaminants present. Thus, source reduction options applicable to dense clay are being evaluated. In situ soil mixing, a technology initially demonstrated by DOE-OTD, will be evaluated during 1995. It is anticipated that these efforts will permit elimination of a pump-and-treat system that has been operating since 1989.

1415 V18/022965

Engineering Analyses of Remedial Action Alternatives - Phase I [Rev. 0]

U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project, St. Charles, MO; MK-Ferguson Company, St. Charles, MO; Jacobs Engineering Group Inc., St. Charles, MO

DOE/OR/21548-269 (Rev. 0); 165 pp. (November 1992)

The applicability of various technologies for remediating the Weldon Spring site has been examined in numerous separate remedial technology evaluation studies. The purpose of this report is to summarize these technology evaluation data to support the evaluation and screening of remedial action technologies in the Feasibility Study for Remedial Action at the Chemical Plant Area of the Weldon Spring Site. It should be noted that the costs and design concepts presented throughout this Phase I Engineering Analysis of Alternatives (EAA) report for the various remedial technologies are preliminary in nature. A companion report, Engineering Analysis of Remedial Alternatives, Phase II (Phase II EAA), presents more definitive data to support the feasibility study evaluation of remedial action alternatives.

1416 V18/022966

Engineering Analysis of Remedial Action Alternatives - Phase II [Rev. 0]

U.S. Department of Energy, Oak Ridge Operations Office, Weldon Spring Site Remedial Action Project, St. Charles, MO; MK-Ferguson Company, St. Charles, MO; Jacobs Engineering Group Inc., St. Charles, MO

DOE/OR/21548-270 (Rev. 0); 525 pp. (November 1992)

This report provides technical information to support the Feasibility Study for Remedial Action at the Chemical Plant Area of

the Weldon Spring Site (FS) prepared by Argonne National Laboratory (ANL). The focus of the Phase II Engineering Analysis of Alternatives (EAA) is on the five alternatives retained for detailed analysis in the FS: no further action; removal, chemical solidification/stabilization with on-site disposal; removal, vitrification with on-site disposal; removal, vitrification with off-site disposal at Clive, Utah; and removal, vitrification with off-site disposal at Richland, Washington. Specific information regarding each of these five alternatives is presented to support the detailed evaluation and comparative analysis of alternatives in the FS. It should be noted that the costs and design concepts presented throughout this Phase II EAA report for the various remedial technologies are preliminary in nature. A companion document, the Engineering Analysis of Remedial Action Alternatives, Phase I (Phase I EAA), presents engineering information for a range of potential treatment and containment options to support the FS screening process.

1417 V18/021559

Engineering Evaluation/Cost Analysis for the Proposed Removal Action at the Southeast Drainage near the Weldon Spring Site, Weldon Spring, Missouri

MK-Ferguson Company, St. Charles, MO; Argonne National Laboratory, Environmental Assessment Division, Argonne, IL

DOE/OR/21548-584; 104 pp. (August 1996)

The engineering evaluation/cost analysis (EE/CA) has been prepared to support the proposed removal of contaminated sediment from selected portions of the Southeast Drainage as part of cleanup activities being conducted at the Weldon Spring site in St. Charles County, Missouri, by the U.S. Department of Energy (DOE). The cleanup activities are conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, incorporating the values of the National Environmental Policy Act (NEPA). The Weldon Spring site is located near the town of Weldon Spring, about 48 km (30 mi) west of St. Louis. It consists of two noncontiguous areas: the chemical plant area and a limestone quarry about 6.4 km (4 mi) south-southwest of the chemical plant area. The Southeast Drainage is a natural 2.4-km (1.5-mi) channel that carries surface runoff to the Missouri River from the southern portion of the chemical plant area and a small portion of the ordnance works area (part of the Weldon Spring Training Area) south of the groundwater divide. The drainage became contaminated as a result of past activities of the U.S. Army and the DOE (and its predecessors).

1418 V18/023011

Geochemistry and Migration of Contaminants at the Weldon Spring Chemical Plant Site, St. Charles County, Missouri - 1989-91

Schumacher, J.G.

U.S. Geological Survey, Rolla, MO

DOE/OR-21892-93-433; 111 pp. (1993)

Investigations were conducted by the US Geological Survey in cooperation with the US Department of Energy at the Weldon Spring chemical plant site to determine the geochemistry of the shallow aquifer and geochemical controls on the migration of

uranium and other constituents from the raffinate (waste) pits. Water-quality analyses from monitoring wells at the site and vicinity property indicate that water in the shallow aquifer is a calcium magnesium bicarbonate type that is at equilibrium with respect to calcite and slightly supersaturated with respect to dolomite.

1419

V18/025439

Groundwater Flow and Ground- and Surface-Water Interaction at the Weldon Spring Quarry, St. Charles County, Missouri

Imes, J.L.; Kleeschulte, M.J.

U.S. Geological Survey, Water Resources Division, Rolla, MO

USGS/WRI-96-4279; 82 pp. (1997)

The detection of uranium-based contaminants in alluvial groundwater south of the quarry indicated the possibility that contaminated groundwater could migrate into the St. Charles County well field. A study was begun in March 1994 by the U.S. Department of Energy to address these concerns. This report presents the results of that study, defines the vertical and lateral movement of groundwater from the quarry to discharge areas in the Missouri River alluvial aquifer, and assesses groundwater and surface water interaction between the quarry area and Femme Osage Slough, Little Femme Osage Slough, and in the alluvium near the quarry. This report also provides: a groundwater flow path analysis from the quarry, data to support remedial actions associated with the removal of uranium-contaminated material from the quarry, and data that can aid in the construction and calibration of a digital groundwater flow model to simulate groundwater flow in the quarry and the nearby alluvial aquifer.

1420

V18/025521

Investigation of Leachates and a Geochemical Barrier for the WSSRAP Disposal Cell

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CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 653-655) (1996)

An on-site disposal cell is the selected alternative for sequestering contamination removed from the Weldon Spring Remedial Action Project (WSSRAP). This contamination comprises nitroaromatic and low-level radioactive wastes from the former Weldon Spring Ordinance Works and the former Weldon Spring Chemical Plant, respectively. The disposal cell is designed to prevent migration of contaminants into the environment and to remain "stable" for at least 1,000 years. Construction is planned to begin in 1997. The disposal cell consists of structural components to control leachate migration from the base of the cell, to prevent radon emanation from the top of the cell, and to maintain the physical stability of the cell. Chemical stabilization/solidification (CSS) will be used to improve the geotechnical properties of the fine raffinate sludges,

which were the by-products of uranium processing at the Weldon Spring Chemical Plant. Contaminated soils and other materials will be placed in the cell without additional processing. During the cell design process, the quality of leachates that would emanate from the wastes was unknown. Understanding the type of leachate and potential contaminant levels was not only important to design of future leachate treatment systems but also to evaluate the effectiveness of the disposal cell itself.

1421

V18/024250

Corrective Action Investigation Plan for Project Shoal Area CAU No. 416

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-454; 129 pp. (August 1996)

This Corrective Action Investigation Plan (CAIP) is part of an ongoing US Department of Energy (DOE)-funded project for the investigation of Corrective Action Unit (CAU) No. 416, Project Shoal Area (PSA). Project Shoal was conducted to determine whether seismic waves produced by underground nuclear testing could be differentiated from naturally occurring earthquakes. The PSA site is located approximately 30 miles southeast of Fallon, Nevada, in the northern portion of Sand Springs Mountains in Churchill County. This CAIP will be implemented in accordance with the Federal Facility Agreement and Consent Order, the Industrial Sites Quality Assurance Project Plan, and all applicable Nevada Division of Environmental Protection policies and regulations.

1422

V18/022340

Insitu Radiological Surveying at the Double Tracks Site, Nellis Air Force Range, Tonopah, NV

Bechtel Nevada Corporation, Las Vegas, NV

DOE/NV/11718-013; 45 pp. (April 1996)

A team for the Remote Sensing Laboratory conducted a series of insitu radiological measurements at the Double Tracks site on the Nellis Air Force Range just east of Goldfield, Nevada, during the periods of April 10-13 and June 5-9, 1995. The survey team measured the terrestrial gamma radiation at the site to determine the levels of natural and man-made radiation. This site includes the areas covered by previous surveys conducted from 1962 through 1993. The main purpose of the first expedition was to assess several new techniques for characterizing sites with dispersed plutonium. The two purposes of the second expedition were to characterize the distribution of transuranic contamination (primarily plutonium) at the site by measuring the gamma rays from americium-241 and to assess the performance of the two new detector platforms. Both of the new platforms performed well, and the characterization of the americium-241 activity at the site was completed. Several plots compare these ground-based system measurements and the 1993 aerial data. The agreement is good considering the systems are characterized and calibrated through independent means. During the April expedition, several methods for measuring depth distribution of americium-241 in the field were conducted as a way of quickly and reliably obtaining depth profiles without the need to wait for laboratory analysis. Two of the methods were not very effective, but the results of the third method appear very promising.

1423 V18/020967

Application of EPA Quality Assurance Procedures to a Soil Characterization Study at the DOE Nevada Test Site

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CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (14 pp.) (1996)

The transfer, modification, and application of well formulated and tested quality assurance (QA) procedures from one project to another deserves consideration. The use of a proven QA program design could result in cost savings and the collection of data with a greater degree of confidence. To test this thesis, a QA program, originally developed for large nationwide Environmental Protection Agency (EPA) programs, was adapted and implemented in a site characterization study at the Department of Energy (DOE) Nevada Test Site to ensure that laboratory data satisfied pre-determined measurement quality objectives (MQOs). The QA procedures were adapted from EPA programs such as the National Acid Precipitation Assessment Program and the Environmental Monitoring and Assessment Program, and to a lesser degree, from programs operating under the requirements of the Comprehensive Environmental Recovery, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). The QA design adopted the batch or lot concept, in which samples are organized into groups of samples for laboratory analysis. Approximately 10 percent of the total samples were measurement quality samples (non-blinds, blinds, and double-blinds), which were included in each batch to evaluate and control measurement uncertainty. Detectability was assessed using instrument detection limits and precision data for low-concentration samples. Precision was assessed using data from reference samples under a two-tiered system based on concentration ranges. Accuracy was investigated in terms of bias with respect to reference values. The results showed that QA concepts developed for previous nationwide EPA programs were successfully adapted for the site-specific DOE project.

1424 V18/022338

Evaluation of Cobalt Mobility in Soils from the Nevada Test Site

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DOE/NV/10845-58; 30 pp. (September 1996)

Nuclear testing at and around the Nevada Test Site (NTS) resulted in widespread contamination from transuranic and other radionuclides, as well as from other toxic inorganic and organic contaminants. The type of contamination, including spatial distribution and type of radionuclides present, depends on the type of testing performed.

Remediation of the contaminated areas is currently under way. The optimum in situ or exsitu remediation technology depends on the degree of interaction between the particular radionuclide, or contaminant in general, and the soil matrix, among other factors. The objective of this project was to evaluate the sorption affinity of NTS soils for common non-transuranic radionuclides. The sorption of cobalt (Co) on soils from two different areas of the NTS, namely the Little Feller and Cabriole event sites, was studied. Experiments were conducted as a function of pH, solid concentration, total Co concentration, ionic strength, and particle size fraction. Preliminary results indicate that both soils have a high sorption capacity for Co. The results suggest that Co uptake is controlled by sorption on either internal, permanent-charge, ion-exchange sites of clay minerals or on amphoteric, surface-hydroxyl sites of oxide. The results further indicate strong retardation of Co in these soils, under most conditions tested and expected to be found in the respective soil environments. These conclusions are applicable to transport of radionuclides which are expected to bind strongly on oxide surfaces (e.g., Co) but the results may not be representative of the behavior of weakly binding radionuclides. These studies clearly demonstrate the importance of evaluating the mobility of radionuclides and the degree of radionuclide-soil interaction before final selection of an in situ or exsitu remediation technology for a contaminated site.

1425 V18/020665

Summary of Hydrogeologic Controls on Groundwater Flow at the Nevada Test Site, Nye County, Nevada

Lacznia, R.J.; Cole, J.C.; Sawyer, D.A.; Trudeau, D.A.

U.S. Geological Survey, Carson City, NV

DOE/NV/11040-T1; 128 pp. (1996)

The underground testing of nuclear devices has generated substantial volumes of radioactive and other chemical contaminants below ground at the Nevada Test Site (NTS). Many of the more radioactive contaminants are highly toxic and are known to persist in the environment for thousands of years. In response to concerns about potential health hazards, the U.S. Department of Energy, under its Environmental Restoration Program, has made NTS the subject of a long-term investigation. Efforts will assess whether byproducts of underground testing pose a potential hazard to the health and safety of the public and, if necessary, will evaluate and implement steps to remediate any of the identified dangers. Groundwater flow is the primary mechanism by which contaminants can be transported significant distances away from the initial point of injection. Flow paths between contaminant sources and potential receptors are separated by remote areas that span tens of miles. The diversity and structural complexity of the rocks along these flow paths complicates the hydrology of the region. Although the hydrology has been studied in some detail, much still remains uncertain about flow rates and directions through the fractured-rock aquifers that transmit water great distances across this arid region. Unique to the hydrology of NTS are the effects of underground testing, which severely alter local rock characteristics and affect hydrologic conditions throughout the region. This report summarizes what is known and inferred about groundwater flow throughout the NTS region. The report identifies and updates what is known about some of the major controls on groundwater flow, highlights some of the uncertainties in the current understanding,

and prioritizes some of the technical needs as related to the Environmental Restoration Program.

1426

V18/023512

Technique Development for the Extraction of Environmental Levels of Iodide from Groundwaters at the Nevada Test Site for the Purpose of Iodine 129/Iodine 127 Analyses

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Lawrence Livermore National Laboratory, Livermore, CA
UCRL-ID-116146; 14 pp. (February 1994)

A technique was developed to extract iodine from groundwaters with very low concentrations of iodine (on the order of $\mu\text{g/L}$ or ppb). Sufficient iodine was necessary (approximately 5 mg AgI) for analysis of the I129/I127 on the Tandem Accelerator Mass Spectrometer (AMS). The technique for separating iodine from groundwater was developed for the field to eliminate shipping of thousands of liters of water back to the laboratory. The technique was field tested on several springs and wells at the Nevada Test Site (NTS). Preliminary isotope ratios are presented along with total iodine concentrations of the waters. A table including 31 selected well and spring samples throughout the NTS presents a previously unknown range of iodine concentrations in groundwaters at the NTS.

1427

V18/021553

Evaluation of Technologies for Volume Reduction of Plutonium-Contaminated Soils from the Nevada Test Site

Papelis, C.; Jacobson, R.L.; Miller, F.L.; Shaulis, L.K.

University of Nevada, Water Resources Center, Las Vegas, NV

DOE/NV/10845-57; 185 pp. (June 1996)

Nuclear testing at and around the Nevada Test Site (NTS) resulted in plutonium (Pu) contamination of the soil over an area of several thousands of acres. The objective of this project was to evaluate the potential of five different processes to reduce the volume of Pu-contaminated soil from three different areas, namely Areas 11, 13, and 52. Volume reduction was to be accomplished by concentrating the Pu into a small but highly contaminated soil fraction, thereby greatly reducing the volume of soil requiring disposal. The processes tested were proposed by Paramag Corporation (PARAMAG), Advanced Processing Technologies Inc. (APT), Lockheed Environmental Systems and Technologies (LESAT), Nuclear Remediation Technologies (NRT), and Scientific Ecology Group (SEG). Because of time and budgetary restraints, the NRT and SEG processes were tested with soil from Area 11 only. These processes typically included a preliminary soil conditioning step (e.g., attrition scrubbing, wet sieving), followed by a more advanced process designed to separate Pu from the soil, based on physiochemical properties of Pu compounds (e.g., magnetic susceptibility, specific gravity). Analysis of the soil indicates that a substantial fraction of the total Pu contamination is typically confined in a relatively narrow and small particle size range. Processes which were able to separate this highly contaminated soil fraction (using physical methods, e.g., attrition scrubbing, wet

sieving), from the rest of the soil achieved volume (mass) reductions on the order of 70%. The advanced, more complex processes tested did not enhance volume reduction. The primary reason why processes that rely on the dependence of settling velocity on density differences failed was the very fine grain size of the Pu-rich particles.

1428

V18/024247

Corrective Action Investigation Plan: Area 2 Photo Skid 16 Wastewater Pit, Corrective Action Unit 332 [Rev. 1]

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-458 (Rev. 1); 107 pp. (January 1997)

This Corrective Action Investigation Plan (CAIP) contains a detailed description and plan for an environmental investigation of the Area 2 Photo Skid 16 Wastewater Pit. The site is located in Area 2 of the Nevada Test Site. The Photo Skid Wastewater Pit was used for disposal of photochemical process waste, and there is a concern that such disposal may have released photochemicals and metals to the soil beneath the pit and adjacent to it. The purpose of this investigation is to identify the presence and nature of contamination present in and adjacent to the wastewater pit and to determine the appropriate course of environmental response action for the site. The potential courses of action for the site are clean closure through remediation, closure in place (with or without remediation), or no further action.

1429

V18/020768

Arid Zone Lysimeter Facility for Performance Assessment and Closure Investigations at the Nevada Test Site

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DOE/NV/10833-34; CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (8 pp.) (1996)

Two precision weighing lysimeters were installed near the Area 5 Radioactive Waste Management Site (RWMS) on the Nevada Test Site to provide support for investigations of water, solute, and heat fluxes in the near-surface of the soil. The lysimeters consist of soil tanks with a volume of 16 cubic meters mounted on a sensitive scale. One lysimeter was revegetated with native shrubs whereas the other was kept bare to stimulate a non-vegetated waste cover. Data consisting of physical and hydrological properties of the lysimeter soils, thermal and moisture conditions in the lysimeters, and atmospheric boundary conditions are being collected for calibrating and verifying computer models for simulating the flow of water and heat in the near surface alluvium at the Area 5 RWMS. This effort will provide site-specific models for demonstration of "no migration" of constituents to the water table. Moisture and thermal conditions in the lysimeters are monitored daily using time domain reflectometry probes and thermocouple psychrometers. Daily evaporation and evapotranspiration are calculated from the lysimeter scales. Meteorological variables are monitored by sensors

mounted on a 3 meter tower adjacent to the lysimeters. An array of soil-solution samplers to be installed through the side of the soil tank will allow studies of waste mobility under natural conditions. Conceptual designs for closure at the RWMS are focused on using an upper layer of repacked native alluvium, which can be tested with the lysimeters. In addition, performance of other components such as a capillary barrier can be tested by installing a scaled version in one of the lysimeter tanks.

1430 V18/022948

Resource Conservation and Recovery Act Industrial Site Environmental Restoration Site Characterization Report: Area 6 Steam Cleaning Effluent Ponds

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-457; 56 pp. (September 1996)

The Area 6 North and South Steam Cleaning Effluent Ponds (SCEPs) are historic disposal units located at the Nevada Test Site (NTS) in Nye County, Nevada. The NTS is operated by the U.S. Department of Energy, Nevada Operations Office (DOE/NV) which has been required by the Nevada Division of Environmental Protection (NDEP) to characterize the site under the requirements of the Resource Conservation and Recovery Act (RCRA) Part B Permit for the NTS and Title 40 Code of Federal Regulations, Part 265. To characterize surface and subsurface conditions and to provide sufficient information to develop closure strategies for the ponds, investigative excavation was undertaken within and in the vicinity of the ponds. Soil cuttings and vapor samples were collected from the excavations. Detailed field observations, including lithologic descriptions, were also made. This report contains a summary of findings.

1431 V18/024251

Resource Conservation and Recovery Act Industrial Site Environmental Restoration Site Characterization Plan: Area 6 Steam Cleaning Effluent Ponds

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-415; 111 pp. (February 1996)

This plan presents the strategy for the characterization of the Area 6 South and North Steam Cleaning Effluent Ponds (SCEPs) at the Nevada Test Site (NTS) to be conducted for the US Department of Energy, Nevada Operations Office (DOE/NV), Environmental Restoration Division (ERD). The purposes of the planned activities are to: obtain sufficient, sample analytical data from which further assessment, remediation, and/or closure strategies may be developed for the site; obtain sufficient, sample analytical data for management of investigation-derived waste (IDW). The scope of the characterization may include excavation, drilling, and sampling of soil in and around both ponds; sampling of the excavated material; in situ sampling of the soil at the bottom and on the sides of the excavations as well as within subsurface borings; and conducting sample analysis for both characterization and waste management purposes. Contaminants of concern include RCRA-regulated VOCs and metals.

1432 V18/025450

Resource Conservation and Recovery Act Industrial Site Environmental Restoration Site Characterization Plan: Area 23, Building 650 Leachfield [Rev. 1]

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-462 (Rev. 1); 101 pp. (March 1997)

This plan presents the strategy for the characterization of Corrective Action Unit 94, Area 23, Building 650 Leachfield (referred to as 650 Leachfield) at the Nevada Test Site, which will be conducted for the US Department of Energy Nevada Operations Office Environmental Restoration Division. The objectives of the planned activities are to: obtain sufficient sample analytical data from which further assessment, remediation, and/or closure strategies may be developed for the site and obtain sufficient sample analytical data for management of investigation-derived waste. All references to regulations in this plan are to the versions of the regulations that are current at the time of publication of this plan. The scope of the characterization will include subsurface soil boring, in situ sampling of the soil within subsurface soil borings, and sample analysis for both site characterization and waste management purposes.

1433 V18/023043

Three-Dimensional Mapping of Equiprobable Hydrostratigraphic Units at the Frenchman Flat Corrective Action Unit, Nevada Test Site

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U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV; Nevada University, Water Resources Center, Las Vegas, NV

DOE/NV/11508-20; 20 pp. (September 1996)

Geological and geophysical data are used with the sequential indicator simulation algorithm of Gomez-Hernandez and Srivastava to produce multiple, equiprobable, three-dimensional maps of informal hydrostratigraphic units at the Frenchman Flat Corrective Action Unit, Nevada Test Site. The upper 50 percent of the Tertiary volcanic lithostratigraphic column comprises the study volume. Semivariograms are modeled from indicator-transformed geophysical tool signals. Each equiprobable study volume is subdivided into discrete classes using the ISIM3D implementation of the sequential indicator simulation algorithm. Hydraulic conductivity is assigned within each class using the sequential Gaussian simulation method of Deutsch and Journel. The resulting maps show the contiguity of high and low hydraulic conductivity regions.

1434 V18/022082

Comparison of Models to Assess the Atmospheric Dispersion of Resuspended Radionuclides on the Nevada Test Site

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CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated

Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 321-325) (1994)

A study of computer codes was made to determine the suitability of their use for modeling radionuclide dispersion from attachment to fugitive dust at the GMX safety shot area of the Nevada Test site. Two codes, the Industrial Source Complex 2 Long Term Model (ISCLT2) and the Fugitive Dust Model (FDM), were subsequently chosen to model the GMX site. Dose calculations were performed using the output values generated by the computer codes. The concentration values produced by the two codes were within a factor of two of each other and were not significantly different. The FDM, however, was felt to be a more useful code for use in calculating doses caused by attachment to fugitive dust.

1435

V18/023041

Assessment of Hydrologic Transport of Radionuclides from the Gnome Underground Nuclear Test Site, New Mexico

Earman, S.; Chapman, J.; Pohlmann, K.; Andricevic, R.

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV; Nevada University, Water Resources Center, Las Vegas, NV

DOE/NV/11508-11; 40 pp. (September 1996)

The U.S. Department of Energy (DOE) is operating an environmental restoration program to characterize, remediate, and close non-Nevada Test Site locations that were used for nuclear testing. Evaluation of radionuclide transport by groundwater from these sites is an important part of the preliminary site risk analysis. These evaluations are undertaken to allow prioritization of the test areas in terms of risk, provide a quantitative basis for discussions with regulators and the public about future work at the sites, and provide a framework for assessing data needs to be filled by site characterization. The Gnome site in southeastern New Mexico was the location of an underground detonation of a 3.5-kiloton nuclear device in 1961 and a hydrologic tracer test using radionuclides in 1963. Transport calculations were performed using the solute flux method, with input based on the limited data available for the site. Model results suggest that radionuclides may be present in concentrations exceeding drinking water regulations outside the drilling exclusion boundary established by DOE. This modeling was performed to investigate how the uncertainty in various physical parameters affects radionuclide transport at the Gnome site, and to serve as a starting point for discussion regarding further investigation at the site; it was not intended to be a definitive simulation of migration pathways or radionuclide concentration values. Given the sparse data, the modeling results may differ significantly from reality. Confidence in transport predictions can be increased by obtaining more site data, including determining whether the hypothesized release of radionuclides from the cavity to the Culebra Dolomite has occurred, determining an accurate groundwater velocity in the Culebra, and defining sorption properties for possible contaminants.

1436

V18/025523

Annual Report: RCRA Post-Closure Monitoring and Inspections for the Mercury Landfill Hazardous Waste Trenches for the Period October 1995-October 1996

Emer, D.F.; Smith, J.L.

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV/11718-092; 238 pp. (January 1997)

The Area 23 Hazardous Waste Trenches were closed in-place in September 1993. Post-closure monitoring of the Area 23 Hazardous Waste Trenches began in October 1993. The post-closure monitoring program is used to verify that the Area 23 Hazardous Waste Trench covers are performing properly, and that there is no water infiltrating into the waste trenches. The performance of the Area 23 Hazardous Waste Trenches is currently monitored using 30 neutron access tubes positioned on and along the margins of the covers. Soil moisture measurements are obtained in the soils directly beneath the trenches and compared to baseline conditions from the first year of post-closure operation. This report documents the post-closure activities between October 1995 and October 1996.

1437

V18/024258

Summary of Data Concerning Radiological Contamination at Well PM-2, Nevada Test Site, Nye County, Nevada

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U.S. Geological Survey, Carson City, NV

USGS-OFR-96-599; 88 pp. (1997)

Analysis of water from well Pahute Mesa No. 2 (PM-2), on Pahute Mesa in the extreme northwestern part of the Nevada Test Site, indicated tritium concentrations above background levels in August 1993. A coordinated investigation of the tritium occurrence in well PM-2 was undertaken by the Hydrologic Resources Management Program of the US Department of Energy. Geologic and hydrologic properties of the hydrogeologic units were characterized using existing information. Soil around the well and water quality in the well were characterized during the investigation. The purpose of this report is to present existing information and results from a coordinated investigation of tritium occurrence. The objectives of the overall investigation include: (1) determination of the type and concentration of contamination; (2) identification of the source and mechanism of contamination; (3) estimation of the extent of radiological contamination; (4) initiation of appropriate monitoring of the contamination; and (5) reporting of investigation results. Compiled and tabulated data of the area are presented. The report also includes characterization of geology, soil, hydrology, and water quality data.

1438

V18/023944

Nevada Test Site Underground Storage Tank Number 12-13-1: Nevada Division of Emergency Management Number H931130E Corrective Action Unit 450 - Closure Report

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-11718-060; 235 pp. (January 1997)

The project site was identified as an abandoned Underground Storage Tank (UST) to be closed under the Department of Energy/Nevada Operations Office (DOE/NV) Environmental Restoration Division (RDX) Program during Fiscal Year 1993. The United States Environmental Protection Agency (EPA) requires that before permanent closure is completed an assessment of the site must take place. The Nevada Division of Environmental Protection (NDAC) requires assessment and corrective actions for a petroleum substance in the soil which exceeds 100 milligrams per kilogram (mg/kg). Subsequent to the tank removal, a hydrocarbon release was identified at the site. The release was reported to the NDEP by DOE/NV on November 30, 1993. Nevada Division of Environmental Management (NDEM) Case Number H931130E was assigned. This final closure report documents the assessment and corrective actions taken for the hydrocarbon release identified at the site.

1439 V18/023758

Application of Pollution Prevention Opportunity Assessments to Environmental Restoration Projects

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GeoTrans, Inc., Las Vegas, NV; International Technology Corporation, Las Vegas, NV; U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

CONF-9505111; Shaping the Future Through Pollution Prevention: Involvement - Commitment - Progress, Proceedings of the Eleventh DOE Pollution Prevention Conference, Knoxville, TN, May 16-18, 1995, 495 pp.; (pp. 83-88) (November 1995)

During July 1994, the U.S. Department of Energy Headquarters provided funding to the DOE Nevada Operations Office (DOE/NV) to implement Pollution Prevention Opportunity Assessments (PPOAs) on Environmental Restoration activities. This funding was provided to develop a pilot program to study the applicability of PPOAs to Environmental Restoration activities. The Underground Test Area (UGTA) Operable Unit groundwater characterization project was chosen as the topic of the first Nevada Environmental Restoration Program PPOA because it is a long-term (approximately 20-year) project with numerous repeatable elements and large quantities of waste generated. The Environmental Restoration Division (ERD) of the DOE/NV has been conducting groundwater characterization as part of the UGTA Operable Unit subprojects at the Nevada Test Site (NTS), Nye County, Nevada. The object of the UGTA Operable Unit project is to obtain geophysical, geological, hydrologic, chemical, and radionuclide data for characterizing the groundwater system beneath the NTS. This involves drilling wells which are typically 914 to 1828 meters (3,000 to 6,000 feet) deep and 30 to 61 centimeters (12 to 24 inches) in diameter, and characteristically produce millions of gallons of effluent. Effluent is placed in lined sumps and the liquids are allowed to evaporate. The effluent consists of groundwater, drilling additives and geologic cuttings from the drilling process. The drilling additives include soap, bentonite clay, and/or polymers. While certain drilling additives are solids, they remain suspended in the liquid until settling. Solids remaining after evaporation of the liquid must be managed as waste. A typical well produces 200 cubic meters (7000 cubic feet) of solids. The PPOA identified opportunities to eliminate or minimize the potential for generation

of contaminated drilling effluent while drilling through the unsaturated zone. The assessment identified a method to separate the geologic cuttings from the liquids prior to being discharged into lined sumps. This separation would enable the solid material to be separated before potential contamination of solids occurred. The liquid portion of the drilling effluent (which contains drilling additives) could be reused, resulting in substantial cost avoidance and waste minimization. The waste minimization evaluation of produced drilling effluent revealed the potential for waste minimization and cost avoidance. Waste minimization implementation options identified by the PPOA have associated costs ranging from very minimal to \$290,350.00 with cost avoidance ranging from \$0.00 to \$1,139,000.00. This process also identified a potential for a safer work environment. In addition to the UGTA Operable Unit drilling operations, it was determined that future PPOAs may be used to help characterize, review, identify, and evaluate opportunities to eliminate or reduce the use of materials and generation of hazardous, nonhazardous, radioactive and mixed wastes within other Nevada ERD activities.

1440 V18/022590

Completion Report for Well ER-19-1

International Technology Corporation, Las Vegas, NV

DOE/NV-410; 93 pp. (December 1995)

Well ER-19-1 was drilled for the U.S. Department of Energy (DOE), Nevada Operations Office (DOE/NV), in support of the Nevada Environmental Restoration Project at the Nevada Test Site (NTS), Nye County, Nevada. IT Corporation (IT) was the principal environmental contractor for the project. The roles and responsibilities of IT and other contractors involved in the project are described in the Raytheon Services Nevada (RSN) Drilling and Completion Programs. The Well ER-19-1 investigation is part of the DOE's Underground Test Area (UGTA) project at the NTS. The goals of the UGTA project include collecting geological, geophysical, hydrological, and water chemistry data from new and existing wells to define groundwater migration pathways, migration rates, and quality at the NTS. An additional major objective of drilling Well ER-19-1 was to develop dual-wall, reverse-circulation drilling technology for use on small-diameter wells at the NTS. The well will become part of the UGTA monitoring well network.

1441 V18/022583

Completion Report for Well ER-3-2

International Technology Corporation, Las Vegas, NV

DOE/NV-408; 80 pp. (December 1995)

Well ER-3-2 was drilled for the U.S. Department of Energy, Nevada Operations Office (DOE/NV), in support of the Nevada Environmental Restoration Project (NV ERP) at the Nevada Test Site. IT Corporation (IT) was the principal environmental contractor for the project. The roles and responsibilities of IT and other contractors involved in the project are described in the Raytheon Services Nevada (RSN) Drilling Program and the Underground Test Area Operable Unit Project Management Plan. The well will become part of the Underground Test Area (UGTA) monitoring well network.

1442 V18/022591

Completion Report for Well ER-30-1

International Technology Corporation, Las Vegas, NV

DOE/NV-407; 79 pp. (December 1995)

Well ER-30-1 was drilled for the U.S. Department of Energy (DOE), Nevada Operations Office, in support of the Nevada Environmental Restoration Project at the Nevada Test Site (NTS). IT Corporation (IT) was the principal environmental contractor for the project. The roles and responsibilities of IT and other contractors involved in the project are described in the Raytheon Services Nevada (RSN) Drilling and Completion Programs and the Underground Test Area Operable Unit Project Management Plan. The Well ER-30-1 investigation is part of the DOE's Underground Test Area (UGTA) Project at the NTS, the goals of which include collecting geological, geophysical, hydrological, and water-chemistry data from new and existing wells to define groundwater migration pathways, rates of migration, and groundwater quality at the NTS. The well will become part of the UGTA monitoring well network.

1443

V18/022078

Estimating Worker Dose at the Nevada Test Site and the Tonopah Test Range

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CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 489-492) (1994)

A preliminary risk assessment was conducted to determine the dose to workers in the vicinity of the Safety Shot areas located on the Nevada Test Site (NTS) and the Tonopah Test Range (TTR). The arid soil contains the radionuclides plutonium-238, 239, 240, 241 and americium-241. The source term data were obtained from the work of Gilbert and McArthur. The exposure scenarios developed for the workers were based upon typical duties assigned to these workers by the DOE, the Air Force and REECO. The dose calculation was performed by utilizing pathway analysis techniques developed originally by the Nevada Applied Ecology Group and updated by the University of Cincinnati. Preliminary results showed that 95% of the dose would be from inhalation. The most recent work in dust resuspension and enhancement of plutonium in the dust was used to predict the quantity of inhaled radionuclides. The results were presented in terms of a dose-to-source (DSR) ratio. The results indicated that a typical worker dose, without protective equipment, would range from a few millirem per year up to 28 mrem/y.

1444

V18/022582

Housekeeping Category Corrective Action Unit Work Plan

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-452; 40 pp. (August 1996)

The purpose of this Corrective Action Unit (CAU) Work Plan is to provide a strategy to be used by the US Department of Energy Nevada Operations Office (DOE/NV), the US Department of Defense (DoD) Defense Special Weapons Agency (DSWA) (formerly the Defense Nuclear Agency), and contractor personnel for conducting corrective actions at the Nevada Test Site (NTS) and Nevada off-site locations including the Tonopah Test Range (TTR), the Project Shoal Area, and the Central Nevada Test Area. This Work Plan applies to housekeeping category CAUs already listed in the Federal Facility Agreement and Consent Order (FFACO) Appendices (FFACO, 1996) as well as newly identified Corrective Action Sites (CASs) that will follow the housekeeping process.

1445

V18/024249

Corrective Action Investigation Plan for Central Nevada Test Area CAU No. 417

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-450; 99 pp. (January 1997)

This Corrective Action Investigation Plan (CAIP) is part of a US Department of Energy (DOE)-funded environmental investigation of the Central Nevada Test Area (CNTA). The CNTA is located in Hot Creek Valley in Nye County, Nevada, adjacent to US Highway 6, about 15 kilometers (10 miles) northeast of Warm Springs. The CNTA was the site of Project Faultless, a nuclear device detonated in the subsurface by the US Atomic Energy Commission (AEC) in January 1968. The purpose of this test was to gauge the seismic effects of relatively large, high-yield detonations completed outside of the Nevada Test Site (NTS). The test was also used to determine the suitability of the site for future large detonations.

1446

V18/022589

Clean Slate Corrective Action Investigation Plan

International Technology Corporation, Las Vegas, NV

DOE/NV-456; 156 pp. (May 1996)

The Clean Slate sites discussed in this report are situated in the central portion of the Tonopah Test Range (TTR), north of the Nevada Test Site (NTS) on the northwest portion of the Nellis Air Force Range (NAFR) which is approximately 390 kilometers (240 miles) northwest of Las Vegas, Nevada. These sites were the locations for three of the four Operation Roller Coaster experiments. These experiments evaluated the dispersal of plutonium in the environment from the chemical explosion of a plutonium-bearing device. Although it was not a nuclear explosion, Operation Roller Coaster created some surface contamination which is now the subject of a corrective action strategy being implemented by the Nevada Environmental Restoration Project (NV ERP) for the U.S. Department of Energy (DOE). Corrective Action Investigation (CAI) activities will be conducted at three of the Operation Roller Coaster sites. These are Clean Slate 1 (CS-1), Clean Slate 2 (CS-2), and Clean Slate 3 (CS-3) sites, which are located on the TTR. The document that provides or references all of the specific information relative to the various investigative processes is called the Corrective Action Investigation Plan (CAIP). This CAIP has been prepared for the DOE Nevada Operations

Office (DOE/NV) by IT Corporation (IT).

1447 V18/024248

Corrective Action Investigation Plan: Cactus Spring Waste Trenches [Rev. 2]

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-429; 144 pp. (February 1997)

This Correction Action Investigation Plan (CAIP) contains environmental sample collection objectives and logic for the Corrective Action Unit (CAU) No. 426, which includes the Cactus Spring Waste Trenches, CAS No. RG-08-001-RG-CS. The Cactus Spring Waste Trenches are located at the Tonopah Test Range (TTR) which is part of the Nellis Air Force Range, approximately 255 kilometers (140 miles) northwest of Las Vegas, Nevada, by air. The purpose of this investigation is to generate sufficient data to establish the types of waste buried in the trenches, identify the presence and nature of contamination, determine the vertical extent of contaminant migration below the Cactus Spring Waste Trenches, and determine the appropriate course of action for the site. The potential courses of action for the site are clean closure, closure in place (with or without remediation), or no further action.

1448 V18/021132

Recycling and Waste Minimization Alternatives Associated with Unexploded Ordnance Remediation at the Tonopah Test Range

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GeoTrans, Inc., Las Vegas, NV; KMI Services, Tonopah, NV; U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (4 pp.) (1996)

Six unexploded ordnance (UXO) disposal sites were remediated at the Tonopah Test Range. Each site contained various types of UXO and miscellaneous debris associated with range cleanup operations. Several methods of waste minimization and recycling were used to assist in the clean up of the six ordnance disposal sites. Clean up operations at all six sites were performed at the same time to save time and money. Several process changes and material substitutions were made during the course of operations to minimize waste volume. Using process knowledge, Explosive Ordnance Disposal (EOD) specialists knowledge, the RCRA scrap metal exclusion, and on-site radiological screening, items removed from the ordnance sites were segregated into recyclable, non-recyclable debris, and potentially hazardous waste piles. The above techniques greatly minimized the potential for cross contamination and mixed waste generation especially at two of the nine sites where depleted uranium was detected within some of the scrap being removed at one and soil bags of unknown origin were found at another. All UXO were detonated to render them safe, demilitarize their appearance, and to remove inert filler so that the scrap ordnance could be recycled. Volume reduction, in the form of compacting, reduced trucking requirements substantially as well as the final disposition of the compacted material (landfill disposal vs.

recycling). Based on the types of metals being recycled (i.e., aluminum, steel), transportation and disposal costs were recovered. By the use of onsite contractors excess explosives (i.e., Composition C-4), EOD specialists were able to assist them in disposal of their explosives and cut back on the purchasing of additional explosives for demilitarization operations. Due to the various waste minimization and recycling practices, ordnance clean up and scrap removal from the six ordnance disposal sites were completed within five months. The overall project cost savings was approximately \$200,000.

1449 V18/022592

Streamlined Approach for Environmental Restoration Plan, CAU No. 400: Bomblet Pit and Five Points Landfill Tonopah Test Range

International Technology Corporation, Las Vegas, NV

DOE/NV-424; 94 pp. (April 1996)

This plan was prepared under the Streamlined Approach for Environmental Restoration (SAFER) concept. The SAFER process is employed at Corrective Action Units (CAUs) where enough information exists about the nature and extent of contamination to propose an appropriate corrective action prior to the implementation of a Corrective Action Investigation (CAI). This process combines elements of the Data Quality Objectives (DQO) process and the observational approach to help plan and conduct corrective actions. DQOs are used to identify the problem and define the type and quality of data needed to complete the investigation phase of the process. The observational approach provides a framework for managing uncertainty and planning decision-making. The purpose of the investigation in the SAFER process is to document and verify the adequacy of existing information (such as process knowledge); to affirm the decision for clean closure, closure in place, or to take no further action; and to provide sufficient data to implement the corrective action. This plan addresses verification for clean closure of CAU No. 400, which includes the Bomblet Pit and the Five Points Landfill. These two sites were used for disposal of unexploded ordnance and other solid waste. This plan describes activities that have taken place at the site as well as the steps that will be taken to gather adequate data to obtain a notice of completion from the Nevada Division of Environmental Protection. It is believed that adequate process knowledge exists to predict clean closure as the proposed corrective action for both sites. This plan describes the proposed collection and analysis of soil samples to determine if additional remedial work is necessary.

1450 V18/023423

Clean Slate 1 Revegetation and Monitoring Plan

Bechtel Nevada Corporation, Las Vegas, NV

DOE/NV/11718-062; 26 pp. (September 1996)

This document is a reclamation plan for short-term and long-term stabilization of land disturbed by activities associated with interim cleanup of radionuclide-contaminated surface soil at the Clean Slate 1 site (located on the Tonopah Test Range). This document has been prepared to provide general reclamation practices and procedures that will be followed during restoration of the cleanup site. Reclamation demonstration plots were established near the

Double Tracks cleanup site in the fall of 1994 to evaluate the performance of several native plant species and to evaluate different irrigation strategies. Results of that study, and the results from numerous other studies conducted at other sites (Area 11 and Area 19 of the Nevada Test Site), have been summarized and incorporated into this final reclamation plan for the cleanup of the Clean Slate 1 site. The plan also contains procedures for monitoring both short-term and long-term reclamation.

1451 V18/022947

Closure Report for CAU No. 400: Bomblet Pit and Five Points Landfill, Tonopah Test Range

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-459; 69 pp. (November 1996)

This Closure Report presents the information obtained from corrective and investigative actions performed to affirm the decision for clean closure of Corrective Action Unit (CAU) No. 400 which includes the Bomblet Pit and the Five Points Landfill, two sites used for disposal of unexploded ordnance (UXO) and other solid waste at the U.S. Department of Energy's (DOE) Tonopah Test Range, located in south-central Nevada. The first phase, or corrective action, for clean closure was performed under the Voluntary Correction Action Work Plan for Ordnance Removal from Five Disposal Sites at the Tonopah Test Range, hereafter referred to as the VCA Work Plan. The second phase consisted of collecting verification samples under the Streamlined Approach for Environmental Restoration Plan, CAU No. 400: Bomblet Pit and Five Points Landfill, Tonopah Test Range, hereafter referred to as the SAFER Plan. Results of the two phases are summarized in this document.

1452 V18/022940

Streamlined Approach for Environmental Restoration Plan for Corrective Action Unit 430, Buried Depleted Uranium Artillery Round No. 1, Tonopah Test Range [Rev. 1]

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV

DOE/NV-446 (Rev. 1); 90 pp. (September 1996)

This plan addresses actions necessary for the restoration and closure of Corrective Action Unit (CAU) No. 430, Buried Depleted Uranium (DU) Artillery Round No. 1 (Corrective Action Site No. TA-55-003-0960), a buried and unexploded W-79 Joint Test Assembly (JTA) artillery test projectile with high explosives (HE), at the U.S. Department of Energy, Nevada Operations Office (DOE/NV) Tonopah Test Range (TTR) in south-central Nevada. It describes activities that will occur at the site as well as the steps that will be taken to gather adequate data to obtain a notice of completion from Nevada Division of Environmental Protection (NDEP). This plan was prepared under the Streamlined Approach for Environmental Restoration (SAFER) concept, and it will be implemented in accordance with the Federal Facility Agreement and Consent Order (FFACO) and the Resource Conservation and Recovery Act (RCRA) Industrial Sites Quality Assurance Project Plan.

1453 V18/021208

Application of a NAPL Partitioning Interwell Tracer Test (PITT) to Support DNAPL Remediation at the Sandia National Laboratories/New Mexico Chemical Waste Landfill

Studer, J.E.; Mariner, P.E.; Jin, M.

INTERA, Inc., Albuquerque, NM; Sandia National Laboratories, Albuquerque, NM; INTERA, Inc., Austin, TX SAND96-0899C; CONF-9605148; Superfund Hazwaste West, Proceedings of a Conference, Las Vegas, NV, May 21-23, 1996; (37 pp.) (1996)

Chlorinated solvents as dense non-aqueous phase liquid (DNAPL) are present at a large number of hazardous waste sites across the U.S. and world. DNAPL is difficult to detect in the subsurface, much less characterize to any degree of accuracy. Without proper site characterization, remedial decisions are often difficult to make and technically effective, cost-efficient remediations are even more difficult to obtain. A new non-aqueous phase liquid (NAPL) characterization technology that is superior to conventional technologies has been developed and applied at full-scale. This technology, referred to as the Partitioning Interwell Tracer Test (PITT), has been adopted from oil-field practices and tailored to environmental application in the vadose and saturated zones. A PITT was applied in December 1995 beneath two side-by-side organic disposal pits at Sandia National Laboratories/New Mexico (SNL/NM) RCRA Interim Status Chemical Waste Landfill (CWL), located in Albuquerque, New Mexico. DNAPL, consisting of a mixture of chlorinated solvents, aromatic hydrocarbons, and PCE oils, is known to exist in at least one of the two buried pits. The vadose zone PITT was conducted by injecting a slug of non-partitioning and NAPL-partitioning tracers into and through a zone of interest under a controlled forced gradient. The forced gradient was created by a balanced extraction of soil gas at a location 55 feet from the injector. The extracted gas stream was sampled over time to define tracer break-through curves. Soil gas sampling ports from multilevel monitoring installations were sampled to define break-through curves at specific locations and depths. Analytical instrumentation such as gas chromatographs and photoacoustical analyzers operated autonomously were used for tracer detection.

1454 V18/022781

Monitoring a Chemical Plume Remediation via the Radio Imaging Method

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CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1336-1341) (1996)

In this paper, we present the results of a site characterization, monitoring, and remediation effort at Sandia National Laboratories (SNL). The primary objective of the study is to determine the

feasibility of using the Radio Imaging Method (RIM) to solve a near-surface waste site characterization problem. The goals are to demonstrate the method during the site characterization phase, then continue with an in-situ monitoring and analysis of the remediation process.

1455 V18/021214

Summary of Field Operations Magazine Road North Wells MRN-1 and MRN-2

Fritts, J.E.; McCord, J.P.

Sandia National Laboratories, Albuquerque, NM; GRAM, Inc., Albuquerque, NM; INTERA, Inc., Albuquerque, NM
SAND96-0165; 97 pp. (March 1996)

This report provides a summary of the field operations associated with the installation of the Magazine Road North (MRN) test/monitoring wells, MRN-1 and MRN-2. These wells were installed in December 1994 and January 1995 as part of the Site-Wide Hydrogeologic Characterization (SWHC) task field program. The SWHC task is part of the Sandia National Laboratories, New Mexico, Environmental Restoration Project carried out by the Environmental Operations Center, 7500. MRN-1 and MRN-2 are paired wells located near the western edge of Kirtland Air Force Base (KAFB), west of Technical Area 3 (TA3), and north of Magazine Road. During the MRN field operations, important subsurface geologic, hydrologic, chemical, and radiological data were obtained. Subsurface geologic data include descriptions of drill cuttings, core, and geophysical logs of the upper unit of the Santa Fe Group. The geology identified here can help determine the eastern limit of the ancestral Rio Grande lithofacies. Subsurface hydrologic data include borehole geophysical logs, and qualitative information obtained during well completion and development. In addition, future aquifer testing at the MRN site will generate data for the interpretation of aquifer parameters such as transmissivity. Samples were taken from core every 100 feet at MRN-1 for chemical and radiological analysis to provide background data for the Environmental Restoration Project.

1456 V18/021212

Application of Non-Intrusive Geophysical Techniques at the Mixed Waste Landfill, Technical Area 3, Sandia National Laboratories, New Mexico

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Sandia National Laboratories, Environmental Restoration Project, Albuquerque, NM; Sunbelt Geophysics, Albuquerque, NM; GRAM, Inc., Albuquerque, NM
SAND95-1609; 19 pp. (March 1996)

The Environmental Restoration Project at Sandia National Laboratories, New Mexico is tasked with assessment and remediation of the Mixed Waste Landfill in Technical Area 3. The Mixed Waste Landfill is an inactive radioactive and mixed waste disposal site. The landfill contains disposal pits and trenches of questionable location and dimension. Non-intrusive geophysical techniques were utilized to provide an effective means of determining the location and dimension of suspected waste disposal trenches before Resource Conservation and Recovery Act intrusive assessment activities were initiated. Geophysical instruments

selected for this investigation included a Geonics EM-31 ground conductivity meter, the new Geonics EM-61 high precision, time-domain metal detector, and a Geometrics 856 total field magnetometer. The results of these non-intrusive geophysical techniques were evaluated to enhance the efficiency and cost-effectiveness of future waste-site investigations at Environmental Restoration Project sites.

1457 V18/021213

Summary of Field Operations Powerline Wells PL-1, PL-2, PL-3

Foutz, W.L.

Lamb Associates, Inc., Albuquerque, NM; Sandia National Laboratories, Albuquerque, NM
SAND96-0164; 102 pp. (March 1996)

This report summarizes field operations and hydrogeologic data obtained during installation of the Powerline monitoring/test wells near the western boundary of Kirtland Air Force Base. These wells were installed in 1994 as part of the Site-Wide Hydrogeologic Characterization Project saturated zone investigation. The Site-Wide Hydrogeologic Characterization Project is part of Sandia National Laboratories, New Mexico, Environmental Restoration Project. Three wells were drilled and completed at this location, and named PL-1, PL-2, and PL-3. They are located northwest of Tech Area 3, and are named after a high-voltage powerline located just south of the wells. The objectives of the Powerline wells were to determine the depth to water, complete 2 water table wells and a deeper Santa Fe Group well, to determine the geologic provenance of Santa Fe Group sediments at this location, and to obtain background core samples for radiological analysis. During these field operations, important subsurface hydrogeologic data were obtained. These data include drill cuttings and lithologic descriptions, core samples with background analytical data, geophysical logs, water quality parameters, and water levels. Aquifer tests at the Powerline location will generate data that may yield information on anisotropy in the Santa Fe Group and constrain numerical modeling results that indicate that there is a major northward component of groundwater flow from McCormick Ranch and Tech Area 3 test sites toward City of Albuquerque and KAFB well fields.

1458 V18/020769

Probabilistic Risk Assessment for the Sandia National Laboratories Technical Area V Liquid Waste Disposal System Surface Impoundments

Dawson, L.A.; Eidson, A.F.

Sandia National Laboratories, Albuquerque, NM; International Technologies, Houston, TX
CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1080-1085) (1996)

A probabilistic risk assessment was completed for a former radioactive waste disposal site. The site, two unlined surface impoundments, was designed as part of the Liquid Waste Disposal System (LWDS) to receive radioactive effluent from nuclear

reactors in Technical Area V (TA-V) at Sandia National Laboratories/New Mexico (SNL/NM). First, a statistical comparison of site sampling results to natural background, using EPA methods, and a spatial distribution analysis were performed. Risk assessment was conducted with SNL/NM's Probabilistic Risk Evaluation and Characterization Investigation System model. The risk assessment indicated that contamination from several constituents might have been high enough to require remediation. However, further analysis based on expected site closure activities and recent EPA guidance indicated that No Further Action (NFA) was acceptable.

1459

V18/021703

Comparison of Passive Soil Vapor Survey Techniques at a Tijeras Arroyo Site, Sandia National Laboratories, Albuquerque, New Mexico

Eberle, C.S.; Wade, W.M.; Tharp, T.; Brinkman, J.

Sandia National Laboratories, Albuquerque, NM

SAND96-1651C; CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1060-1064) (1996)

Soil vapor surveys were performed to characterize the approximate location of soil contaminants at a hazardous waste site. The samplers were from two separate companies and a comparison was made between the results of the two techniques. These results will be used to design further investigations at the site.

1460

V18/022277

Geochemical Study of Groundwater at Sandia National Laboratories/New Mexico and Kirtland Air Force Base

Rust Geotech, Inc., Grand Junction, CO

GJPO-WMP-96; 80 pp. (October 1995)

Sandia National Laboratories/New Mexico (Sandia/NM) requested that the U.S. Department of Energy (DOE) Grand Junction Projects Office (GJPO), through its prime contractor, Rust Geotech, provide interpretation of groundwater geochemical data at Sandia/Kirtland Air Force Base (KAFB). Existing analytical data were used to prepare a database with relevant chemical analyses for groundwater samples collected at the two sites. A subset of the database was selected that contains one set of chemical analyses for each sampling location (well or spring). These data were selected primarily on the basis of charge balance. Piper diagrams, Stiff diagrams, histograms, and spatial plots were used to display and analyze these geochemical data. Geochemical modeling using NETPATH and PHREEQE was used to help interpret observed trends.

1461

V18/023042

Assessment of Hydrologic Transport of Radionuclides from the Gasbuggy Underground Nuclear Test Site, New Mexico

Earman, S.; Chapman, J.; Andricevic, R.

U.S. Department of Energy, Nevada Operations Office, Las Vegas, NV; Nevada University, Water Resources Center, Las Vegas, NV

DOE/NV/11508-16; 25 pp. (September 1996)

The U.S. Department of Energy (DOE) is operating an environmental restoration program to characterize, remediate, and close non-Nevada Test Site locations that were used for nuclear testing. Evaluation of radionuclide transport by groundwater from these sites is an important part of the preliminary risk analysis. These evaluations are undertaken to allow prioritization of the test areas in terms of risk, provide a quantitative basis for discussions with regulators and the public about future work at the sites, and provide a framework for assessing data needs to be filled by site characterization. The Gasbuggy site in northwestern New Mexico was the location of an underground detonation of a 29-kiloton nuclear device in 1967. Transport calculations were performed using the solute flux method, with input based on the limited data available for the site. Model results suggest that if radionuclides produced by the shot entered the Ojo Alamo formation, they are most likely contained within the area currently administered by DOE. This modeling was performed to investigate how the uncertainty in various physical parameters affects calculations of radionuclide transport at the Gasbuggy site, and to serve as a starting point for discussion regarding further investigation at the site; it was not intended to be a definitive simulation of migration pathways or radionuclide concentration values.

1462

V18/023296

Tritium Migration at the Gasbuggy Site: Evaluation of Possible Hydrologic Pathways

Chapman, J.; Mihevc, T.; Lyles, B.

Nevada University, Water Resources Center, Las Vegas, NV
DOE/NV/11508-12; 25 pp. (September 1996)

An underground nuclear test named Gasbuggy was conducted in northwestern New Mexico in 1967. Subsequent groundwater monitoring in an overlying aquifer by the U.S. Environmental Protection Agency revealed increasing levels of tritium in monitoring well EPNG 10-36, located 132 m from the test, suggesting migration of contaminants from the nuclear cavity. There are three basic scenarios that could explain the occurrence of tritium in well 10-36: (1) introduction of tritium into the well from the land surface, (2) migration of tritium through the Ojo Alamo Formation, and (3) migration through the Pictured Cliffs Formation. The two subsurface transport scenarios were evaluated with a travel time analysis. In one, transport occurs to the Ojo Alamo sandstone either up to the emplacement hole or through fractures created by the blast, and then laterally through the aquifer to the monitoring well. In the other, lateral transport occurs through fractures in the underlying Pictured Cliffs detonation horizon and then migrates up the monitoring well through plugged casing connecting the two formations. The travel time analysis indicates that the hydraulic conductivity measured in the Ojo Alamo Formation is too low for lateral transport to account for the observed arrival of tritium at the monitoring well. This suggests transport either through fractures intersecting the Ojo Alamo close to well EPNG 10-36, or through fractures in the Pictured Cliffs and up through the bottom plug in the well. The transport scenarios were investigated using hydrologic logging techniques and sampling at the monitoring well, with the fieldwork conducted after the removal of a string of 0.05-m-diameter tubing that had previously

provided the only monitoring access. No vertical movement of water was detected with a thermal flowmeter through the bottom cement plug and the water chemistry is consistent with the known characteristics of the Ojo Alamo, suggesting no leakage from the Pictured Cliffs through the bottom plug in the well. Though relatively fresh formation water was present across from the perforations in the Ojo Alamo as the well recovered from the tubing removal, the water did not contain measurable tritium in either May 1994 or May 1995. The previously measured tritium was highly variable from one sample to the next and did not display typical breakthrough behavior for a migrating contaminant. Thus, the earlier monitoring samples may not have been representative of Ojo Alamo Formation water through time, because sampling was restricted inside the 0.05-m tubing. The tritium previously sampled from the tubing may have been dispersed to non-detectable concentrations when the tubing was pulled prior to DRI's sampling. Though no tritium was detected in water samples consistent with the Ojo Alamo Formation, low levels of tritium were found higher in the borehole in a zone of chemically and isotopically distinct water. This lower salinity water has an evaporative isotopic signature, suggesting exposure in a surface pond. The tritium content could be related to gas flaring operations during Gasbuggy production testing, with the water introduced to the well through leakage or injection.

1463 V18/022585

Evaluating Pu-239 Levels Using Field Detectors

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ERM Program Management Company, Los Alamos, NM;
Los Alamos National Laboratory, Los Alamos, NM

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):66a (June 1996)

At Los Alamos National Laboratory, cleanup was planned at three septic tanks where surface soil in the outfall drainage areas was found to be contaminated with Pu-239. To meet budget and deadline constraints, a technique was developed that used field instruments to verify Pu-239 soil contamination at levels less than 2.8 Bq/g, the established cleanup level. The drainage areas were surveyed using a low-energy gamma probe to identify likely areas of Pu-239 contamination. Between 40 and 135 0.1-min gamma radiation measurements were obtained from each drainage area. From these data, locations were identified for subsequent screening for alpha radioactivity. Soil samples from between 11 and 18 locations at each drainage area were placed in petri dishes, dried, and counted for 10 minutes using an alpha probe. Alpha counts were then related to Pu-239 concentrations using a curve developed from local soils containing known concentrations of Pu-239. Up to six soil samples from each drainage area, representing a range of alpha radioactivity levels, were sent for laboratory analysis of isotopic plutonium to confirm field measurement results. Analytical and field results correlated well at all but one outfall area. At this area, field measurements predicted more Pu-239 than was measured in the laboratory, indicating the presence of another alpha-emitting radionuclide that might have been missed if only laboratory analyses for plutonium had been used. This technique, which combined a large number of gamma radioactivity measurements, a moderate number of alpha radioactivity measurements, and a few isotopic

plutonium measurements, allowed quick and inexpensive comparison of Pu-239 with the cleanup level.

1464 V18/022323

Final Environmental Assessment for the Low Energy Demonstration Accelerator, Technical Area 53, Los Alamos National Laboratory, Los Alamos, NM

U.S. Department of Energy, Los Alamos Area Office, Office of Defense Programs, Los Alamos, NM

DOE/EA-1147; 135 pp. (April 1, 1996)

As part of the Department of Energy's (DOE) need to maintain the capability of producing tritium in support of its historic and near-term stewardship of the nation's nuclear weapons stockpile, the agency has recently completed a Programmatic Environmental Impact Statement for Tritium Supply and Recycling. The resulting Record of Decision (ROD) determined that over the next three years the DOE would follow a dual-track acquisition strategy that assures tritium production for the nuclear weapon stockpile in a rapid, cost effective, and safe manner. Under this strategy the DOE will further investigate and compare two options for producing tritium: (1) purchase of an existing commercial light-water reactor or irradiation services with an option to purchase the reactor for conversion to a defense facility; and (2) design, build, and test critical components of a system for accelerator production of tritium (APT). The final decision to select the primary production option will be made by the Secretary of Energy in the October 1998 time frame. The alternative not chosen as the primary production method, if feasible, would be developed as a back-up tritium supply source. This Environmental Assessment (EA) analyzes the potential environmental effects that would be expected to occur if the DOE were to design, build, and test critical prototypical components of the accelerator system for tritium production, specifically the front-end low-energy section of the accelerator, at Los Alamos National Laboratory. The Low Energy Demonstration Accelerator (LEDA) would be incrementally developed and tested in five separate stages over the next seven years. The following issues were evaluated for the proposed action: utility demands, air, human health, environmental restoration, waste management, transportation, water, threatened and endangered species, wetlands, cultural resources, and environmental justice.

1465 V18/022170

Rectangular Schlumberger Resistivity Arrays for Delineating Vadose Zone Clay-Lined Fractures in Shallow Tuff

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ICF Kaiser, Inc., Rancho Cordova, CA; ICF Kaiser, Inc., Chicago, IL; ERM Program Management Company, Los Alamos, NM; Los Alamos National Laboratory, Los Alamos, NM

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 397-408) (1996)

Rectangular Schlumberger arrays can be used for 2-dimensional

lateral profiling of apparent resistivity at a unique current electrode separation, hence single depth of penetration. Numerous apparent resistivity measurements are collected moving the potential electrodes (fixed MN spacing) within a rectangle of defined dimensions. The method provides a fast, cost-effective means for the collection of dense resistivity data to provide high-resolution information on subsurface hydrogeologic conditions. Several rectangular Schlumberger resistivity arrays were employed at Los Alamos National Laboratory (LANL) from 1989 through 1995 in an area adjacent to and downhill from an outfall pipe, septic tank, septic drainfield, and sump. Six rectangular arrays with 2 AB spacings were used to delineate lateral low resistivity anomalies that may be related to fractures that contain clay and/or vadose zone water. Duplicate arrays collected over a three year time period exhibited very good data repeatability. The properties of tritium make it an excellent groundwater tracer. Because tritium was present in discharged water from all of the anthropogenic sources in the vicinity it was used for this purpose. One major low resistivity anomaly correlates with relatively high tritium concentrations in the tuff. This was determined from borehole samples collected within and outside of the anomalous zone. The anomaly is interpreted to be due to fractures that contain clay from the soil profile. The clay was deposited in the fractures by aeolian processes and by surface water infiltration. The fractures likely served as a shallow vadose zone groundwater pathway.

1466 V18/022827

Environmental Waste Site Characterization Utilizing Aerial Photographs, Remote Sensing, and Surface Geophysics

Pope, P.; Van Eckhout, E.M.; Rofer, C.; Baldrige, S.; Ferguson, J.; Jiracek, G.; Balick, L.K.; Josten, N.E.; Carpenter, M.V.

Los Alamos National Laboratory, Los Alamos, NM; University of Texas at Dallas, Richardson, TX; San Diego State University, San Diego, CA; Bechtel Nevada Corporation, Remote Sensing Laboratory, Las Vegas, NV; Idaho National Engineering Laboratory, Idaho Falls, ID

CONF-960804 (Vol. 3); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 3, 841 pp.; (pp. 1901-1908) (1996)

Six different techniques were used to delineate a 40 year old trench boundary at Los Alamos National Laboratory. Data from historical aerial photographs, a magnetic gradient survey, airborne multispectral and thermal infra-red imagery, seismic refraction, DC resistivity, and total field magnetometry were utilized in this process. Each data set indicated a southern and northern edge for the trench. Average locations and 95% confidence limits for each edge were determined along a survey line perpendicular to the trench. Trench edge locations were fairly consistent among all six techniques. Results from a modeling effort performed with the total magnetic field data was the least consistent. However, each method provided unique and complementary information. The integration of all this information led to a more complete characterization of the trench boundaries and contents.

1467 V18/022166

1993 to 1995 Environmental Surveillance Data Collected at or near Area G

Mullen, K.; Collins, S.; Rogers, D.B.

Los Alamos National Laboratory, Los Alamos, NM

LA-13204-MS; 17 pp. (September 1996)

This report summarizes Environmental Surveillance data collected by the Water Quality and Hydrology Group during 1993, 1994, and 1995 at or in the vicinity of TA-54, Area G of the Los Alamos National Laboratory, New Mexico. The summary includes radiochemical, metals, general inorganic, and organic analytical results. The tables list measured concentrations (or detection limits for results below detection limits), analytical uncertainties for radiochemical data, sample locations, and sample dates. A map showing sample locations is also included. Preparation of this report was funded by the Solid Waste Management Group (CST-14) in support of the Waste Management Program.

1468 V18/022165

Area G Perimeter Surface-Soil and Single-Stage Water Sampling: Environmental Surveillance for Fiscal Year 94, Group ESH-19

Conrad, R.C.; Childs, M.; Lyons, C.R.; Coriz, F.

Los Alamos National Laboratory, Los Alamos, NM

LA-13165-PR; 79 pp. (August 1996)

ESH-19 personnel collected soil and single-stage water samples around the perimeter of Area G at Los Alamos National Laboratory during FY94 to characterize possible contaminant movement out of Area G through surface water and sediment runoff. These samples were analyzed for tritium, total uranium, isotopic plutonium, americium-241, and cesium-137. Ten metals were also analyzed on selected soils using analytical laboratory techniques. All radiochemical data are compared with analogous samples collected during FY 93 and reported in LA-12986. Baseline concentrations for future disposal operations were established for metals and radionuclides by a sampling program in the proposed Area G Expansion Area. Considering the amount of radioactive waste that has been disposed at Area G, there is evidence of only low concentrations of radionuclides on perimeter surface soils. Consequently, little radioactivity is leaving the confines of Area G via the surface water runoff pathway.

1469 V18/022874

Biological Assessment for the Transfer of the DP Land Tract

Keller, D.C.

Los Alamos National Laboratory, Los Alamos, NM

LA-UR-96-3790; 75 pp. (October 1996)

The Department of Energy (DOE) is proposing to transfer to the County of Los Alamos up to 10-ha (25-ac) of federal land located in Technical Area-21 to be developed for commercial uses. Previous studies for the proposed land transfer area indicate that potential habitat for four threatened, endangered, and sensitive species occurs in or adjacent to the proposed land transfer area. These include the

northern goshawk (federal species of concern), Mexican spotted owl (federal threatened), the spotted bat (federal species of concern, state threatened), and the peregrine falcon (federal endangered, state endangered). In order to determine the possible influences of the land transfer on these organisms, information from these species-specific surveys was collected. These surveys were used to confirm the presence of these species or to infer their absence in or near the project area. It was concluded that none of the above mentioned species occur in the project area. Stretches of the stream channel within Los Alamos Canyon have been identified as palustrine and riverine, temporarily flooded wetlands. The proposed land transfer should not affect these wetlands.

1470 V18/023000

Fracture Characterization of the Bandelier Tuff in OU-1098 (TA-2 and TA-41)

Wohletz, K.H.

Los Alamos National Laboratory, Los Alamos, NM
LA-13194-MF; 21 pp. (1996)

Rock fracture characterization documents a total of 1496 fractures in unit 2 of the Tshirege Member of the Bandelier Tuff along 6013 feet of Los Alamos Canyon's north wall adjacent to Operational Unit 1098. Geologically termed joints, these fractures likely owe their primary origin to brittle failure during the cooling contraction of the tuff after its emplacement nearly 1 million years ago. Subsequent tectonic movement along the Pajarito Fault system has modified fracture strikes, dips, apertures, and linear density. From a background linear density of approximately 20 fractures per 100-foot interval along the canyon wall, fracture density increases to values in excess of 50 fractures per 100-foot interval in a zone at and immediately east of the Omega West reactor building TA-2-1. This increase in fracture density is coincident with the mapped trace of the Guaje Mountain Fault (GMFZ) that apparently bifurcates with a branch running through the canyon at Building TA-2-1 and another about 200 feet east of the Omega site east gate. With it occurs notable slump failure of the canyon wall, increased cumulative fracture aperture, and slight rotation of fracture orientations. Fractures show average strikes of either N35W or N47E, average dips between 75N and 82N, and average apertures of 0.7 cm. Calculations, based on the assumption that fracture apertures are produced by vertical movement along each fracture, suggest approximately 3 m of westward downdrop has occurred over the GMFZ in this area. While fracture character is not documented for Bandelier Tuff units above and below unit 2, observations indicate that inferred tectonic movement has likely influenced fracture permeability in the Bandelier Tuff in Los Alamos Canyon along the trace of the Guaje Mountain Fault. Because of increased fracture permeability, groundwater movement is expected to show greater penetration into bedrock units in the area just east of the Omega West reactor.

1471 V18/022872

Radionuclide Contaminant Analysis of Small Mammals at Area G, TA-54, Los Alamos National Laboratory, 1995

Bennett, K.; Biggs, J.; Fresquez, P.R.

Los Alamos National Laboratory, Los Alamos, NM
LA-13242-MS; 21 pp. (January 1997)

At Los Alamos National Laboratory, small mammals were sampled at two waste burial sites (Site 1-recently disturbed and Site 2-partially disturbed) at Area G, Technical Area 54 and a control site on Frijoles Mesa (Site 4) in 1995. Our objectives were to: (1) identify radionuclides that are present within surface and subsurface soils at waste burial sites, (2) compare the amount of radionuclide uptake by small mammals at waste burial sites to a control site, and (3) identify if the primary mode of contamination to small mammals is by surface contact or ingestion/inhalation. Three composite samples of at least five animals per sample were collected at each site. Pelts and carcasses of each animal were separated and analyzed independently. Samples were analyzed for ²⁴¹Am, ⁹⁰Sr, ²³⁸Pu, ²³⁹Pu, total U, ¹³⁷Cs, and ³H. Significantly higher (parametric t-test at p=0.05) levels of total U, ²⁴¹Am, ²³⁸Pu, and ²³⁹Pu were detected in pelts than in carcasses of small mammals at TA-54. Concentrations of other measured radionuclides in carcasses were nearly equal to or exceeded the mean concentrations in the pelts. Our results show higher concentrations in pelts compared to carcasses, which is similar to what has been found at waste burial/contaminated sites outside of Los Alamos National Laboratory. Site 1 had a significantly higher (alpha=0.05, P=0.0125) mean tritium concentration in carcasses than Site 2 or Site 4. In addition Site 1 also had a significantly higher (alpha=0.05, p=0.0024) mean tritium concentration in pelts than Site 2 or Site 4. Site 2 had a significantly higher (alpha=0.05, P=0.0499) mean ²³⁹Pu concentration in carcasses than either Site 1 or Site 4.

1472 V18/021014

Qualitative Risk Evaluation of Environmental Restoration Programs at Brookhaven National Laboratory

Morris, S.C.

Brookhaven National Laboratory, Office of Environmental Restoration, Upton, NY
BNL-63201; 110 pp. (May 1996)

This report documents the evaluation of risks associated with environmental restoration activities at Brookhaven National Laboratory using two tools supplied by DOE to provide a consistent set of risk estimates across the DOE complex: Risk Data Sheets (RDS) and Relative Risk Ranking. The tools are described, the process taken characterized, and results provided and discussed. The two approaches are compared and recommendations provided for continuing improvement of the process.

1473 V18/025319

Pilot-Scale Treatability Testing of the Insitu Vittrification Technology at the Brookhaven National Laboratory: Chemical/Animal Pits and Glass Holes Areas

Campbell, B.; Timmons, D.M.; Brower, J.

Geosafe Corporation, Richland, WA; Brookhaven National Laboratory, Upton, NY

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (12 pp.) (1997)

Pilot-scale treatability testing of the In Situ Vitrification (ISV) technology was performed on a simulated pit in the chemical/animals area of the Brookhaven National Laboratory (BNL) site. The testing was conducted as a part of an evaluation of feasible alternatives for remediating the Chemical/Animal Pits (Pits) and the Glass Holes (Holes) within OU-1 at BNL. This paper presents the results of the pilot-scale testing on the simulated pit and an assessment of full-scale remediation of the site using the ISV process. The findings are pertinent to DOE buried waste applications throughout the Weapons Complex. A total of 31 Pits and 20 Holes have been identified by non-intrusive means at the BNL site.

1474

V18/025490

**Superfund Record of Decision (EPA Region 2):
Brookhaven National Laboratory (USDOE), Operable
Unit 4, Upton, NY, March 25, 1996**

U.S. Environmental Protection Agency, Office of Emergency
and Remedial Response, Washington, DC

EPA/ROD/R02-96/285; 116 pp. (June 1997)

This decision document presents the selected remedial action for Operable Unit (OU) IV of the Brookhaven National Laboratory (BNL) site in Upton, New York. Operable Unit IV includes the Central Steam Facility (CSF), the Reclamation Facility Building 650 Sump and Sump Outfall, leaking sewer lines, Recharge Basin HO, and associated environmental media. The purpose of this remedy is to address contamination associated with a 1977 oil/solvent spill and a fuel unloading area near BNL's CSF and with the Reclamation Facility Building 650 Sump and Sump Outfall area. The OU IV remedy consists of a combination of treatment and institutional controls. The components of the selected remedy for contaminated groundwater, in combination with the engineering enhancement option, and for the chemically contaminated soils, are final response actions. The component of the selected remedy that addresses radiologically contaminated soil is considered an interim action.

1475

V18/025356

**Bioengineering Management Technology
Demonstration on a Shallow Land Disposal Trench in a
Humid Environment**

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New York State Energy Research and Development
Authority, West Valley, NY

CONF-970335; Waste Management '97: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
March 2-6, 1997; (10 pp.) (1997)

In response to rising leachate levels in waste disposal trenches at the State-Licensed, Low-Level Radioactive Waste Disposal Area (SDA), the New York State Energy Research and Development Authority (NYSERDA) has installed infiltration control technologies to remedy the water management problems caused by the wet climate and silty-clay soils found at the SDA. In 1993, NYSERDA began the Bioengineering Management Pilot Project on a waste disposal trench at the SDA near West Valley, New York. The Pilot Project was initiated to evaluate the effectiveness of this technology for

minimizing or eliminating water infiltration into the shallow, land burial disposal trenches and to assess the feasibility of a bioengineering management program as a longer-term alternative to geomembrane covers, which were placed over the remaining trenches. Installation of a bioengineered cover at the SDA marked the first demonstration of this technology on an actual disposal trench. The bioengineering management system eliminates infiltration of water by placing fiberglass panels, mounted on wooden frames, perpendicular to the length of the trench. This design provides a hard cover to increase runoff to approximately 80 to 90 percent of precipitation. Shallow-rooted Hetzi junipers planted between the panels provide evapotranspiration (ET) of the remaining precipitation to prevent deep percolation of water through the trench cap soil. Environmental data, which includes trench leachate elevations, radioactivity levels in vegetation, and soil moisture, along with observed maintenance requirements, are being used to determine the viability of this technology at the SDA. To date, the bioengineered cover has required minimal maintenance while maintaining the trench water level in a steady-state condition.

1476

V18/025401

**Accelerated Aquifer Remediation Utilizing
Groundwater ReInjection at the Fernald Environmental
Management Project**

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Janke, R.

Fluor Daniel Fernald, Cincinnati, OH; U.S. Department of
Energy, Fernald Environmental Management Project,
Fernald, OH

CONF-970335; Waste Management '97: Working Towards a
Cleaner Environment, Proceedings of a Conference on HLW,
LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ,
March 2-6, 1997; (5 pp.) (1997)

The Fernald Environmental Management Project (FEMP) facility formerly operated from 1952 to 1989 as a large-scale production facility of high-purity uranium metal products in support of U.S. defense initiatives. Environmental restoration at the site includes the active restoration of the contaminated portions of the Great Miami Aquifer. It has been determined through computer model simulations that the use of a promising innovative technology - groundwater reinjection - could help reduce the time required to restore the Great Miami Aquifer to approximately ten years. If successful, the long-term savings in operations and maintenance costs associated with the faster remediation time are estimated at over \$50M.

1477

V18/021219

Site Treatment Plant Delayed

ENR 235(26):18 (December 25, 1995)

A \$21-million nuclear waste vitrification plant at the U.S. Dept. of Energy's former uranium enrichment site in Fernald, Ohio, is facing design and procurement problems that have delayed its startup 17 months. But DOE says it will not delay the 10-year cleanup of the entire site. The pressure of Superfund-imposed deadlines forced the plant's fast-track design and construction. Portions of the project were designed in parallel rather than in sequence, say officials of DOE and Fernald Environmental Restoration Management

Company (FERMCO), the site's Fluor Corporation-led cleanup contractor. DOE opted to vitrify 9,700 tons of radioactive waste stored in four cement silos as part of a December 1994 agreement with the U.S. Environmental Protection Agency. The pact gave FERMCO 15 months to start remediation. The first glitch occurred when DOE could not get bids for a melter in the pilot vitrification plant that could effectively operate at up to 1,450 degrees C. That forced DOE to revise the request for proposals for the melter to specify a one-ton-per-day furnace instead of a 5-tpd unit, says Nina Akgunduz, DOE project manager. The melter supplier is GTS Duratek Inc., Columbia, Md. The original operating schedule anticipated 100% efficiency in the pilot plant, with completed test burns in three months. But the schedule was revised after European vitrification specialists specified 30% efficiency as a more realistic estimate. The pilot is now set to begin operating in February. Data collected from the pilot plant will be used to design the Site's \$200-million, full-scale vitrification plant, which will handle up to 30 tons of material a day. Reising says one lesson learned so far is to include operations and construction staff early on in the process. Design problems would have been caught earlier, he says. Meanwhile, design and construction of the larger plant is also on a fast track, with the first construction package to be awarded in March.

1478 V18/021313

Remedial Investigation/Feasibility Study: Operable Unit 1 - Waste Pit Area [Progress Report]

Lojek, D.

U.S. Department of Energy, Washington, DC
Report; 2 pp. (March 1995)

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project. The nature and extent of contamination at the Fernald Site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented. The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup. The Fernald Operable Unit 1 consists of Waste Pits one through six, the burn pit, a settling basin for surface water runoff, and miscellaneous structures and soil within the Operable Unit 1 (OU1) boundary. It is located in the northwest quadrant of the Fernald site and covers approximately 37 acres. This progress report provides a brief summary of the history of OU1, the current status of OU1 Remedial Investigation/Feasibility Study (RI/FS) activities, and the selected remedial activity for OU1.

1479 V18/021314

Remedial Investigation/Feasibility Study: Operable Unit 2 - Other Waste Units [Progress Report]

Warner, R.D.

U.S. Department of Energy, Washington, DC
Report; 2 pp. (March 1995)

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's Fernald

Environmental Management Project. The nature and extent of contamination at the Fernald Site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented. The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup. The Fernald Operable Unit 2 (OU2) includes the Solid Waste Landfill, Lime Sludge Ponds, Inactive Flyash Pile, Active Flyash Pile, and the South Field Area. These areas were used to dispose of flyash from the boiler plant, spent lime from water treatment activities, sanitary waste, and construction rubble from past operations at the Fernald site. This progress report provides a brief summary of the history of OU2, the current status of OU2 Remedial Investigation/Feasibility Study (RI/FS) activities, and the preferred cleanup alternative for OU2.

1480 V18/021317

Remedial Investigation/Feasibility Study: Operable Unit 3 - Production Area [Progress Report]

Reising, J.

U.S. Department of Energy, Washington, DC
Report; 2 pp. (March 1995)

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project. The nature and extent of contamination at the Fernald Site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented. The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup. Operable Unit 3 (OU3), the former production area and production-associated facilities, is one of the largest and most complex of the Fernald site Operable Units, largely due to the wide variety of former processing and support facilities. The primary contaminant is uranium, and the main focal points of cleanup are buildings, equipment, and support facilities. This progress report provides a brief summary of the history of OU3, the current status of OU3 Remedial Investigation/Feasibility Study (RI/FS) activities, cleanup alternatives under consideration, and work being done to alleviate near-term concerns.

1481 V18/021315

Remedial Investigation/Feasibility Study: Operable Unit 4 - Silos 1-4 [Progress Report]

Allen, R.B.

U.S. Department of Energy, Washington, DC
Report; 2 pp. (March 1995)

The U.S. Department of Energy's (DOE) Fernald Environmental Management Project site is divided into five sections, known as operable units, for environmental investigation and cleanup. The operable units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup. Located at the western periphery of the Fernald site, "Operable Unit 4" (OU4) is defined as a geographic area that includes Silos 1 and 2

(K-65 Silos), Silo 3 (metal oxide silo), the unused Silo 4, and ancillary structures. Operable Unit 4 remediation will address each of these structures, any contaminated soils within the geographic boundary, and any contaminated perched water encountered during Operable Unit 4 remedial activities. Silos 1 and 2 contain radium-bearing low-level radioactive wastes dating back to the 1950s. Silo 3 contains dried uranium-bearing wastes, and Silo 4 is empty. The Remedial Investigation/Feasibility Study (RI/FS), a "blueprint" for OU4 cleanup, was completed with U.S. EPA approval and signing of a final Record of Decision that outlines the selected cleanup remedy. Major components of the selected remedy for OU4 include: (1) Removal of the contents of Silos 1, 2, and 3; (2) Vitrification of the residues and sludges removed from the silos and decant sump tank; (3) Shipment of the vitrified forms to the Nevada Test Site; (4) Demolition of Silos 1, 2, 3, and 4, and decontamination, to the extent practicable, of the debris; (5) Removal of contaminated soils within the OU4 boundary, to achieve proposed remediation levels; and (6) Pumping and treatment of any contaminated perched water encountered during remedial activities. The overall objective of OU4 remedial actions is to safely remove a known source of contamination. Operable Unit 4 remediation is anticipated to require approximately six years and \$91.7 million, based on the assumptions in the Final Record of Decision for Operable Unit 4.

1482

V18/021316

Remedial Investigation/Feasibility Study: Operable Unit 5 - Environmental Media [Progress Report]

Janke, R.

U.S. Department of Energy, Washington, DC
Report; 2 pp. (March 1995)

The Remedial Investigation/Feasibility Study (RI/FS) is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project. The nature and extent of contamination at the Fernald Site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented. The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Fernald Operable Unit 5 (OU5) encompasses the environmental media at the Fernald site and surrounding areas. While other Operable Units focus on specific waste facilities or defined areas, OU5 is concerned with those environmental media that could be affected by the Fernald site. "Environmental media" includes groundwater, surface water, soils, sediments, vegetation and wildlife. This progress report provides a brief summary of the history of OU5, the current status of OU5 Remedial Investigation/Feasibility Study (RI/FS) activities, cleanup alternatives under consideration, and work being done to alleviate near-term concerns.

1483

V18/023593

Screening and Comparison of Remedial Alternatives for the South Field and Flyash Piles at the Fernald Site

Bumb, A.C.; Jones, G.N.; Warner, R.D.

Fluor Daniel, Inc., Greenville, SC; Fernald Environmental Restoration Management Corporation, Cincinnati, OH; U.S. Department of Energy, Fernald Environmental Management

Project, Fernald, OH

FEMP-2510; CONF-9605242; Proceedings of the Tenth Outdoor Action Conference, Las Vegas, NV, May 9-11, 1996; (20 pp.) (May 1996)

The South Field, the Inactive Flyash Pile, and the Active Flyash Pile are in close proximity to each other and are part of Operable Unit 2 (OU2) at the Fernald Environmental Management Project (FEMP). The baseline risk assessment indicated that the exposure pathways which pose the most significant risk are external radiation from radionuclides in surface soils and use of uranium contaminated groundwater. This paper presents screening and comparison of various remedial alternatives considered to mitigate risks from the groundwater pathway. Eight remedial alternatives were developed which consisted of consolidation and capping, excavation and off-site disposal with or without treatment, excavation and on-site disposal with or without treatment and combinations of these. Risk-based source (soil) preliminary remediation levels (PRLs) and waste acceptance criteria (WACs) were developed for consolidation and capping, excavation, and on-site disposal cell. The PRLs and WACs were developed using an integrated modeling tool consisting of an infiltration model, a surface water model, a vadose zone model, and a three-dimensional contaminant migration model in saturated media. The PRLs and WACs were then used to determine need for soil treatment, determine excavation volumes, and screen remedial alternatives. The selected remedial alternative consisted of excavation and on-site disposal with off-site disposal of the fraction exceeding the WAC.

1484

V18/022581

Superfund Record of Decision (EPA Region 5): Feed Materials Production Center (USDOE), Operable Unit 5, AKA Fernald Environmental Management Project, Fernald, Hamilton County, OH, January 31, 1996

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ROD/R05-96/312; 590 pp. (December 1996)

This decision document presents the selected remedial action for Operable Unit 5 of the Fernald Environmental Management Project (FEMP) site in Hamilton and Butler Counties, Ohio. Operable Unit 5 consists of impacted environmental media including groundwater in the underlying Great Miami Aquifer, perched groundwater, surface water, soil, sediment, flora, and fauna.

1485

V18/023436

Superfund Record of Decision (EPA Region 5): Feed Materials Production Center (USDOE), Operable Unit 3, AKA Fernald Environmental Management Project, Fernald, Hamilton County, OH, (Final Remedial Action), September 24, 1996

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ROD/R05-96/311; 134 pp. (December 1996)

This Record of Decision (ROD) presents the selected final remedial action for Operable Unit 3 (OU3) at the U.S. Department of Energy Fernald Environmental Management Project (FEMP) Site in Fernald, Ohio. OU3, which is one of five operable units at the

FEMP, consists of the former Production Area and production-associated buildings and equipment, including all above-, at-, and below-grade improvements, containerized materials, storage pads, roads, railroad tracks, above- and below-ground tanks, and utilities.

1486 V18/022758

Radioactive Waste Excavation at Mound Area 7 Using INEL Dig-Face Monitoring Technology

Carpenter, M.V.; Josten, N.E.

Idaho National Engineering Laboratory, Idaho Falls, ID
CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1119-1130) (1996)

Dig-face characterization is a method to improve the safety and efficiency during hazardous waste retrieval. A dig-face characterization system consists of on-site hardware for collecting detailed information on the changing chemical, radiological, and physical conditions in the subsurface throughout a hazardous site excavation. The dig-face characterization concept originated at the Idaho National Engineering Laboratory where it has been under development since 1992. In August 1995, a prototype dig-face system was taken to Mound Laboratory, Ohio, to monitor a hazardous waste site excavation. Mound Area 7 was the site of previous disposal of ²³²Th, ²²⁷Ac, and other waste. The dig-face characterization system was used to monitor a 20-ft x 20-ft x 5-ft-deep excavation intended to remove the ²²⁷Ac contaminated soils. Radiological, geophysical, and topographical sensors were scanned across each of four successive excavated soil levels, each 1-ft to 2-ft thick. The radiation sensors produced highly detailed images showing the location of the contaminants ²³²Th and ²²⁷Ac, and the clear delineation between them. When combined into a single data set, the four levels of collected data produced a three dimensional image of the contamination. The radiation sensor data indicated that only a small portion of the excavated soil was actually contaminated. The information produced by the dig-face system was used to direct precise excavation activities in the area containing the ²²⁷Ac and to plan subsequent removal of the separate ²³²Th plume.

1487 V18/024254

Alternative Proposal for the Disposal of Potentially Contaminated Railroad Cross-ties at the Savannah River Site [Rev. 1]

Hochel, R.C.

Westinghouse Savannah River Company, Aiken, SC
WSRC-TR-96-0149 (Rev. 1); 13 pp. (June 1996)

The Savannah River Site (SRS) has accumulated approximately 300,000 cross-ties that have been replaced over a 40-year period of maintaining the site's 62 miles of railroad track. The ties reside in a pile on an open area of 2.3 acres near the site's F-Area facilities. A small fraction of the ties are potentially contaminated with radioactivity as a result of past site practices and service. Contamination was possible from occasional leaks in

transport-casks moved by rail from the site's five nuclear materials production reactors to its two reprocessing facilities. Casks typically were filled with spent fuel, targets, and water from the reactor disassembly basins, which contained small amounts of fission and neutron activation product radioactivity normal to the operation of nuclear reactors.

1488 V18/023013

Gamma Well-Logging in Burial Ground of Savannah River Site

Winn, W.G.; Hofstetter, K.J.; MacMurdo, K.W.

Westinghouse Savannah River Company, Aiken, SC

CONF-951006; Proceedings of an American Nuclear Society (ANS) Winter Meeting, San Francisco, CA, October 29-November 1, 1995. ANS, La Grange Park, IL, 522 pp.; Transactions of the American Nuclear Society 73:83-85 (1995)

Gamma well-logging measurements were conducted in an inactive radioactive waste burial ground of the Savannah River site to appraise whether any evidence existed for downward movement of radioactivity toward the water table. Similar measurements on the same wells were conducted in 1980, providing a baseline from which to measure any changes in their radioactive plumes. In particular, the recent measurements sought to detect significant changes in depth location and radiation magnitude of the plumes, as well as the existence of any new plumes. By comparing measurements on a number of these wells, which were distributed on a grid pattern, it was anticipated that the general status of this section of the burial ground could be established.

1489 V18/023428

Visual and Radiological Inspection of a Pipeline Using a Teleoperated Pipe Crawler

Fogle, R.F.; Kuelske, K.; Kellner, R.A.

Radwaste Magazine 3(4):42-49 (July 1996)

In the 1950s the Savannah River Site built an open, unlined retention basin for temporary storage of potentially radionuclide-contaminated cooling water from a chemical separations process and storm water drainage from a nearby waste management facility, which stored large quantities of nuclear fission by-products in carbon steel tanks. An underground process pipeline lead to the basin. Once the closure of the basin in 1972, further assessment has been required. A visual and radiological inspection of the pipeline was necessary to aid in the decision about further remediation. This article describes the inspection using a teleoperated pipe crawler.

1490 V18/025400

Accelerated Clean-Up in the A/M Area, Savannah River Site

Bergren, C.L.; Simmons, M.; Hopkins, C.

Westinghouse Savannah River Company, Aiken, SC

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (3 pp.) (1997)

In 1983, the Savannah River Site (SRS), near Aiken, South Carolina, initiated one of the largest and most successful remediation programs aimed at cleaning up organic solvents from the soils and groundwater. Located in the northern portion of the SRS, the 350 acre A/M Area contained facilities for reactor fuel and target assemblies, support facilities, laboratories, and administration buildings. At several stages in the fabrication process, fuel assemblies were degreased using industrial solvents, primarily trichloroethylene (TCE) and tetrachloroethylene (PCE). Approximately 3.5 million pounds of solvents were released to the environment as process waste. This has led to a groundwater contaminant plume of approximately 1500 acres in size. The timing of the releases, location quantity and chemical differences among the solvents determined the distribution in the soils and groundwater. To date, more than 2.3 billion gallons of contaminated groundwater have been treated by two air strippers removing over 334,000 pounds of solvents. Soil vapor extraction units have removed well over 100,000 pounds of solvents from the vadose zone since they were installed in 1995.

1491

V18/025520

Field Test of Single Well DNAPL Characterization Using Alcohol Injection/Extraction

Jerome, K.M.; Looney, B.B.; Rhoden, M.L.; Riha, B.D.; Burdick, S.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-348; 74 pp. (October 29, 1996)

Soils and groundwater beneath an abandoned process sewer line in the A/M Area of the Savannah River Site (SRS) contain elevated levels of volatile organic compounds, specifically trichloroethylene (TCE) and tetrachloroethylene (PCE), two common chlorinated solvents. These compounds have low aqueous solubilities, thus when released to the subsurface in sufficient quantity, tend to exist as immiscible fluids or nonaqueous phase liquids (NAPLs). Because chlorinated solvents are also denser than water, they are referred to by the acronym DNAPLs, or dense non-aqueous phase liquids. Technologies targeted at efficient characterization or removal of DNAPL are not currently proven. The authors performed injection/extraction characterization tests in six existing wells in A/M Area. Water concentrations for TCE and/or PCE in these wells ranged from 0% to 100% of solubility. For each test, small amounts of solubilizing solution were used to try to confirm or deny the presence or absence of DNAPL in the immediate vicinity of the well screen.

1492

V18/024023

Lessons Learned at Savannah River: Phased-In Approach Lets New Groundwater Cleanup Methods Complement Traditional Ones

Bergren, C.L.; Looney, B.B.; Shealy, M.D.

Westinghouse Savannah River Company, Aiken, SC

Environmental Solutions (January 1996):1-4 (January 1996)

The Savannah River Site, near Aiken, SC, in 1983 began one of the largest and most successful cleanup programs for soil and groundwater contaminated with industrial solvents. Coordinated, phased implementation of groundwater pump-and-treat, soil-vapor

extraction and other technologies at the site's Administration and Materials Manufacturing Areas has resulted in rapid cleanup progress.

1493

V18/022336

Reprocessing of Seismic Shear Wave and TDEM Data Collected at the A&M Areas of the Savannah River Plant: Final Report - September 1992-December 1995

Blackhawk Geosciences, Inc., Golden, CO; U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, WV

DOE/MC/29106-5262; 50 pp. (March 1996)

The upper aquifers in the A&M area of the Savannah River Site are known to be contaminated by chlorinated solvents. Remediation plans depend critically on continuity of a confining zone known as the Crouch Branch Confining Unit (CBCU), which occurs at depths between about 250 feet and 300 feet. Surface and borehole geophysical methods were tested and further developed between 1993 and 1995 to map the lithology (clay content) and stratigraphy of the CBCU. It was found that time domain electromagnetics (TDEM) soundings were effective in mapping lithology and changes in lithology, and shear (S-) wave reflection surveys were effective in mapping stratigraphy. An integrated interpretation of the two methods yielded a rather complete image of lithology and stratigraphy of the CBCU. At the completion of the 1993-1995 work, several issues needed to be further developed. Additional funding was obtained to address some of the outstanding issues. This report contains the results of the additional work. Extensive computer code was developed for effective processing of multi-component S-wave high resolution reflection data. To test these algorithms and to better understand S-wave propagation in the near future, multi-component check shot surveys were acquired in boreholes. The developed algorithms were mainly tested on the multi-component borehole data set. The results of this analysis show clear evidence of seismic azimuthal anisotropy in the upper 300 feet of sediments of the A&M area.

1494

V18/024016

Use of a 2-Inch, Dual Screen Well to Conduct Aquifer Tests in the Upper and Lower Lost Lake Aquifer Zones: Western Sector, A/M Area, SRS

Hiergesell, R.A.; Novick, J.S.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-0227; 25 pp. (September 1996)

Two aquifer tests were conducted at MSB-78B/C, located in the Western Sector of the A/M Area. MSB-78B/C is a 2-inch diameter well having two separate screen zones, each finished in the Upper and Lower Lake Aquifer Zones, respectively. Each screen zone was pumped separately using an inflatable packer to isolate one zone from the other during the tests. Hydraulic responses to pumping during each test were monitored in separate wells located 25 feet from the pumping well. The hydraulic parameters Transmissivity, Storativity, and Leakance were calculated for the Upper and Lower Lost Lake Aquifer Zones using the drawdown responses. Pumping rates of 4.1 gallons per minute were achieved during each test and all purged water was collected in a tanker truck and transported to an air stripper for disposal.

1495 V18/023014

Mixed Waste Management Facility (MWMF) Old Burial Ground (OBG) Source Control Technology and Inventory Study

Flach, G.P.; Rehder, T.E.; Kanzleiter, J.P.

Westinghouse Savannah River Company, Aiken, SC

Q-ESR-E-00001; 84 pp. (October 2, 1996)

This report has been developed to support information needs for wastes buried in the Burial Ground Complex. Information discussed is presented in a total of four individual attachments. The general focus of this report is to collect information on estimated source inventories, leaching studies, source control technologies, and to provide information on modeling parameters and associated data deficiencies.

1496 V18/021216

Interim Action Proposed Plan for the Old Radioactive Waste Burial Ground (643-E) [Rev. 1]

McFalls, S.L.

Westinghouse Savannah River Company, Aiken, SC

WSRC-RP-94-1225 (Rev. 1); 30 pp. (December 1995)

This Interim Action Proposed (IAPP) is issued by the U.S. Department of Energy (DOE), which functions as the lead agency for SRS remedial activities, and with concurrence by the U.S. Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). The purpose of this IAPP is to describe the preferred interim remedial action for addressing the Old Radioactive Waste Burial Ground (ORWBG) unit located in the Burial Ground Complex (BGC) at the Savannah River Site (SRS) in Aiken, South Carolina. On December 21, 1989, SRS was included on the National Priorities List (NPL). In accordance with Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), DOE has negotiated a Federal Facility Agreement (FFA, 1993) with EPA and SCDHEC to coordinate remedial activities at SRS. Public participation requirements are listed in Sections 113 and 117 of CERCLA. These requirements include establishment of an Administrative Record File that documents the selection of remedial alternatives and allows for review and comment by the public regarding those alternatives. The SRS Public Involvement Plan (PIP) (DOE, 1994) is designed to facilitate public involvement in the decision-making process for permitting closure, and the selection of remedial alternatives. Section 117(a) of CERCLA, 1980, as amended, requires publication of a notice of any proposed remedial action.

1497 V18/021220

Superfund Record of Decision (EPA Region 4): Savannah River Site (USDOE), Old Radioactive Waste Burial Ground (643-E), Aiken, SC, June 18, 1996

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ROD/R04-96/267; 55 pp. (June 1996)

This decision document presents the selected remedial interim

action for the Old Radioactive Waste Burial Ground (ORWBG) located at the Savannah River Site (SRS) in Aiken, South Carolina. The selected interim action for the ORWBG, Placement of a Soil Cover, consists of placement of a low-permeability soil cover (minimum thickness 2 feet) on top of the existing grade. Topsoil (vegetative soil layer - minimum thickness of 3 inches) would be added and the area compacted and seeded to prevent erosion. This is an interim RCRA/CERCLA action and in no way constitutes a final action for the ORWBG.

1498 V18/021217

Characterization of the Burma Road Rubble Pit at the Savannah River Site, Aiken, South Carolina

Ward, K.G.; Frazier, W.L.; McAdams, T.D.; McFalls, S.L.; Rabin, M.; Voss, L.

Westinghouse Savannah River Company, Aiken, SC;
Neptune and Company, Inc., Los Alamos, NM

WSRC-MS-96-0005; CONF-960212; Waste Management '96: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, February 25-29, 1996; (12 pp.) (1996)

The Burma Road Rubble Pit (BRRP) is located at the Savannah River Site (SRS). The BRRP unit consists of two unlined earthen pits dug into surficial soil and filled with various waste materials. It was used from 1973–1983 for the disposal of dry inert rubble such as metal, concrete, lumber, poles, light fixtures, and glass. No record of the disposal of hazardous substances at the BRRP has been found. In 1983, the BRRP was closed by covering it with soil. In September 1988, a Ground Penetrating Radar survey detected three disturbed areas of soil near the BRRP, and a detailed and combined RCRA Facility Investigation/Remedial Investigation was conducted from November 1993 to February 1994 to determine whether hazardous substances were present in the subsurface, to evaluate the nature and extent of contamination, and to evaluate the risks posed to the SRS facility due to activities conducted at the BRRP site. Metals, semi-volatile organic compounds, volatile organic compounds, radionuclides and one pesticide (Aldrin) were detected in soil and groundwater samples collected from seventeen BRRP locations. A baseline risk assessment (BRA) was performed quantitatively to evaluate whether chemical and radionuclide concentrations detected in soil and groundwater at the BRRP posed an unacceptable threat to human health and the environment. The exposure scenarios identifiable for the BRRP were for environmental researchers, future residential and occupational land use. The total site noncancer hazard indices were below unity, and cancer risk levels were below $1.0\text{E-}06$ for the existing and future case environmental researcher scenario. The future case residential and occupational scenarios showed total hazard and risk levels which exceeded U.S. EPA criterion values relative to groundwater scenarios. For the most part, the total carcinogenic risks were within the $1.0\text{E-}04$ to $1.0\text{E-}06$ risk range. Only the future adult residential scenario was associated with risks exceeding $1.0\text{E-}04$.

1499 V18/022164

Superfund Record of Decision (EPA Region 4): Savannah River Site (USDOE), Burma Road Rubble Pit (Operable Unit 32), Aiken, SC, June 18, 1996

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ROD/R04-96/268; 26 pp. (August 1996)

The Burma Road Rubble Pit (BRRP) unit (231-4F) is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) solid waste management unit/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site. Only non-hazardous, inert material (e.g., wood, trash, wire, bottles, plastic, rubble, foam, concrete, etc.) was placed at the BRRP source unit. Based on the results of the remedial investigation, no action is necessary at the BRRP unit soils to ensure the protection of human health and the environment.

1500

V18/022887

**Four Mile Creek Bottomland Restoration Program:
Final Report as of December 31, 1995**

Savannah River Ecology Laboratory, Aiken, SC

SREL-53; 150 pp. (December 31, 1995)

Since 1990, a series of experiments has examined the appropriateness of 24 tree species for restoring a bottomland and swamp forest to the delta of Four Mile Creek. In addition, the various silvicultural techniques used to maximize the survival of the tree plantings, have been appraised for effectiveness and cost. While the topographic relief on the delta is small (decimeter differences between most sites), it is sufficient to utilize the various flood tolerances of the woody species. Hence, a diverse forest community can be established, using these elevational differences. In the wettest sites where water persists virtually continuously and may be one to two meters deep during large flood events, only the most flood tolerant species can survive, such as *Taxodium distichum* and *Nyssa aquatica*. These species will also survive very well at higher elevations, since the permanent water table never fell below one meter deep. In sites that are not flooded, unless the entire swamp is flooded, several additional species can be used. These include: *Fraxinus pennsylvanica*, *Carya aquatica*, *Quercus lyrata* and *Quercus nuttallii*. Finally, in slightly higher areas, *Quercus michauxii*, *Quercus nigra* and *Quercus phellos* would have adequate survival. Other species with similar flood tolerance might also do well, but were not examined in these experiments.

1501

V18/022174

**Demonstration of Geophysical Methods for Burial
Ground Geophysical Characterization Study at the
DOE Savannah River Site**

Hasbrouck, J.C.; Mac Lean, H.D.

Rust Geotech, Inc., Grand Junction, CO; U.S. Department of Energy, Grand Junction Office, Grand Junction, CO

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 905-906) (1996)

Rust Geotech, operating contractor at the U.S. Department of Energy Grand Junction Projects Office (DOE-GJPO), conducted a

demonstration of the trench boundary and large-object location capabilities of five nonintrusive geophysical methods in the Low-Level Radioactive Waste Disposal Facility (LLRWDF) at the DOE Savannah River Site (SRS). The plan for Resource Conservation and Recovery Act (RCRA) closure of the SRS LLRWDF specifies in-place compaction of "B-25" metal boxes containing low-level radioactive wastes. The boxes are buried in Engineered Low-Level Trenches (ELLTs) at the facility. To properly guide and control the compaction operation, the coordinates of the trench boundaries must be determined to an accuracy within 5 feet and the outer edges of the metal boxes in the trenches must be determined to within 2 feet.

1502

V18/024145

M Area HWMF Fact Sheet

Westinghouse Savannah River Company, Savannah River Technology Center, Aiken, SC

Factsheet; 2 pp. (June 7, 1993)

A and M Area soil and groundwater contamination is a result of previous waste disposal practices, once considered state-of-the-art. The primary source of contamination was the M Area Settling Basin, an 8 million gallon impoundment which received waste effluent from the M Area manufacturing facilities. Waste entered the M Area Settling Basin through an underground process sewer line (vitrified clay pipeline). The Basin overflowed to a natural seepage area and a shallow depression, known as Lost Lake, via a drainage ditch. This entire area is called the M Area Hazardous Waste Management Facility (HWMF). The effluent discharged to the unlined M Area Settling Basin contained heavy metals and chlorinated solvents. Most of the metals (aluminum, nickel, uranium, and lead) were effectively captured in the sediments of the Basin. Approximately two million pounds of trichloroethylene and tetrachloroethylene, chlorinated degreasing solvents similar to those used in the dry-cleaning industry, were released to the Basin. Most of the solvent seeped into the subsurface, contaminating the soil and groundwater, the remainder evaporated from the site.

1503

V18/024017

**Piezo-Resistivity Electric Cone Penetration Technology
Investigation of the M-Basin at the Savannah River
Site, Aiken, SC**

Bowers, B.; Rossabi, J.; Shinn, J.D., II; Bratton, W.L.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-96-0319; 158 pp. (1992)

This report documents the results of a combined field and laboratory investigation program to: (1) delineate the geologic layering, and (2) determine the location of a dense non-aqueous liquid-phase (DNAPL) contaminated plume beneath the M Area Hazardous Waste Management Facility at the Savannah River Plant. During April of 1991, DNAPLs were detected in monitoring well MSB-3D, located adjacent to the capped M-Area Settling Basin. Solvents in the well consisted mainly of tetrachloroethylene (PCE) and trichloroethylene (TCE), which are also the main solvents found in groundwater in the M Area. Prediction of the lateral and vertical spread of an M Area DNAPL plume requires detailed mapping of both the lateral and vertical stratigraphy and hydraulic conductivity. This report presents the results of soil, soil gas, and

groundwater characterization using cone penetrometer technology.

1504 V18/023981

Characterization of the Geology, Geochemistry, and Microbiology of the Radio Frequency Heating Demonstration Site at the Savannah River Site

Eddy-Dilek, C.A.; Jarosch, T.R.; Fliermans, C.B.; Looney, B.B.; Parker, W.H.

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-93-459; 135 pp. (August 1993)

The overall objective of the Integrated Demonstration Project for the Remediation of Organics at Nonrad Sites at the Savannah River Site (SRS) is to evaluate innovative remediation, characterization, and monitoring systems to facilitate restoration of contaminated sites. The first phase of the demonstration focused on the development and application of in situ air stripping technologies to remediate soils and groundwater contaminated with volatile organic compounds (VOCs). The second phase focussed on the enhancement of the in situ air stripping process by adding selected nutrients to stimulate naturally occurring microorganisms that degrade VOCs. The purpose of the third phase was to evaluate the use of heating technologies [radio frequency (RF) and ohmic heating] to enhance the removal of contamination from clay layers where mass transfer is limited. The objective of this report is to document pretest and post-test data collected in support of the RF heating demonstration.

1505 V18/021408

Investigation of the Continuity of Clay Layers Using Non-Invasive Surface Methods: Shear Wave Seismic Surveying - Final Report

Clark, J.C.; Johnson, W.J.

Bay Geophysical Associates, Inc., Traverse City, MI

Report; 100 pp. (November 1993)

The high resolution seismic reflection technique using S-waves has the ability to resolve thin (1- to 3-foot thick) clay layers. In an experiment conducted at the Integrated Demonstration site at M-Area of the Savannah River Site, two seismic profiles were obtained from both P- and S-waves. Data acquisition was achieved using high frequency geophones, a high digital sampling rate, and a 5-foot source/geophone spacing to enhance resolution. Results using conventional P-waves were disappointing, but subsurface sedimentary structure could be mapped using the S-waves. The resolution achieved with the S-waves was essentially triple that achieved with the P-waves above the water table and approximately five times that of P-waves below the water table. The purpose of this project was to delineate clay layers in support of DNAPL investigations. Although the S-wave reflections were able to resolve thin clay layers, the results were not unambiguous. As this study did not achieve the resolution necessary to obtain the desired results, it is recommended that another location at the SRS be tested where local operations are not a noise source, the ground is undisturbed, and a normal velocity profile is present.

1506 V18/022792

Post-Test Evaluation of the Geology, Geochemistry,

Microbiology, and Hydrology of the Insitu Air Stripping Demonstration Site at the Savannah River Site

Eddy-Dilek, C.A.; Looney, B.B.; Hazen, T.C.; Nichols, R.L.; Fliermans, C.B.; Parker, W.H.; Dougherty, J.M.; Kaback, D.S.; Simmons, J.L.

Westinghouse Savannah River Company, Savannah River Technology Center, Aiken, SC

WSRC-TR-93-369; 280 pp. (July 1993)

A full-scale demonstration of the use of horizontal wells for in situ air stripping for environmental restoration was completed as part of the Savannah River Integrated Demonstration Program. The demonstration of in situ air stripping was the first in a series of demonstrations of innovative remediation technologies for the cleanup of sites contaminated with volatile organic contaminants. The in situ air stripping system consisted of two directionally drilled wells that delivered gases to and extracted contamination from the subsurface. The demonstration was designed to remediate soils and sediments in the unsaturated and saturated zones as well as groundwater contaminated with volatile organic compounds. The demonstration successfully removed significant quantities of solvent from the subsurface. The field site and horizontal wells were subsequently used for an in situ bioremediation demonstration during which methane was added to the injected air. The field conditions documented herein represent the baseline status of the site for evaluating the in situ bioremediation as well as the post-test conditions for in situ air stripping demonstration. Characterization activities focused on documenting the nature and distribution of contamination in the subsurface. The post-test characterization activities discussed herein include results from the analysis of sediment samples, three-dimensional images of the pretest and post-test data, contaminant inventories estimated from pretest and post-test models, a detailed lithologic cross sections of the site, results of aquifer testing, and measurements of geotechnical parameters of undisturbed core sediments.

1507 V18/022586

Development and Implementation of a Site Radiation Protection Program for a Radioactive Waste Vitrification and RCRA Clean Closure Project at the Savannah River Site

Davidson, M.S.; Howard, I.S.; Veronee, W.A., Jr.

GTS Duratek, Inc., Columbia, MD

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):4a (June 1996)

The purpose of this project was to implement a radiological protection program at the M-Area Vendor Treatment Facility (VTF) at the Savannah River Site. The project is unique in that it incorporates a turnkey approach to operation and control of a single waste treatment facility at a DOE site. The Vendor Treatment Facility is a temporary installation in the M-Area of the Savannah River Site consisting of buildings 341-M and 341-8M and tanks 100-7, 100-8, and 100-10. The objective of the VTF is to convert approximately 660,000 gallons of uranium and nickel-contaminated sludge to a stable glass wasteform. The scope of the VTF project also includes RCRA clean closure of the tanks following removal of the sludge. Facility-specific radiological

controls for the VTF were necessary to minimize safety and health risks to occupational workers, as well as members of the general public. The Radiation Protection Program (RPP) established radiological requirements for all VTF operations and support activities. The RPP was designed and implemented to support Westinghouse Savannah River Company's (WSRC) implementation of a radiological protection program as specified in WSRC Manual 5Q; the U.S. DOE Radiological Control Manual, DOE/EH-0256T; Occupational Radiation Protection, 10 CFR 835; and contractual commitments.

1508

V18/021546

Rehabilitation of Monitoring Wells Clogged by Calcite Precipitation and Drilling Mud

Kroening, D.E.; Snipes, D.S.; Brame, S.E.; Hodges, R.A.; Price, V.; Temples, T.J.

Groundwater Monitoring and Remediation 16(2):114-123 (September 1996)

Based on aquifer performance tests, 13 out of 15 wells situated at the Mixed Waste Disposal (MWD) area located at the Savannah River Site, South Carolina, exhibited high skin factors and low well efficiencies indicative of severely damaged wells. The use of damaged wells in aquifer testing can lead to inaccurate determinations of aquifer properties, and such wells are unusable in future remediation programs. Moreover, damaged wells can go dry during purging, thus compromising sample collection. Pump tests, chemical analyses, and biological investigations revealed that the poor well performance at MWD was attributable to calcite precipitation on the well screen and drilling mud in the filter pack. The calcite problem resulted from improper well installation, and the drilling mud in the filter pack was due to inadequate well development. Experimental rehabilitation procedures employed on two wells, MWD 5A and 1A, included acidification, swabbing, introduction of surfactants, and surging. Treatment of the wells substantially improved well yields, skin factors, and well efficiencies. Moreover, well rehabilitation was determined to be a reasonable alternative to drilling new wells at the MWD wellfield.

1509

V18/022889

Savannah River Site Geosynthetic Cap Closure Technology

Davis, L.B.

Westinghouse Savannah River Company, Aiken, SC
Report; 30 pp. (August 1996)

The first geosynthetic cap used at the Savannah River Site and the first geosynthetic cap approved in the state of South Carolina was at the Nonradioactive Disposal Facility (also known as the Sanitary Landfill). The closure plan was approved by the South Carolina Department of Health and Environmental Control in 1995. This work was done by the Environmental Restoration Program and managed by Bechtel and Westinghouse Savannah River Companies. The flexibility and ease of installation with geosynthetic capping shortens installation and construction time. Millions of dollars are saved compared to the conventional kaolin clay cap closure. Following are photos and descriptions of a typical geosynthetic cap depicting seven layers: foundation layer, reinforcement layer, gas vent layer, geosynthetic clay liner, flexible membrane liner,

geosynthetic drainage layer and the vegetative layer.

1510

V18/021551

Z-Area Saltstone Disposal Facility Groundwater Monitoring Report

Westinghouse Savannah River Company, Aiken, SC

WSRC-TR-95-0437; 54 pp. (December 1995)

Samples from the ZBG wells at the Z-Area Saltstone Disposal Facility are analyzed quarterly for constituents required by South Carolina Department of Health and Environmental Control Industrial Waste Permit IWP-217 and for other constituents as part of the Savannah River Site Groundwater Monitoring Program. During third quarter 1995, no constituents were reported above final Primary Drinking Water Standards or Savannah River Site flagging criteria. In the past, tritium has been detected sporadically in the ZBG wells at levels similar to those detected before Z Area began radioactive operations.

1511

V18/022886

Findings of the Wetland Survey of the David Witherspoon, Inc., 1630 Site, South Knoxville, Knox County, Tennessee

Rosensteel, R.A.

JAYCOR Environmental, Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-398; 20 pp. (March 1997)

In accordance with Department of Energy (DOE) Regulations for Compliance with Floodplains and Wetlands Environmental Review Requirements, surveys for wetland presence or absence were conducted in September 1996 on the DWI-1630 site (Witherspoon Landfill) located in South Knoxville, Knox County, Tennessee. The DWI-1630 site includes a closed, capped landfill area, areas of past disturbance adjacent to the capped area, and patches of hardwood forest. Wetlands were identified on the landfill cap and in a small bottomland that was formerly used for a retention pond in the southwest corner of the DWI-1630 site. The wetlands identified in the cap are man-induced, atypical situation wetlands. These areas have hydrophytic vegetation and wetland hydrology, but the soils do not have hydric characteristics. Wetland development appears to be due to a combination of the grading or subsidence of the clay landfill cap, the low permeability of the clay fill soil, and the absence of surface drainage outlets from the depressions. These atypical situation wetland areas may not be considered by the US Army Corps of Engineers of the State of Tennessee to be jurisdictional wetlands. The wetland in the former retention pond area has hydrophytic vegetation, wetland hydrology, and hydric soils and is a jurisdictional wetland.

1512

V18/022963

Work Plan for the Radiological Survey for the David Witherspoon, Incorporated, Landfill-1630 Site, Knoxville, Tennessee

U.S. Department of Energy, Washington, DC; Jacobs Engineering Group Inc., Oak Ridge, TN

DOE/OR/02-1483&D1; 33 pp. (July 1996)

This work plan establishes the methods and requirements for performing a radiological survey at the David Witherspoon, Incorporated, Landfill-1630 Site (DWI 1630 Site) in accordance with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The radiological survey will identify the radiological contamination level of the equipment and debris stored at the DWI 1630 Site. The data generated from the survey activities will support the decisions for characterization of the equipment/debris and aid in subsequent disposition and waste handling. The survey activities to be performed under this work plan include an equipment radiological survey, a walkover survey, and an immunoassay testing for polychlorinated biphenyls (PCBs). This work plan includes a quality assurance (QA)/quality control (QC) project plan, a health and safety (H&S) plan, and a waste management plan.

1513 V18/022964

Work Plan Addendum for David Witherspoon, Inc., 901 Site Building Characterization, Knoxville, Tennessee

U.S. Department of Energy, Washington, DC; Jacobs Engineering Group Inc., Oak Ridge, TN

DOE/OR/02-1503/V2&D1/A1; 25 pp. (January 1997)

This document establishes the rationale and procedures for obtaining radiological and polychlorinated biphenyl (PCB) data from all of the David Witherspoon, Inc. (DWI) buildings so that the need for remedial action can be evaluated. The chemicals of concern (COCs) are limited to radionuclides and polychlorinated biphenyls (PCBs), which represent most of the health risk at the site. Both of these contaminants are, therefore, a concern for all of the buildings. Physical data (i.e., construction materials and volume estimates) will be obtained for remedial alternative cost estimates should the radiological/PCB data indicate further action is warranted. Chapter 2 provides a brief site history, including the former uses and construction of five main buildings. Chapter 3 presents the proposed field schedule in association with the RI work plan and provides a detailed description of the RI activities. Chapter 4 discusses quality assurance/quality control (QC) requirements. Chapter 5 presents health and safety requirements and procedures for managing investigation-derived waste (IDW).

1514 V18/022280

Annual Summary Report on the Surveillance and Maintenance Program for Remedial Action Inactive Waste Sites at the Oak Ridge K-25 Site: Fiscal Year 1995

Oak Ridge K-25 Site, Oak Ridge, TN

K/ER-291; 35 pp. (December 15, 1995)

Fiscal year (FY) 1995 marked the third year of the Surveillance and Maintenance (S&M) Program for the Environmental Restoration (ER) Remedial Action (RA) Inactive Waste Sites (IWS) at the Oak Ridge K-25 Site. The mission of this program, authorized and funded by Activity Data Sheet 4306, has remained as originally established: to ensure adequate containment and control of potential or known contamination at inactive ER waste sites pending their characterization and final remediation. At the end of FY 1995, there existed a total of 123 sites in the S&M Program; this consisted of 57 ER Inactive Waste Sites and 66 RCW Valve

Vaults, covering 160 acres. Three inactive waste sites were added to the program, consisting of the K-1007-P1 Pond, F-05 Laboratory, and the J.A. Jones Maintenance Complex.

1515 V18/022285

Site Evaluation Report for the K-1004-J Laboratory and Vault Area

T N and Associates, Oak Ridge, TN; Oak Ridge K-25 Site, Oak Ridge, TN

DOE/OR/01-1489&D1; 45 pp. (June 1996)

Since 1987, the K-25 Site primary mission has been the decontaminating and decommissioning (D&D) of its' facilities. As part of this mission, DOE is required to evaluate the environmental impacts of its' facilities following specific procedures outlined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA). In the late 1940s the K-1004-J Laboratory was designed and built on the K-25 Site as a facility to conduct research for the recovery of uranium from Hanford spent-fuel solutions. Original plans indicated that there were six underground storage vaults which were used to store radioactive materials. The purpose of this report is to identify and document the contents of the known vault located beneath the floor of the RAD Worker II classroom in the K-1004-J Laboratory building and, if possible, the location of any other vaults in the room. The scope involved evaluating the contents of the vaults through visual observation and a series of nondestructive in-situ radiological measurements.

1516 V18/022367

Remedial Action/Effectiveness Report for the K-1070 Operable Unit SW31 Spring Phase 2 Remedial Action at the Oak Ridge K-25 Site, Oak Ridge, Tennessee [D1, Rev. 1]

Oak Ridge K-25 Site, Oak Ridge, TN

DOE/OR/01-1520&D1/R1; 15 pp. (January 1997)

The U.S. Department of Energy (DOE) issues the Remedial Action Report (RAR) for the interim remediation of the K-1070 Operable Unit (OU) SW31 Spring (hereafter referred to as the SW31 Spring). The scope of the RAR encompasses the operational stage of Phase 1 and Phase 2 activities. During the Phase 1 operation, the SW31 Spring water was collected, transferred to a tanker, and transported to the Y-12 Groundwater Treatment Facility for treatment. Phase 2 activities included the construction of treatment upgrades at the K-25 CNF and connection to the Phase 1 collection and transfer system.

1517 V18/023959

Remedial Investigation of the K-1070-A Burial Ground at East Tennessee Technology Park, Oak Ridge, Tennessee: Volume 1 - Report

U.S. Department of Energy, Washington, DC; Science Applications International Corporation, Oak Ridge, TN

DOE/OR/01-1519/V1&D1; 478 pp. (March 1997)

This Remedial Investigation Report on the K-1070-A Burial Ground at the East Tennessee Technology Park was prepared in accordance

with requirements under the Comprehensive Environmental Response, Compensation, and Liability Act for reporting the results of a site characterization for public review. The East Tennessee Technology Park was formerly known as the Oak Ridge K-25 Site and will be referred to as the K-25 Site in this document. This document provides the Environmental Restoration Program with information on the K-1070-A Burial Ground remedial investigation plus results of numerous other investigations and monitoring conducted at the K-1070-A Burial Ground. It also includes information on risk assessments that have evaluated long-term impacts to human health and the environment. Information provided in this document forms the basis for the development of the Feasibility Study Report.

1518 V18/023960

Remedial Investigation of the K-1070-A Burial Ground at East Tennessee Technology Park, Oak Ridge, Tennessee: Volume 2 - Appendixes A-J

U.S. Department of Energy, Washington, DC; Science Applications International Corporation, Oak Ridge, TN
DOE/OR/01-1519/V2&D1; 525 pp. (March 1997)

This document provides the Environmental Restoration Program with information on the K-1070-A Burial Ground remedial investigation plus results of numerous other investigations and monitoring conducted at the K-1070-A Burial Ground. Appendixes A-J of the Remedial Investigation Report are the following: (A) K-1070-A Burial Ground Waste Inventory and Annual Reports to USAEC, (B) Project Quality Assurance Summary, (C) Remedial Investigation Data Quality Assessment and Evaluation, (D) 1990 Census Data for Roane County, Tennessee, (E) Field Sampling Activities, (F) K-25 Plant Microgravity Survey, Oak Ridge, Tennessee, (G) Integrated Interpretation of Microgravity Data Report, (H) Lithology Logs and Monitor Well Construction Diagrams, (I) Geophysical Log Interpretation, and (J) Sonar Survey Report of Boreholes BRW-103 and BRW-104.

1519 V18/023961

Remedial Investigation of the K-1070-A Burial Ground at East Tennessee Technology Park, Oak Ridge, Tennessee: Volume 3 - Appendixes K-N

U.S. Department of Energy, Washington, DC; Science Applications International Corporation, Oak Ridge, TN
DOE/OR/01-1519/V3&D1; 515 pp. (March 1997)

This document provides the Environmental Restoration Program with information on the K-1070-A Burial Ground remedial investigation plus results of numerous other investigations and monitoring conducted at the K-1070-A Burial Ground. Appendixes K-N of this Remedial Investigation Report are the following: (K) Slug Test Data, (L) Groundwater Tracer Test Results, (M) Analytical Data, and (N) Geotechnical Data.

1520 V18/023962

Remedial Investigation of the K-1070-A Burial Ground at East Tennessee Technology Park, Oak Ridge, Tennessee: Volume 4 - Appendixes O-T

U.S. Department of Energy, Washington, DC; Science

Applications International Corporation, Oak Ridge, TN
DOE/OR/01-1519/V4&D1; 625 pp. (March 1997)

This document provides the Environmental Restoration Program with information on the K-1070-A Burial Ground remedial investigation plus results of numerous other investigations and monitoring conducted at the K-1070-A Burial Ground. Appendixes O-T of this Remedial Investigation Report are the following: (O) Water Level Measurement Data, (P) Microbial Monitoring for Anaerobic Degradation Conditions Report, (Q) Radiation Walkover Survey Report, (R) Modeling Results, (S) Human Health Risk Assessment Data, (T) Ecological Risk Assessment Data.

1521 V18/022305

Removal Site Evaluation Report for the K-1407 Contaminated Debris at the Oak Ridge K-25 Site, Oak Ridge, TN

Abston, J.P.; McGinn, C.W.; Moyer, J.H.; Stanley, A.M.; Wells, S.C.; Zondlo, T.F.

U.S. Department of Energy, Washington, DC; Oak Ridge K-25 Site, Oak Ridge, TN

DOE/OR/01-1476&D1; 50 pp. (June 1996)

This document is a Removal Site Evaluation Report for the K-1407 Contaminated Debris Area at the Department of Energy's K-25 Site in Oak Ridge, Tennessee. During excavation activities for storm water diversion ditches for the K-1407-B/C Ponds remedial construction on July 14, 1994, debris with beta/gamma counts as high as 24,000 dpm/100 square centimeters was uncovered in an approximately 400 ft. sq. area southwest of the K-1407-C Pond. This site evaluation was initiated to determine the probable source and nature of the contaminated debris, the potential risks posed by the debris, whether a removal action pursuant to section 300.415 of the National Contingency Plan is warranted or if the area will require additional investigation.

1522 V18/023972

RCRA Closure Plan for the K-1417 Concrete Block Casting and Storage Yard and the K-1419 Sludge Fixation Facility at the Oak Ridge K-25 Site, Oak Ridge, Tennessee: Volume 1 - Closure Plan

U.S. Department of Energy, Washington, DC

DOE/OR-1076/V1&D1; 45 pp. (August 1992)

This closure plan has been prepared for the K-1417 Concrete Block Casting and Storage Yard (K-1417 unit) and the K-1419 Sludge Fixation Facility (K-1419 unit) at the Oak Ridge K-25 Site (facility identification number TN0 89 009 0004). This plan outlines the actions required to achieve closure of the K-1417 and K-1419 units and is being submitted in accordance with TN Rule 1200-1-11.05(7)(a)-(f) and 40 CFR 265.110-.115. The K-1417 and K-1419 units have been used to treat and store containerized treated and raw sludges originating from the Resource Conservation and Recovery Act (RCRA) closure of the K-1407 B and C Ponds. This closure plan outlines the steps that will be taken to meet the closure performance standards specified in TN Rule 1200-1-11-.05(7)(b) (40 CFR 265.111).

1523 V18/023971

Remedial Investigation Work Plan for the K-901 Operable Unit at the Oak Ridge K-25 Site, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC

DOE/OR-0152/V1&D1; 495 pp. (August 1992)

The Oak Ridge K-25 Site is one of three major installations on the Oak Ridge Reservation (ORR), along with the Oak Ridge Y-12 Plant and Oak Ridge National Laboratory (ORNL). This document, Remedial Investigation Work Plan for the K-901 Operable Unit at the Oak Ridge K-25 Site, Oak Ridge, Tennessee, has been prepared to summarize data collected to date at the K-901 Operable Unit (OU) in the northwest corner of the K-25 Site and to recommend additional activities required to complete the remedial investigation (RI). This document contains historical and operational information, background information related to the physical characteristics of the area, a statistical review of the data collected to date, and a preliminary screening of the data to identify potential contaminants of concern. This project has been discussed with the Environmental Protection Agency (EPA), the Tennessee Department of Environment and Conservation (TDEC), and the Department of Energy (DOE) in meetings on September 25, 1992 and February 20, 1992. At these meetings, all the aforementioned parties agreed to the project scope, objectives, and schedule reflected in the three volumes of this report. A record of the aforementioned meetings can be found in Appendix A of this volume.

1524 V18/022466

Technologies for Remedial Action at the Department of Energy K-25 Site and Oak Ridge National Laboratory

Kubarewicz, J.W.; Watson, J.S.; Kuhaida, A.J., Jr.

CH2M Hill Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

CONF-9309146; Emerging Technologies in Hazardous Waste Management V, Proceedings of the Fifth American Chemical Society Industrial and Engineering Chemistry Division Special Symposium, Atlanta, GA, September 27-29, 1993. American Chemical Society, Washington, DC, 903 pp.; (7 pp.) (1993)

Technologies likely to be needed to remediate environmental problems at the K-25 Site and ORNL are identified and assessed in "technology logic diagrams" (TLD) developed for the two sites. The TLD utilizes a logical progression of elements to identify, evaluate and status potential technologies related to environmental management problems at these sites. Although there were some common problems and thus similar solutions at the two sites, differences in the type of site contamination and understanding required different approaches and applications of technology. The contamination at the two sites and our understanding of the extent of contamination are reviewed and compared. Potential remedial technologies for the site problems are identified and their developmental and implementation needs and priorities are assessed.

1525 V18/020765

Discovery, Interception, and Treatment of a Groundwater Plume: Oak Ridge National Laboratory

Lee, R.R.; Ketelle, R.H.

Oak Ridge National Laboratory, Energy Division, Oak Ridge, TN

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1329-1335) (1996)

A radiological groundwater plume was discovered to be discharging into a surface stream and portions of the storm drain network at Oak Ridge National Laboratory (ORNL). A CERCLA removal action was initiated to address the discharges. The plume was found to be migrating 65 degrees oblique to the overall hydraulic gradient and was identified only after historic data were analyzed and field tests were performed under the working hypothesis of stratabound flow and transport. A detailed geologic and hydrologic analysis was performed that accurately predicted the 3-dimensional plume configuration from a single point datum where significantly elevated contaminant levels were found in a bedrock core hole. Subsequent sampling found that direct discharges of contamination existed in the stream only in the location of the predicted stratum. The affected storm drain outfall discharges were suspected to be the major contributors to Sr-90 surface water risk from ORNL. Thus, the selected removal action focused on eliminating the known seepage to the storm drain network. Intercept system operations reduced the total surface water Sr-90 flux by about 90%. Ongoing investigations seek to identify the source of the plume with the hope that the intercept system may eventually be deactivated. However, the efficiency of the system exceeded expectations and demonstrated that a good understanding of the hydrodynamics is a prerequisite to success. The relatively trouble free operation of the system also indicates that simple technologies can serve as effective measures to address immediate problems.

1526 V18/022342

Implementation Plan for Liquid Low-Level Radioactive Waste Systems Under the FFA for Fiscal Years 1996 and 1997 at Oak Ridge National Laboratory, Oak Ridge, Tennessee [October 1996]

H&R Technical Associates, Inc., Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR/01-1473&D2; 95 pp. (October 1996)

This document is the fourth annual revision of the plans and schedules for implementing the Federal Facility Agreement (FFA) compliance program, originally submitted in 1992 as ES/ER-17&D1, Federal Facility Agreement Plans and Schedules for Liquid Low-Level Radioactive Waste Tank Systems at Oak Ridge National Laboratory, Oak Ridge, Tennessee. This document summarizes the progress that has been made to date or will be made as of the end of Fiscal Year (FY) 1996 in implementing the plans and schedules for meeting the FFA commitments for the Liquid Low-Level Waste (LLLW) System at Oak Ridge National Laboratory (ORNL). In addition, this document lists FFA activities planned for FY 1997. Information presented in this document provides a comprehensive summary to facilitate understanding of the FFA compliance program for LLLW tank systems and to present plans and schedules associated with remediation, through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, of LLLW tank systems that have

been removed from service.

1527

V18/025276

Level 3 Baseline Risk Assessment for Building 3515 at Oak Ridge National Laboratory Oak Ridge, Tennessee

Wollert, D.A.; Cretella, F.M.; Golden, K.M.; Robers, S.K.
University of Tennessee, Knoxville, TN; DASKR Limited,
Charleston, WV

ORNL/ER-311; 123 pp. (August 1995)

This report presents the results of the Level 3 Baseline Risk Assessment (BRA) performed for Building 3515 located at the Oak Ridge National Laboratory (ORNL). This BRA is intended to provide an analysis of the potential for adverse health effects (current or future) posed by contaminants at the facility. Building 3515 is a surplus facility slated for decontamination and decommissioning. Site characterization activities were performed from December 1993 through February 1994 to collect information necessary to begin planning the D&D of the building. To adequately characterize the risks posed by the facility, receptors for both current and potential future land uses were evaluated. A Level 3 (least rigorous) BRA was conducted for this facility to use the limited available characterization data. Future plans for the facility (demolition) preclude additional characterization and a more rigorous analysis for risk assessment purposes.

1528

V18/021570

Technical Evaluation of the Insitu Vitrification Melt Expulsion at the Oak Ridge National Laboratory on April 21, 1996, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-377; 96 pp. (August 1996)

On April 21, 1996, at 6:12 p.m., approximately 20 tons of molten glass were expelled from a 216-ton body of molten (approximately 1600 degrees C) radioactively contaminated soil (containing 2.4 Ci of Cs-137) at a field site at the Oak Ridge National Laboratory in Oak Ridge, Tennessee. The melt expulsion was caused by pressurized steam venting rapidly through, rather than by the desired path around, the molten body. During the previous 17 days, an old seepage pit was undergoing in situ vitrification (ISV) to convert it from porous, leachable soil into a monolithic, impermeable vitreous waste form. Approximately 2 MW of electrical power was being delivered to the molten body, which was contained in the ground and covered with a stainless steel hood maintained under negative pressure to collect, filter, scrub, and monitor off-gas. Off-gas into the hood was rapidly heated by the melt expulsion from a typical operating temperature of 250 degrees C to over 1000 degrees C with an associated surge of pressure sufficient to lift the 15,000-lb hood approximately 12 in. off the ground. A small pool of molten glass was able to flow up to 3 ft outside the hood while it was raised off the ground. The escaping hot off-gas and molten glass ignited several small fires in combustible components near or attached to the external hood frame (e.g. wire insulation, plastic hose, fiberglass trays). Fire department personnel responded to the emergency notification within minutes but were not needed because the small fires self-extinguished within an hour. Four project personnel were performing tasks at the site at the time of the melt expulsion; none were injured or contaminated during the melt expulsion incident. Air

samples taken from the hood perimeter near the small fires failed to detect any airborne contamination.

1529

V18/023592

Radiological Assessment of Worker Doses During Sludge Mobilization and Removal at the Melton Valley Storage Tanks

Kerr, G.D.; Coleman, R.L.; Kocher, D.C.; Wynn, C.C.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/TM-13352; 81 pp. (December 17, 1996)

This report presents an assessment of potential radiation doses to workers during mobilization and removal of contaminated sludges from the Melton Valley Storage Tanks at Oak Ridge National Laboratory. The assessment is based on (1) measurements of radionuclide concentrations in sludge and supernatant liquid samples from the waste storage tanks, (2) measurements of gamma radiation levels in various areas that will be accessed by workers during normal activities, (3) calculations of gamma radiation levels for particular exposure situations, especially when the available measurements are not applicable, and (4) assumed scenarios for worker activities in radiation areas. Only doses from external exposure are estimated in this assessment. Doses from internal exposure are assumed to be controlled by containment of radioactive materials or respiratory protection of workers and are not estimated.

1530

V18/022347

Analysis and Interpretation of Airborne Geophysical Data Acquired over the Melton Valley Waste Area Groupings and Adjacent Areas, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Nyquist, J.E.; Doll, W.E.

Lockheed Martin Energy Systems, Inc., Environmental Sciences Division, Oak Ridge, TN

ES/ER/TM-208; 115 pp. (September 1996)

In 1992, the Environmental Restoration and Waste Management (ERWM) Remote Sensing Program contracted Aerodat, Ltd. (Formerly Geonex Aerodat) to acquire airborne geophysical data over the entire Oak Ridge Reservation (ORR). This document provides a detailed review of a subsection of the data obtained from the airborne surveys that covers most of the Melton Valley watershed, including the major ORNL burial grounds. The area chosen on the basis of current and anticipated needs of the Environmental Restoration (ER) Program and encompasses a rectangle of approximately eight sq miles extending from the Clinch River, 0.5 miles north of Jones Island at the northwest corner, to a point just north of the Dosimetry Applications Research Facility (DOSAR) at the southeast corner. The goals of the study were to: (1) provide confirmation of the boundaries of waste areas, (2) provide a summary of the distribution of metallic wastes within the waste areas, (3) identify anomalies that are outside of waste areas and provide an explanation for their existence, (4) highlight where modifications to existing geologic maps are inferred by the airborne data, (5) examine relationships between geophysical anomalies and groundwater pathways, (6) document radioactive contamination in the survey area, and (7) distinguish between anomalies that occur due to natural processes and those that result

from human activities.

1531 V18/023973

Remedial Investigation Report on the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 1 - Evaluation, Interpretation, and Data Summary

U.S. Department of Energy, Washington, DC

DOE/OR/01-1546/V1&D2; 225 pp. (May 1997)

The Melton Valley watershed presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context with the intent of enabling program managers and decision-makers to understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions. Volume 1 of the Remedial Investigation Report contains site descriptions and the watershed conceptual model, identification of applicable or relevant and appropriate requirements (ARARs), a summary of historical data, and a detailed assessment of the nature and extent of contamination for subsections of the watershed. Risk assessment results are also presented.

1532 V18/023974

Remedial Investigation Report on the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 2 - Appendixes A and B

U.S. Department of Energy, Washington, DC

DOE/OR/01-1546/V2&D2; 335 pp. (May 1997)

The Melton Valley watershed presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context with the intent of enabling program managers and decision-makers to understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions. Volume 2 of the Remedial Investigation Report contains Appendix A and Appendix B. Appendix A contains tables showing source inventory information for the evaluated subbasins. Appendix B presents the human health risk assessment.

1533 V18/023975

Remedial Investigation Report on the Melton Valley Watershed at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 3 - Appendix C

U.S. Department of Energy, Washington, DC; CDM Federal Programs Corporation, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

DOE/OR/01-1546/V3&D2; 475 pp. (May 1997)

The Melton Valley watershed presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal

unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context with the intent of enabling program managers and decision-makers to understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions. Volume 3 of the Remedial Investigation Report contains the ecological risk assessment.

1534 V18/021573

Environmental Health and Safety Independent Investigation of the Insitu Vitrification Melt Expulsion at the Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-371; 48 pp. (July 1996)

At about 6:12 pm, EDT on April 21, 1996, steam and molten material were expelled from the Pit 1 in situ vitrification (ISV) project at the Oak Ridge National Laboratory (ORNL). At the request of the director of the Environmental Restoration (ER) Division, Department of Energy Oak Ridge Operations, an independent investigation team was established on April 26, 1996. This team was tasked to determine the facts related to the ORNL Pit 1 melt expulsion event (MEE) in the areas of environment safety and health concerns such as the adequacy of the ISV safety systems; operational control restrictions; emergency response planning/execution; and readiness review, and report the investigation team findings within 45 days from the date of incident. These requirements were stated in the letter of appointment presented in Appendix A of this report. This investigation did not address the physical causes of the MEE. A separate investigation was conducted by ISV project personnel to determine the causes of the melt expulsion and the extent of the effects of this phenomenon. In response to this event, occurrence report ORO-LMES-X10ENVRES-1996-0006 (Appendix B) was filed. The investigation team did not address the occurrence reporting or event notification process. The project personnel (project team) examined the physical evidence at the Pit 1 ISV site (e.g., the ejected melt material and the ISV hood), reviewed documents such as the site-specific health and safety plan (HASp), and interviewed personnel involved in the event and/or the project. A listing of the personnel interviewed and evidence reviewed is provided.

1535 V18/023951

Active Sites Environmental Monitoring Program: FY 1995 Annual Report

Morrissey, C.M.; Cunningham, G.R.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/M-4950; 75 pp. (July 1996)

This report summarizes the activities of the Active Sites Environmental Monitoring Program (ASEMP) from October 1994 through September 1995. The Radioactive Solid Waste Operations Group (RSWOG) of the Waste Management and Remedial Action Division (WMRAD) and the Environmental Sciences Division (ESD) at Oak Ridge National Laboratory (ORNL) established ASEMP in 1989. The purpose of the program is to provide early

detection and performance monitoring at active low-level waste (LLW) disposal sites in Solid Waste Storage Area (SWSA) 6 and transuranic (TRU) waste storage sites in SWSA 5 North as required by Chapters II and III of U.S. Department of Energy (DOE) Order 5820.2A.

1536 V18/020738

Detection and Mapping of Buried Waste

Stahl, G.A.; Odenweller, J.B.; Huff, D.D.

Environmental Research Institute of Michigan, Ann Arbor, MI; Oak Ridge National Laboratory, Oak Ridge, TN

CONF-960203 (Vol. 2); *Geologic Remote Sensing - Practical Solutions for Real World Problems*, Proceedings of the Eleventh Thematic Conference, Las Vegas, NV, February 27-29, 1996. Environmental Research Institute of Michigan, Ann Arbor, MI, Vol. 2, 723 pp.; (pp. II231-II240) (1996)

A major environmental concern today is the characterization, remediation, and monitoring of Federal waste sites, such as those operated by the Department of Energy (DOE). A significant amount of hazardous waste is buried at known sites on DOE reservations. Determining the exact location of buried waste trenches is an important step in the characterization and remediation of these sites. Remotely sensed imagery offers a rich source of information for accomplishing this task. This paper presents a case study conducted at Solid Waste Storage Area 4 (SWSA 4) at Oak Ridge National Laboratory. Historical aerial photography and recently collected multispectral imagery were analyzed to determine the precise locations of the buried trenches. A comparison of the results to recent ground measurements indicates the strengths and weaknesses of the remote sensing approach. Further analysis of these ground data also provides an understanding of the phenomenology that gives rise to the imagery signatures associated with the trenches. Application of these techniques can significantly reduce the costs of site remediation. By knowing the trench locations precisely, rather than the general locations, remediation alternatives to contain and isolate the waste materials can be tailored appropriately.

1537 V18/023432

Technical Work Plan for Surface Impoundments Operable Unit Engineering Support Studies

Parsons Engineering Science, Inc., Atlanta, GA

ORNL/ER-324; 228 pp. (November 1995)

This document provides a comprehensive work plan which, when utilized as a data collection guide for field activities, will provide the necessary information required to complete a report on geotechnical properties of the sediments contained in the Surface Impoundments Operable Unit at Oak Ridge National Laboratory in Oak Ridge, Tennessee. Detailed guidance is provided for the following activities: collection of samples from the impoundments; compressive strength testing of the raw sediments; compressive strength testing of the structurally modified (lime and cement additives) sediments; testing for sediment physical properties and settling rates; testing for sediment dewatering characteristics; testing for radiation activity during the field work; testing for polymer additions that may enhance settling. The work plan additionally provides guidance and examples for the preparation of documents

necessary to establish readiness for safe and satisfactory performance of the field activities. An outline for the format requested for a report of these data is also provided.

1538 V18/022283

Annual Report on Environmental Monitoring Activities for FY 1995 (Baseline Year) at Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Science Applications International Corporation, Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR/01-1484&D1; ORNL/M-5204; 165 pp. (June 1996)

This report presents the results of baseline year monitoring conducted during fiscal year (FY) 1995 at Waste Area Grouping (WAG) 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee. After completion of a Resource Conservation and Recovery Act (RCRA) Facility Investigation, WAG 6 moved into a deferred action monitoring status. "Deferred action" was the chosen alternative for WAG 6 based on information indicating that remediation resources could be better spent addressing the major contributors to contaminant release from the White Oak Creek watershed. At the time, WAG 6 was estimated to contribute less than 2% to potential risk associated with off-site releases.

1539 V18/023976

Field Grouting Summary Report on the WAG 4 Seeps 4 and 6 Removal Action Project, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 1 - Text

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-401/V1; 70 pp. (May 1997)

During the summer of 1996, a unique multi-phase, multi-stage, low-pressure permeation grouting pilot program was performed inside portions of four unlined waste disposal trenches at Waste Area Grouping (WAG) 4 at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The project was deemed a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); however, due to a history of heavy precipitation in the fall, the schedule was fast-tracked to meet an October 31, 1996 grouting completion date. The technical objective of the removal action was to reduce the off-site transport of strontium-90 by grouting portions of four waste disposal trenches believed to be responsible for over 70 percent of the strontium-90 leaving the site. A goal of the grouting operation was to reduce the average in situ hydraulic conductivity of the grouted waste materials to a value equal to or less than 10(E-6) cm/sec. This target hydraulic conductivity value was established to be at least two orders of magnitude lower than that of the surrounding natural ground. This report describes brief background to the project, describes and analyzes the grouting operations, draws conclusions from the work performed, and presents some of the "lessons learned."

1540 V18/023977

Field Grouting Summary Report on the WAG 4 Seeps 4 and 6 Removal Action Project, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 2 - Appendixes A-D

ECO Grouting Specialists Limited, Cheltenham, Ontario, Canada; Oak Ridge National Laboratory, Oak Ridge, TN ORNL/ER-401/V2; 135 pp. (May 1997)

During the summer of 1996, a unique multi-phase, multi-stage, low-pressure permeation grouting pilot program was performed inside portions of four unlined waste disposal trenches at Waste Area Grouping (WAG) 4 at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The project was deemed a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); however, due to a history of heavy precipitation in the fall, the schedule was fast-tracked to meet an October 31, 1996 grouting completion date. The technical objective of the removal action was to reduce the off-site transport of strontium 90 by grouting portions of four waste disposal trenches believed to be responsible for over 70 percent of the strontium 90 leaving the site. A goal of the grouting operation was to reduce the average in situ hydraulic conductivity of the grouted waste materials to a value equal to or less than $10(E-6)$ cm/sec. This target hydraulic conductivity value was established to be at least two orders of magnitude lower than that of the surrounding natural ground. Appendixes A, B, C, and D of the report present pipe driving records, casing grout injection records, hydraulic conductivity testing records, and grout quality control test records, respectively.

1541 V18/023978

Field Grouting Summary Report on the WAG 4 Seeps 4 and 6 Removal Action Project, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 3 - Appendixes E and F

ECO Grouting Specialists Limited, Cheltenham, Ontario, Canada; Oak Ridge National Laboratory, Oak Ridge, TN ORNL/ER-401/V3; 278 pp. (May 1997)

During the summer of 1996, a unique multi-phase, multi-stage, low-pressure permeation grouting pilot program was performed inside portions of four unlined waste disposal trenches at Waste Area Grouping (WAG) 4 at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee. The project was deemed a non-time-critical removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA); however, due to a history of heavy precipitation in the fall, the schedule was fast-tracked to meet an October 31, 1996 grouting completion date. The technical objective of the removal action was to reduce the off-site transport of strontium 90 by grouting portions of four waste disposal trenches believed to be responsible for over 70 percent of the strontium 90 leaving the site. A goal of the grouting operation was to reduce the average in situ hydraulic conductivity of the grouted waste materials to a value equal to or less than $1 \times 10(-6)$ cm/sec. This target hydraulic conductivity value was established to be at least two orders of magnitude lower than that of the surrounding natural ground. Appendixes E and F present daily grouting reports and grout injection summary tables, respectively.

1542 V18/022273

Geology Summary of Waste Area Grouping 5 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Anderson, J.E.

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN

ORNL/ER/MS-1; 15 pp. (August 1996)

During FY 1994, three multiport wells were installed in Waste Area Grouping (WAG) 5. The wells were instrumented with Westbay multiport systems. The purpose of the wells is: (1) to characterize different flow systems and (2) to monitor for contaminants. The geology of the individual boreholes (WAG 5-12, WAG 5-13, WAG 5-14) is documented but does not explicitly show geologic relationships between these boreholes or integrate this information into the geology of WAG 5. The purpose of this report is to document and present a summary of the distribution of geologic formations in WAG 5. This information is presented in several ways: (1) stratigraphic correlation diagrams based on the natural gamma ray log, (2) geologic cross sections, and (3) a geologic map. This work provides a reference frame for interpreting flow, water, and contaminant chemistry data from multiport wells.

1543

V18/023435

Groundwater Level Monitoring Sampling and Analysis Plan for the Environmental Monitoring Plan at Waste Area Grouping 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee [Rev. 1]

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-199/R1; 104 pp. (September 1995)

This document is the Groundwater Level Monitoring Sampling and Analysis Plan (SAP) for Waste Area Grouping (WAG) 6 at Oak Ridge National Laboratory (ORNL). Note that this document is referred to as a SAP even though no sampling and analysis will be conducted. The term SAP is used for consistency. The procedures described herein are part of the Environmental Monitoring Plan (EMP) for WAG 6, which also includes monitoring tasks for seeps and springs, groundwater quality, surface water, and meteorological parameters. Separate SAPs are being issued concurrently to describe each of these monitoring programs. This SAP has been written for the use of the field personnel responsible for implementation of the EMP, with the intent that the field personnel will be able to take these documents to the field and quickly find the appropriate steps required to complete a specific task. In many cases, Field Operations Procedures (FOPs) will define the steps required for an activity. The FOPs for the EMP are referenced and briefly described in the relevant sections of the SAPs, and are contained within the FOP Manual. Both these documents (the SAP and the FOP Manual) will be available to personnel in the field.

1544

V18/024032

ORNL Completes Low-Pressure Permeation Grouting for Radioactive Source Control at WAG 4

TIE Quarterly 5(2):5,12 (Fall 1996/Winter 1997)

Oak Ridge National Laboratory (ORNL) used low-pressure permeation grouting together with real-time injection monitoring to emplace a variety of grout formulations into radioactive waste trenches that had been identified as major contributors to Sr-90 discharge from Waste Area Grouping (WAG) 4. This emplacement of grout was one of a series of environmental restoration projects

to control Sr-90 release at the site. A combination of Portland cement-based grouts, ultra fine cement-based grouts, and polyacrylamide chemical grout was injected in a multiple-pass operation designed to initially fill large voids, then progressively tighten the grouted mass until groundwater would flow around the target areas rather than through zones containing wastes considered to be major sources for release.

1545

V18/020993

Remedial Site Evaluation Report for the Waste Area Grouping 10 Wells Associated with the New Hydrofracture Facility at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 1 - Evaluation, Interpretation, and Data Summary

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; Bechtel National, Inc., Oak Ridge, TN; CH2M Hill Inc., Oak Ridge, TN; Ogden Environmental and Energy Services Company, Oak Ridge, TN; PEER Consultants, Oak Ridge, TN

DOE/OR/01-1471/V1&D1; 160 pp. (August 1996)

This document provides the Environmental Restoration Program with information about the results of an evaluation of Waste Area Grouping (WAG) 10 wells associated with the New Hydrofracture Facility (NHF) at Oak Ridge National Laboratory. Information provided in this document forms the basis for decisions regarding the need for subsequent action at WAG 10. This report is a continuation of the hydrofracture site evaluation efforts within WAG 10. It addresses 21 inactive wells associated with the NHF and makes recommendations for closing the wells. The primary goal of this evaluation was to gain sufficient data about the wells to recommend the type and best method of final disposition (plugging and abandonment, P&A) for the wells. To meet this goal, a full suite of borehole geophysical logs was run. The secondary goals were to determine the stratigraphic position of the rock cover, deep monitoring, and observation wells; the subsurface stratigraphy at NHF; and identify possible artificially induced or natural pathways for the spread of contaminants from hydrofracture activities. A general approach was used to develop detailed P&A descriptions for the 21 WAG 10 NHF wells according to the unique characteristics of each well. The refined approaches were then used to develop generated waste volume and cost estimates. Volume 1 of this evaluation contains evaluation, interpretation, and data summary. Volume 2 contains field activities and well summaries.

1546

V18/020994

Remedial Site Evaluation Report for the Waste Area Grouping 10 Wells Associated with the New Hydrofracture Facility at Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 2 - Field Activities and Well Summaries

U.S. Department of Energy, Oak Ridge Operations Office, Oak Ridge, TN; Bechtel National, Inc., Oak Ridge, TN; CH2M Hill Inc., Oak Ridge, TN; Ogden Environmental and Energy Services Company, Oak Ridge, TN; PEER Consultants, Oak Ridge, TN

DOE/OR/01-1471/V2&D1; 340 pp. (August 1996)

This document provides the Environmental Restoration Program

with information about the results of an evaluation of Waste Area Grouping (WAG) 10 wells associated with the New Hydrofracture Facility (NHF) at Oak Ridge National Laboratory. Information provided in this document forms the basis for decisions regarding the need for subsequent action at WAG 10. This report is a continuation of the hydrofracture site evaluation efforts within WAG 10. It addresses 21 inactive wells associated with the NHF and makes recommendations for closing the wells. The primary goal of this evaluation was to gain sufficient data about the wells to recommend the type and best method of final disposition (plugging and abandonment, P&A) for the wells. To meet this goal, a full suite of borehole geophysical logs was run. The secondary goals were to determine the stratigraphic position of the rock cover, deep monitoring, and observation wells; the subsurface stratigraphy at NHF; and identify possible artificially induced or natural pathways for the spread of contaminants from hydrofracture activities. A general approach was used to develop detailed P&A descriptions for the 21 WAG 10 NHF wells according to the unique characteristics of each well. The refined approaches were then used to develop generated waste volume and cost estimates. Volume 1 of this evaluation contains evaluation, interpretation, and data summary. Volume 2 contains field activities and well summaries.

1547

V18/022366

Removal Action Report on Waste Area Grouping 4 Seeps 4 and 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN
DOE/OR/01-1544&D1; 30 pp. (December 1996)

This report documents removal action activities for a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) non-time-critical removal action as described in the Action Memorandum prepared by Jacobs ER Team (1996). The technical objective of this removal action was to reduce the release of strontium 90 (90Sr) into an ephemeral tributary to White Oak Creek from WAG 4 seeps, as measured at Monitoring Station (MS) 1 at ORNL, Oak Ridge, Tennessee.

1548

V18/024253

Seeps and Springs Sampling and Analysis Plan for the Environmental Monitoring Plan at Waste Area Grouping 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee [Rev. 1]

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/ER-201/R1; 113 pp. (September 1995)

This Sampling and Analysis Plan addresses the monitoring, sampling, and analysis activities that will be conducted at seeps and springs and at two french drain outlets in support of the Environmental Monitoring Plan for Waste Area Grouping (WAG) 6. WAG 6 is a shallow-land-burial disposal facility for low-level radioactive waste at Oak Ridge National Laboratory, a research facility owned by the U.S. Department of Energy and operated by Lockheed Martin Energy System, Inc. Initially, sampling will be conducted at as many as 15 locations within WAG 6 (as many as 13 seeps and 2 french drain outlets). After evaluating the results obtained and reviewing the observations made by field personnel during the first round of sampling, several seeps and springs will be

chosen as permanent monitoring points, together with the two french drain outlets. Baseline sampling of these points will then be conducted quarterly for 1 year (i.e., four rounds of sampling after the initial round). The samples will be analyzed for various geochemical, organic, inorganic, and radiological parameters. Permanent sampling points having suitable flow rates and conditions may be outfitted with automatic flow-monitoring equipment. The results of the sampling and flow-monitoring efforts will help to quantify flux moving across the ungauged perimeter of the site and will help to identify changes in releases from the contaminant sources.

1549 V18/023448

Technical Evaluation Summary of the Insitu Vittrification Melt Expulsion at the Oak Ridge National Laboratory on April 21, 1996, Oak Ridge, Tennessee [Rev. 1]

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/ER-374/R1; 73 pp. (November 1996)

This Technical Evaluation Summary of the In Situ Vittrification Melt Expulsion at the Oak Ridge National Laboratory on April 21, 1996 was prepared at the request of the Department of Energy as a supporting reference document for the Final Unusual Occurrence Report to fully explore the probable causes that led to the subject incident. This document provides the Environmental Restoration Program with the technical information on the performance of the in situ vittrification (ISV) treatability study operations at ORNL pit 1 up to and including the time of the melt expulsion incident. This document also discusses the causes of the melt expulsion event, the consequent damages to equipment, the radiological impacts of the event, and the equipment design modifications and procedural changes necessary for future safe ISV operations.

1550 V18/023399

Tritium Dynamics Within Secondary Contaminant Sources in Fractured Shale Bedrock

Jardine, P.M.; Brooks, S.C.; Hicks, D.S.; Lu, B.W.; Sanford, W.E.; Reedy, O.C.

Oak Ridge National Laboratory, Oak Ridge, TN
CONF-961103; Decommissioning, Decontamination, and Reutilization Worldwide Experience: DD&R, What Does It Mean, M.G. White, R.G. Thomas and R.F. Ranellone (eds.), Proceedings of an Embedded Topical Symposium of an American Nuclear Society Winter Meeting, Washington, DC, November 10-14, 1996. American Nuclear Society, Inc., La Grange Park, IL, 328 pp.; Transactions of the American Nuclear Society 75:55-56 (1996)

The disposal of low-level radioactive waste at Oak Ridge National Laboratory (ORNL) has historically involved shallow land burial via pits and trenches. For the past several decades, contaminants have been migrating from the primary waste trenches into the underlying saturated zone, which is composed primarily of fractured shale bedrock. A portion of these contaminant plumes have been moving quickly along fast-flowing fractures, while other portions of the plumes have been slowly migrating into the surrounding bedrock matrix. Contaminant migration into the matrix is both beneficial and problematic. Matrix storage alleviates the potential of large contaminant discharges from the primary waste trenches into the

groundwater, yet it creates a secondary contaminant source that is difficult to remediate. The contaminant tritium is of particular concern because of the large inventories present in existing waste sites and because of its high mobility from the primary waste source. Waste Area Grouping 5 (WAG 5) at ORNL is known to be a significant contributor of tritium contamination to the local watershed. The total yearly tritium discharge from this region is on the order of many thousands of curies. Remedial action at WAG 5 is hampered by inaccurate risk assessment that is associated with the poorly defined source terms of the contaminated bedrock. The authors objectives were to (a) quantify the rate of tritium storage and depletion within secondary sources at WAG 5 and (b) define the importance of primary and secondary sources of tritium to contamination discharged to the streams along the perimeter of WAG 5.

1551 V18/021568

Waste Area Grouping 2: Phase I Remedial Investigation - Sediment and Cesium-137 Transport Modeling Report

Clapp, R.B.; Bao, Y.S.; Moore, T.D.; Brenkert, A.L.; Purucker, S.T.; Reece, D.K.; Burgoa, B.B.

Oak Ridge National Laboratory, Oak Ridge, TN
ORNL/ER-367; 238 pp. (June 1996)

This report is one of five reports issued in 1996 that provide follow-up information to the Phase I Remedial Investigation (RI) Report for Waste Area Grouping (WAG) 2 at Oak Ridge National Laboratory (ORNL). The five reports address areas of concern that may present immediate risk to public health at the Clinch River and ecological risk within WAG 2 at ORNL. A sixth report, on groundwater, in the series documenting WAG 2 RI Phase I results were part of project activities conducted in FY 1996. The five reports that complete activities conducted as part of Phase I of the Remedial Investigation (RI) for WAG 2 are as follows: (1) Waste Area Grouping 2, Phase I Task Data Report: Seep Data Assessment; (2) Waste Area Grouping 2, Phase I Task Data Report: Tributaries Data Assessment; (3) Waste Area Grouping 2, Phase I Task Data Report: Ecological Risk Assessment; (4) Waste Area Grouping 2, Phase I Task Data Report: Human Health Risk Assessment; (5) Waste Area Grouping 2, Phase I Task Data Report: Sediment and Cs-137 Transport Modeling. In December 1990, the Remedial Investigation Plan for Waste Area Grouping 2 at Oak Ridge National Laboratory was issued. The WAG 2 RI Plan was structured with a short-term component to be conducted while upgradient WAGs are investigated and remediated, and a long-term component that will complete the RI process for WAG 2 following remediation of upgradient WAGs. RI activities for the short-term component were initiated with the approval of the Environmental Protection Agency, Region IV (EPA), and the Tennessee Department of Environment and Conservation (TDEC). This report presents the results of an investigation of the risk associated with possible future releases of Cs-137 due to an extreme flood. The results are based on field measurements made during storms and computer model simulations.

1552 V18/020845

Waste Area Grouping 2: Phase I, Task Data Report - Human Health Risk Assessment

Purucker, S.T.; Douthat, D.M.

Oak Ridge National Laboratory, Health Sciences Research Division, Oak Ridge, TN

ORNL/ER-368; 183 pp. (June 1996)

This report is one of five reports issued in 1996 that provide follow-up information to the Phase I Remedial Investigation (RI) Report for Waste Area Grouping (WAG) 2 at Oak Ridge National Laboratory (ORNL). The five reports address areas of concern that could cause potential human health risk and ecological risk within WAG 2 at ORNL. The purpose of this report is to present a summary of the human health risk assessment results based on the data collected for the WAG 2 Phase I RI. Estimates of risk are provided based on measured concentrations in the surface water, floodplain soil, and sediment of White Oak Creek, Melton Branch, and their tributaries.

1553

V18/020853

Removal Action Report on the Waste Evaporator Facility, Building 3506, at Oak Ridge National Laboratory, Oak Ridge, Tennessee [D1]

Lockheed Martin Energy Systems, Inc., Environmental Restoration Division, Oak Ridge, TN

DOE/OR/01-1460&D1; 15 pp. (July 1996)

The construction phase of the Waste Evaporator Facility (WEF) Removal Action was completed on June 25, 1996. The construction objectives set forth in the Action Memorandum were met. There were a few deviations from the proposed plan that reduced activity durations and waste volumes generated. The Action Memorandum does not require follow-on monitoring. Activities included: Removing accumulated water from the cell; Removing contaminated sediment from the cell; Removing contaminated soil from the gallery crawlspace; Dismantling the structure to one foot below-grade; Disposal of concrete rubble; and, Covering remaining below-grade materials

1554

V18/022883

Comprehensive Work Plan for the Well Driller's Steam Cleaning Facility at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-394; 10 pp. (February 1997)

The purpose of this Comprehensive Work Plan is to address the history of the site as well as the scope, roles and responsibilities, documentation, training, environmental compliance requirements, and field actions needed to close the Oak Ridge National Laboratory (ORNL) Well Driller's Steam Cleaning Facility, hereinafter referred to as the Facility.

1555

V18/022393

Validated Analytical Data Summary Report for White Oak Creek Watershed Remedial Investigation Supplemental Sampling, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Oak Ridge, TN; CDM Federal Programs Corporation, Oak Ridge, TN

ORNL/ER-381; 55 pp. (September 1996)

This Validated Analytical Data Summary Report describes the fieldwork and presents the validated analytical data collected to support the White Oak Creek Watershed Remedial Investigation (RI)/Feasibility Study (FS). Data were collected at various sites at the Oak Ridge National Laboratory to support the completion of a baseline ecological risk assessment for the project. A series of Data Quality Objectives meetings, held in February 1996, identified the absence of metals data as a data gap that would require filling before the RI/FS could be completed. Mobilization for the field activities occurred in May 1996. In June, radiation walkover surveys were conducted and/or soil samples were collected from Waste Area Groupings 3, 4, 7, and 9. The analytical data were sent off-site for analysis and subsequently validated. The validated results are presented in tabular form by location.

1556

V18/022353

White Oak Creek Watershed, Melton Valley Remedial Investigation Report, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 1 - Main Text

Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR-01-1546/V1&D1; ORNL/M-5520/V1&D1; 225 pp.

(November 1996)

The White Oak Creek (WOC) Melton Valley Remedial Investigation (RI) Area presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context to help program managers and decision-makers understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions.

1557

V18/022354

White Oak Creek Watershed, Melton Valley Remedial Investigation Report, Oak Ridge National Laboratory, Oak Ridge, Tennessee: Volume 2 - Appendixes A and B

Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR-01-1546/V2&D1; ORNL/M-5520/V2&D1; 467 pp.

(November 1996)

The White Oak Creek (WOC) Melton Valley Remedial Investigation (RI) Area presents a multifaceted management and decision-making challenge because of the very heterogeneous conditions that exist with respect to contaminant type, disposal unit age, mode of disposal, release mechanism, and potential risk-producing pathways. The investigation presented here has assembled relevant site data in the geographic context to help program managers and decision-makers understand site conditions and evaluate the necessity, relative priority, and scope of potential remedial actions. These appendices contain source inventory information and the human health risk assessment

1558

V18/022355

White Oak Creek Watershed, Melton Valley Remedial Investigation Report, Oak Ridge National Laboratory,

Oak Ridge, Tennessee: Volume 3 - Appendix C

Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR-01-1546/V3&D1; ORNL/M-5520/V3&D1; 285 pp.
(November 1996)

This report provides details on the baseline ecological risk assessment conducted in support of the Remedial Investigation (RI) Report for the Melton Valley area of the White Oak Creek watershed (WOCW). The RI presents an analysis meant to enable the U.S. Department of Energy (DOE) to pursue a series of remedial actions resulting in site cleanup and stabilization. The ecological risk assessment builds off of the WOCW screening ecological risk assessment. All information available for contaminated sites under the jurisdiction of the U.S. Department of Energy's Comprehensive Environmental Response, Compensation, and Liability Act Federal Facilities Agreement within the White Oak Creek (WOC) RI area has been used to identify areas of potential concern with respect to the presence of contamination posing a potential risk to ecological receptors within the Melton Valley area of the White Oak Creek watershed. The risk assessment report evaluates potential risks to receptors within each subbasin of the watershed as well as at a watershed-wide scale.

1559 V18/022172

Clean Enough for Industry: An Airborne Geophysical Case Study

Nyquist, J.E.; Beard, L.P.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 853-863) (1996)

Data from two airborne geophysical surveys of the Department of Energy's Oak Ridge Reservation (ORR) were extremely valuable in deciding whether a 1000-acre (400-hectare) parcel of the ORR should be leased to the City of Oak Ridge for industrial development. The findings, based on electromagnetic and magnetic data, were incorporated into the federally mandated Environmental Assessment Statement (EAS), and in general supported claims that this land was never used as a hazardous waste disposal site. The study estimated the amount of iron required to produce each anomaly using a simple dipole model. All anomalies with equivalent sources greater than approximately 1000 kg of iron were checked in the field, and the source of all but one identified as either a bridge, reinforced concrete debris, or a similarly benign object. Additionally, some smaller anomalies (equivalent sources of roughly 500 kg) have been checked; thus far, these also have innocuous sources. Airborne video proved invaluable in identifying logging equipment as the source of some of these anomalies. Geologic noise may account for some of the remaining anomalies. Naturally occurring accumulations of magnetic minerals in the soil on the ORR have been shown to produce anomalies which, at a sensor height of 30 in, are comparable to the anomaly produced by about 500 kg of iron. By comparison, the electronic noise of the magnetic gradiometer, 0.01- 0.02 nT/m, is equivalent to only about 50-100 kg of iron at a 30 m sensor height. The electromagnetic

data, combined with field mapping of karst structures, provided evidence of a northeast-southwest striking conduit spanning the parcel. The possible existence of a karst conduit led the EAS authors to conclude that this is a "sensitive hydrologic setting." We conclude that aerial geophysics is an extremely cost-effective, and efficient technique for screening large tracts of land for environmental characterization.

1560 V18/021759

Effective Porosity and Pore-Throat Sizes of Mudrock Saprolite from the Nolichucky Shale Within Bear Creek Valley on the Oak Ridge Reservation: Implications for Contaminant Transport and Retardation Through Matrix Diffusion

Dorsch, J.; Katsube, T.J.

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN; Geological Survey of Canada, Mineral Resources Division, Ottawa, Ontario, Canada

ORNL/GWPO-025; 75 pp. (May 1996)

Matrix diffusion is regarded as an important transport mechanism within the low-permeability dual-porosity saprolite mantle on the Oak Ridge Reservation (ORR). In order to evaluate and model matrix diffusion, a knowledge of the effective porosity of the saprolite matrix is necessary. The purpose of the research reported in this document was the derivation of quantitative data on effective porosity and pore-throat sizes of mudrock saprolite based on state-of-the-art petrophysical measurement techniques. The target was the saprolite developed from the Nolichucky Shale of the Conasauga Group within Bear Creek Valley on the Oak Ridge Reservation (ORR). The data are important for the evaluation of matrix diffusion as a transport process within fractured low-permeability geological materials such as mudrock saprolite on the ORR.

1561 V18/020767

FY94 Site Characterization and Multilevel Well Installation at a West Bear Creek Valley Research Site on the Oak Ridge Reservation

Moline, G.R.; Schreiber, M.E.

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN; University of Wisconsin, Department of Geology and Geophysics, Madison, WI

ORNL/TM-13029; 90 pp. (March 1996)

The goals of this project are to collect data that will assist in determining what constitutes a representative groundwater sample in fractured shale typical of much of the geology underlying the Oak Ridge Reservation (ORR) waste disposal sites, and to determine how monitoring well construction and sampling methods affect the representativeness of the sample. This report details the FY94 field activities at a research site in west Bear Creek Valley on the ORR. These activities funded by the Energy Systems Groundwater Program Office through the Oak Ridge Reservation Hydrologic and Geologic Studies (ORRHAGS) task, focus on developing appropriate sampling protocols for the type of fractured media that underlies many of the ORR waste disposal sites. Currently accepted protocols were developed for porous media and are likely to result in

nonrepresentative samples in fractured systems.

1562

V18/022363

Quality Assurance/Quality Control Summary Report on Phase 2 of the Clinch River Remedial Investigation at the Oak Ridge Reservation, Oak Ridge, Tennessee

Holladay, S.K.

Automated Sciences Group, Inc., Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN; Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/ER-385; 450 pp. (December 1996)

A comprehensive QA program which included administrative controls, quality control samples, and quality reviews was implemented for Phase 2 of the Clinch River Remedial Investigation (CRRI). This document presents results of the QA activities. Quality assurance (QA) objectives for Phase 2 were that: (1) scientific data generated would withstand scientific and legal scrutiny; (2) data would be gathered using appropriate procedures for sample collection, sample handling and security, chain of custody, laboratory analyses, and data reporting; (3) data would be of known precision and accuracy; and (4) data would meet data quality objectives defined in the Phase 2 Sampling and Analysis Plan. Approximately 4400 inorganic, 3000 organic, and 2000 radiological samples were analyzed resulting in over 160,000 contaminant and physical analyses. The QA completeness goal for the program was to obtain valid analytical results for at least 90% of the samples collected during the program. Overall completeness for all Phase 2 media and analyses exceeded this goal. Less than one percent of the analyses were rejected. Rejected data occurred because of low spike recoveries and low sensitivity. A review of the QA systems and quality control (QC) data associated with the Phase 2 investigation is presented to evaluate whether the data were of sufficient quality to satisfy Phase 2 objectives.

1563

V18/022946

Environmental Restoration Footprint Reduction Process: Evaluation of McKinney Ridge Study Area [D1, Rev. 1]

U.S. Department of Energy, Washington, DC; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; Barge, Waggoner, Sumner and Cannon, Inc., Oak Ridge, TN; Radian Corporation, Oak Ridge, TN; Tennessee Department of Environment and Conservation, DOE Oversight Division, Oak Ridge, TN

DOE/OR/01-1511&D1/R1; 65 pp. (February 1997)

The McKinney Ridge study area is being evaluated by the U.S. Department of Energy (DOE) Environmental Management program as part of an incremental process to identify Oak Ridge Reservation (ORR) lands that have not been impacted by activities that have resulted in hazardous substance contamination and to issue all such lands a No Further Investigation (NFI) status. This process is referred to as the Environmental Restoration Footprint Reduction process. Should contaminated areas be identified in the study area during the evaluation, then they will be added to Appendix C of the Federal Facility Agreement (FFA) as areas of concern (AOCs) and will be subject to the conditions of that agreement. Uncontaminated study areas or portions of study areas

will not be considered part of the National Priorities List (NPL) site. The McKinney Ridge investigation included a review of historical data, examination of aerial photographs and remote sensing data, and field resolution of all apparent anomalies. Findings indicate that no public health concern should arise because of past and present activities in the study area.

1564

V18/022955

Environmental Restoration Footprint Reduction Process: Evaluation of Pine Ridge Study Area

U.S. Department of Energy, Washington, DC; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN; Barge, Waggoner, Sumner and Cannon, Inc., Oak Ridge, TN; Radian Corporation, Oak Ridge, TN; Tennessee Department of Environment and Conservation, DOE Oversight Division, Oak Ridge, TN

DOE/OR/01-1522&D1; 60 pp. (March 1997)

The Pine Ridge study area is being evaluated by the DOE Environmental Management program as part of an incremental process to identify Oak Ridge Reservation (ORR) lands that have not been impacted by activities that have resulted in hazardous substance contamination and to issue all such lands a No Further Investigation (NFI) status. This process is referred to as the Environmental Restoration Footprint Reduction process. Findings indicate that no public health concern should arise because of past and present federal activities within the study area. The possibility of groundwater contamination from other affected areas of the ORR exists, and future groundwater use restrictions may be deemed necessary. When and if the study area is considered for transfer to a non-DOE use, additional sampling will be necessary to determine the need for groundwater use restrictions. Presently there are no groundwater monitoring wells within the study area. Investigation results and present land uses do not presently justify the initiation of intrusive sampling.

1565

V18/022383

Sampling Results, DNAPL Monitoring Well GW-729, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Third Quarter FY 1995 Through Third Quarter FY 1996

Drier, R.B.; Caldanaro, A.J.

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN; Oak Ridge Institute for Science and Education, Oak Ridge, TN

Y/ER-205; 60 pp. (December 1996)

In January 1990, dense, nonaqueous phase liquids (DNAPLs) were discovered approximately 274 ft below ground surface along the southern border of the Y-12 Plant Burial Grounds. Immediately after the discovery, an investigation was conducted to assess the occurrence of DNAPL at the site and to make recommendations for further action. To date, free-phase DNAPL contamination has been encountered in GW-625 (the discovery well), and is suspected to occur in GW-628 and GW-629. A major task in the remediation of this area calls for the construction and installation of five multiport wells. This report summarizes purging and sampling activities and presents analytical results for one of these wells, GW-729. If future technological development provides a feasible method to remove DNAPLs, then data from the multiport wells will provide general

knowledge of the DNAPL location. Additionally, the information developed will be necessary to evaluate the effectiveness of the remediation technology.

1566 V18/023966

Sampling and Analysis Plan for Groundwater Plumes Through the Use of Direct Push Probe Technology for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1581&D1; 38 pp. (March 1997)

The overall objectives of the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) RI are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to perform an ecological risk assessment and a human health risk assessment, to support the evaluation of remedial alternatives for the FS, to determine the need for early actions, and to develop a Proposed Plan and Record of Decision for the CA. The UEFPC CA, which includes the main Y-12 Plant area, is an operationally and hydrogeologically complex area that contains numerous contaminants and contaminant sources, as well as ongoing industrial and defense-related activities. One of the data needs that has been identified is the need for characterization data from sites within and adjacent to groundwater plumes to identify potential contaminant sources and to define the boundaries of on-site contaminant plumes. The data will be obtained from temporary well points installed with direct push technology.

1567 V18/023965

Sampling and Analysis Plan for Sumps for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1574&D1; 25 pp. (March 1997)

The overall objectives of the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) Remedial Investigation (RI) are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to perform an ecological risk assessment and a human health risk assessment, to support the evaluation of remedial alternatives for the FS, to determine the need for early actions, and to develop a Proposed Plan and Record of Decision for the CA. The UEFPC CA, which includes the main Y-12 Plant area, is an operationally and hydrogeologically complex area that contains numerous contaminants and contaminant sources as well as ongoing industrial and defense-related activities. One of the data needs that has been identified for the investigation is characterization data from the basement sumps of various buildings located within the Y-12 Plant area. This report identifies those sumps and presents a plan for sampling them.

1568 V18/022380

Wetland Survey of Selected Areas in the Oak Ridge

Y-12 Plant Area of Responsibility, Oak Ridge, Tennessee

Rosensteel, B.A.

Oak Ridge Y-12 Plant, Oak Ridge, TN; JAYCOR Environmental, Oak Ridge, TN

Y/ER-279; 20 pp. (January 1997)

This document was prepared to summarize wetland surveys performed in the Y-12 Plant area of responsibility in June and July 1994. Wetland surveys were conducted in three areas within the Oak Ridge Y-12 Plant area of responsibility in June and July 1994: the Upper East Fork Poplar Creek (UEFPC) Operable Unit (OU), part of the Bear Creek Valley OU (the upper watershed of Bear Creek from the culvert under Bear Creek Road upstream through the Y-12 West End Environmental Management Area, and the catchment of Bear Creek North Tributary 1), and part of Chestnut Ridge OU 2 (the McCoy Branch area south of Bethel Valley Road).

1569 V18/021567

Report on the Biological Monitoring Program for Bear Creek at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: 1989-1994

Hinzman, R.L.; Beauchamp, J.J.; Cada, G.F.; Christensen, S.W.; Peterson, M.J.; Phipps, T.L.; Roy, W.K.; Schilling, E.M.; Smith, J.G.; Smith, M.R.; Southworth, G.R.; Stewart, A.J.; Wicker, L.F.; Wojtowicz, J.A.

Oak Ridge National Laboratory, Oak Ridge, TN

ORNL/TM-12884; 207 pp. (April 1996)

The Bear Creek Valley watershed drains the area surrounding several closed Oak Ridge Y-12 Plant waste disposal facilities. Past waste disposal practices in the Bear Creek Valley resulted in the contamination of Bear Creek and consequent ecological damage. Ecological monitoring by the Biological Monitoring and Abatement Program (BMAP) was initiated in the Bear Creek watershed in May 1984 and continues at present. Studies conducted during the first year provided a detailed characterization of the benthic invertebrate and fish communities in Bear Creek. The initial characterization was followed by a biological monitoring phase in which studies were conducted at reduced intensities.

1570 V18/024010

Field Characterization Report on Phase I of the Bear Creek Valley Treatability Study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Science Applications International Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-286; 88 pp. (April 1997)

A treatability study is being performed to investigate the practicability of using passive, in situ treatment systems to remove contaminants from the Bear Creek Valley (BCV) Characterization Area (CA), as outlined in Bear Creek Valley Characterization Area Technology Demonstration Action Plan. This draft document is a report of the site characterization results and is part of Phase I of this study. Field activities performed are outlined in Bear Creek Valley Passive Surface Water Treatment Technology Demonstration, Phase I, Site Characterization. The focus of the

characterization was to obtain sufficient site-specific data on hydrogeology of North Tributary (NT)-1, NT-2, and upper Bear Creek (above its confluence with NT-1) to support selection of groundwater capture and treatment systems in Phases II and III. Groundwater samples from the S-3 Site and NT-1 area were also collected for the principal investigators to test during Phase I laboratory work.

1571

V18/024009

Phase I Report on the Bear Creek Valley Treatability Study, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Science Applications International Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-285; 225 pp. (April 1997)

A treatability study is being conducted to support implementation of early actions at the S-3 Site in the Bear Creek Valley (BCV) Characterization Area (CA). The system will include a trench for capturing and treating groundwater by passing it through a train of individual treatment media that, together, are capable of removing some or all of the targeted contaminants of concern. The treatment objectives of the early actions are: (1) to reduce concentrations of uranium and nitrate in Bear Creek to meet downstream concentration goals that will be protective of human health at a location that will be determined in the record of decision (ROD) for the BCV CA and (2) to reduce concentrations of nitrate, total dissolved solids (TDS), and selected metals in NT-1 to reduce the risk to the ecology of North Tributary (NT)-1 and upper Bear Creek. In addition, a secondary objective of the early actions will be to hydraulically contain a plume of contaminated groundwater in the bedrock of the Nolichucky Shale that is currently migrating west along geological strike from the S-3 Site. This plume discharges contaminants into NT-1 and NT-2 and the long-term effect of containment will be to reduce contaminant discharges to these two tributaries.

1572

V18/024087

Best Management Practices Plan for Installation of and Monitoring at Temporary Weirs at NT-4, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER/MS-11; 6 pp. (June 1997)

This Best Management Practices (BMP) Plan has been developed in order to maintain compliance with applicable regulatory requirements by documenting the practices that are required during the installation and maintenance of temporary weirs at the North Tributary (NT)-4, subsequent collection of water discharge data, and removal of the weirs. The practices included in this BMP comply with the Clean Water Act and the intent of Section 70-8-104(b) of the Tennessee Code Annotated: Tennessee Wildlife Resources Commission Proclamation 94-16 to prevent the destruction of the habitat of state-listed wildlife species that are designated as "in need of management."

1573

V18/022932

Hydraulic Head Data from the DNAPL Monitoring Wells GW-726, GW-727, GW-729, GW-730, and GW-790 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee,

Third Quarter FY 1992 Through Second Quarter FY 1996

Drier, R.B.; Caldanaro, A.J.

Oak Ridge National Laboratory, Oak Ridge, TN

Y/ER-283; 30 pp. (February 1997)

In January 1990, DNAPLs were discovered at a depth of approximately 274 feet below ground surface along the southern border of the Y-12 Plant Burial Grounds. To assess the occurrence of DNAPL at the site, the work plan called for the construction and installation of five multiport wells. This report summarizes fluid pressure monitoring activities for the five multiport wells. The report includes a discussion of data collection and processing, and presents the data in the form of hydraulic head graphs. The report does not include interpretation of: (1) flow paths; (2) aquifer characteristics; or (3) spatial synthesis of data. As funding and need arises, these topics will be addressed in future reports. To date, a series of fluid pressure measurements have been collected from each of the five Westbay-instrumented multiport wells that were built to quantify groundwater characteristics on the vicinity of a DNAPL plume. These measurements have been converted to hydraulic head, and the results are presented graphically in the report.

1574

V18/022271

Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 1

Science Applications International Corporation, Oak Ridge, TN

DOE/OR/01-1455/V1&D1; 425 pp. (September 1996)

This report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other U.S. Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge Reservation (ORR), encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill 1 (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI.

1575

V18/022951

Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 1 [D2]

U.S. Department of Energy, Washington, DC; Science Applications International Corporation, Oak Ridge, TN

DOE/OR/01-1455/V1&D2; 375 pp. (March 1997)

This Remedial Investigation (RI) Report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other U.S. Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge

Reservation (ORR), encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI.

1576 V18/024243

Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 6, Appendix G - Baseline Ecological Risk Assessment Report

Oak Ridge National Laboratory, Oak Ridge, TN
DOE/OR-01-1455/V6&D1; 872 pp. (September 1996)

This Remedial Investigation (RI) Report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other US Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge Reservation (ORR) encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill 1 (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI. This BCV RI Report represents the first major step in the decision-making process for the BCV watershed. The RI results, in concert with the follow-on FS will form the basis for the Proposed Plan and Record of Decision for all BCV sites. This comprehensive decision document process will meet the objectives of the watershed approach for BCV. Appendix G contains ecological risks for fish, benthic invertebrates, soil invertebrates, plants, small mammals, deer, and predator/scavengers (hawks and fox). This risk assessment identified significant ecological risks from chemicals in water, sediment, soil, and shallow groundwater. Metals and PCBs are the primary contaminants of concern.

1577 V18/024266

Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 2, Appendix A - Waste Sites, Source Terms, and Waste Inventory Report, Appendix B - Description of the Field Activities and Report Database, Appendix C - Characterization of Hydrogeologic Setting Report

Science Applications International Corporation, Oak Ridge, TN
DOE/OR-01-1455/V2&D1; 644 pp. (September 1996)

This Remedial Investigation (RI) Report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other US

Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge Reservation (ORR), encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill 1 (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI. This BCV RI Report represents the first major step in the decision-making process for the BCV watershed. The RI results, in concert with the follow-on FS, will form the basis for the Proposed Plan and Record of Decision for all BCV sites. This comprehensive decision document process will meet the objectives of the watershed approach for BCV. Appendix A includes descriptions of waste areas and estimates of the current compositions of the wastes. Appendix B contains an extensive database of environmental data for the Bear Creek Valley Characterization Area. Information is also presented about the number and location of samples collected, the analytes examined, and the extent of data validation. Appendix C describes the hydrogeologic conceptual model for Bear Creek Valley. This model is one of the principal components of the conceptual site models for contaminant transport in BCV.

1578 V18/024267

Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 4, Appendix E - Valley-Wide Fate and Transport Report

Science Applications International Corporation, Oak Ridge, TN
DOE/OR-01-1455/V4&D1; 275 pp. (September 1996)

This Remedial Investigation (RI) Report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other US Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge Reservation (ORR), encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill 1 (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI. This BCV RI Report represents the first major step in the decision-making process for the BCV watershed. The RI results, in concert with the follow-on FS, will form the basis for the Proposed Plan and Record of Decision for all BCV sites. This comprehensive decision document process will meet the objectives of the watershed approach for BCV. Appendix E addresses contaminant releases and migration pathways from a valley-wide perspective and provides estimates of changes in contaminant fluxes in BCV.

1579 V18/024268

Report on the Remedial Investigation of Bear Creek

Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 3, Appendix D - Nature and Extent of Contamination Report

Science Applications International Corporation, Oak Ridge, TN

DOE/OR-01-1455/V3&D1; 714 pp. (September 1996)

This Remedial Investigation (RI) Report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other US Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge Reservation (ORR), encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill 1 (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI. This BCV RI Report represents the first major step in the decision-making process for the BCV watershed. The RI results, in concert with the follow-on FS, will form the basis for the Proposed Plan and Record of Decision for all BCV sites. This comprehensive decision document process will meet the objectives of the watershed approach for BCV. Appendix D describes the nature and extent of contamination in environmental media and wastes.

1580

V18/024269

Report on the Remedial Investigation of Bear Creek Valley at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: Volume 5, Appendix F - Baseline Human Health Risk Assessment Report

Oak Ridge National Laboratory, Oak Ridge, TN

DOE/OR-01-1455/V5&D1; 1094 pp. (September 1996)

This Remedial Investigation (RI) Report characterizes the nature and extent of contamination, evaluates the fate and transport of contaminants, and assesses risk to human health and the environment resulting from waste disposal and other US Department of Energy (DOE) operations in Bear Creek Valley (BCV). BCV, which is located within the DOE Oak Ridge Reservation (ORR), encompasses multiple waste units containing hazardous and radioactive wastes arising from operations at the adjacent Oak Ridge Y-12 Plant. The primary waste units discussed in this RI Report are the S-3 Site, Oil Landfarm (OLF), Boneyard/Burnyard (BYBY), Sanitary Landfill 1 (SL 1), and Bear Creek Burial Grounds (BCBG). These waste units, plus the contaminated media resulting from environmental transport of the wastes from these units, are the subject of this RI. This BCV RI Report represents the first major step in the decision-making process for the BCV watershed. The RI results, in concert with the follow-on FS, will form the basis for the Proposed Plan and Record of Decision for all BCV sites. This comprehensive decision document process will meet the objectives of the watershed approach for BCV. Appendix F documents potential risks and provides information necessary for making remediation decisions. A quantitative analysis of the inorganic, organic, and radiological

site-related contaminants found in various media is used to characterize the potential risks to human health associated with exposure to these contaminants.

1581

V18/022375

Treatability Study on the Bear Creek Valley Characterization Area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee - Phase II Work Plan for S-3 Site Contaminated Groundwater Interception: In-Field Media Evaluation and Groundwater Capture Methods

Oak Ridge Y-12 Plant, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

Y/ER-278; 55 pp. (December 1996)

A treatability study is being conducted to support implementation of early actions at the S-3 Site in the Bear Creek Valley (BCV) Characterization Area (CA). The objectives of the early actions will be to: (1) reduce concentrations of uranium and nitrate in Bear Creek; and (2) to reduce concentration of contaminants of concern in North Tributary (NT)-1 and NT-2. The BCV CA treatability study focuses on capture and treatment of shallow groundwater before it discharges to tributary waters. The objectives of treatment of this groundwater are (1) to reduce the concentrations of uranium and nitrate in NT-1 and Bear Creek such that, in concert with actions taken at BYBY, the concentrations of these chemicals in surface water and groundwater are reduced to acceptable levels; (2) to reduce the concentrations of nitrate and metals, and reduce the overall concentration of total dissolved solids to meet ecological remedial goal objectives in NT-1 and upper Bear Creek; and (3) to hydraulically contain the plume of contaminated groundwater that is moving west in bedrock in the Nolichucky Shale along strike from the S-3 Site, such that the rate of contaminant discharge to NT-2 will be reduced in the long term.

1582

V18/021307

Subsurface Hydrology Around Building 9201-2: Results of the July 1994 Water Level Recovery Test, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN

Y/ER-263; 15 pp. (June 1996)

A water level recovery test was conducted at Building 9201-2 at the Oak Ridge Y-12 Plant in Oak Ridge, Tennessee, from 12:45 p.m. on July 29 until 8:22 a.m. on July 31, 1994. The purpose of the test was to improve the general understanding of the subsurface hydrology around the building. The information is needed to determine the minimum pumping capacity necessary to maintain safe water levels in the basement of the building and to assist in designing systems for treating mercury-bearing waters in the basement. The test was initiated by shutting off the three main sump pumps in Building 9201-2 (i.e., O-12, E-13, and E-22) for 43.5 hr and allowing the water in the basement to approach a static level. The pumps in sumps F-3 and P-6 were also not operating during the test. During the test, water levels were monitored in 5 sumps (P-6, O-12, F-3, E-13, and E-22); a pit near sump K-22; 4 monitoring wells or piezometer in the basement near the O-12 sump, and 16 wells outside of the building. Sump K-22 was dry during the entire test.

1583 V18/023006

Discussion Paper on Applicability of Oil and Grease Analysis for RCRA Closure Criteria

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-209; 11 pp. (February 1995)

A site characterization (SC) was performed for the Building 9409-5 Diked Tank Storage Facility. The initial SC indicated areas which had oil and grease levels above the criteria of the currently proposed RCRA closure plan. After further investigation, it was demonstrated that the oil and grease parameter may not be an accurate indication of a release from this facility and should not be included as a contaminant of concern in the closure criteria.

1584 V18/022934

Final Report for the Central Mercury Treatment System in Building 9623 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-282; 15 pp. (February 1997)

This document discusses the construction of the Central Mercury Treatment System (CMTS) in Building 9623 at the Y-12 Plant, the remediation activities involved, waste generated from the project, and the monitoring schedule of the CMTS. As part of the Reduction of Mercury in Plant Effluent Program, the project treats groundwater contaminated with mercury from Buildings 9201-4, 9201-5, and 9204-4 at the Y-12 Plant to meet National Pollutant Discharge Elimination System (NPDES) Permit limits for discharge to East Fork Poplar Creek.

1585 V18/024011

Calendar Year 1995 Groundwater Quality Report for the Chestnut Ridge Hydrogeologic Regime, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/TS-1435 (Final); 448 pp. (February 1996)

This annual groundwater quality report (GWQR) contains groundwater quality data obtained during the 1995 calendar year (CY) at several hazardous and nonhazardous waste management facilities associated with the U.S. Department of Energy (DOE) Y-12 Plant located on the DOE Oak Ridge Reservation (ORR) southeast of Oak Ridge, Tennessee. These sites are located south of the Y-12 Plant in the Chestnut Ridge Hydrogeologic Regime (Chestnut Ridge Regime), which is one of the three regimes defined for the purposes of groundwater quality monitoring at the Y-12 Plant. The GWQR for the Chestnut Ridge Regime is completed in two parts: Part 1 (this report) containing the groundwater quality data and Part 2 containing a detailed evaluation of the data.

1586 V18/022378

Quality Assurance Project Plan for the Chestnut Ridge Fly Ash Pond Stabilization Project at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-270; 10 pp. (July 1996)

The Chestnut Ridge Fly Ash Pond Stabilization (CRFAPS) Project will stabilize a 19-m-high (62-ft-high) earthen embankment across Upper McCoy Branch situated along the southern slope of Chestnut Ridge. This task will be accomplished by raising the crest of the embankment, reinforcing the face of the embankment, removing trees from the face and top of the embankment, and repairing the emergency spillway.

1587 V18/023969

Remedial Action Report on Chestnut Ridge Operable Unit 2 (Filled Coal Ash Pond and Vicinity) at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; Lockheed Martin Energy Systems, Inc., Oak Ridge, TN

DOE/OR/01-1596&D1; 20 pp. (May 1997)

The Chestnut Ridge Filled Coal Ash Pond (CRFCAP) is situated 0.8 km (0.5 mile) south of the Oak Ridge Y-12 Plant. Built in 1955 as a settling basin for coal ash from the Y-12 steam plant, the pond was constructed by building a 19-meter-high (62-ft-high) earthen dam across Upper McCoy Branch. Ash at the steam plant was mixed with untreated water from Clinch River to form a slurry, then pumped to the crest of Chestnut Ridge, and released through a large pipe. From the crest, the ash flowed by gravity down the slope of Chestnut Ridge into the pond. The pond has a storage capacity of 16 ha-m (129 acre-ft) and was expected to have a 20-year capacity for ash. The ash filled the pond by 1967, however, and until 1989 the slurry was allowed to overtop the spillway and flow down Upper McCoy Branch to Rogers Quarry. Vegetation was allowed to grow on the dam, and over time the dam and the spillway deteriorated. The Record of Decision issued for CRFCAP in 1996 identified stabilization of the pond dam as the preferred remedial alternative. The goal of the remedial action, known as the CRFCAP Stabilization Project, was to prevent future release of coal ash slurry to the Upper McCoy Branch watershed by stabilizing the dam that supports the pond. The CRFCAP Stabilization Project was to achieve this goal through the following actions: (1) raising the crest of the dam, (2) reinforcing the face of the dam, (3) installing a subsurface drain, (4) removing large trees from the face of the dam, and (5) repairing the emergency spillway (including removing the steep slope to the east of the spillway). The project scope also included long-term monitoring of the dam, controls to limit site access, and replacement of a small wetlands at the foot of the dam.

1588 V18/021306

Remedial Action Work Plan for the Chestnut Ridge Fly Ash Pond at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee [D2]

MK-Ferguson of Oak Ridge Company, Oak Ridge, TN

DOE/OR/01-1469&D2; 25 pp. (May 1996)

The Chestnut Ridge Fly Ash Pond (CRFAP) is situated 0.8 km (0.5 mile) south of the Oak Ridge Y-12 Plant along the southern slope of Chestnut Ridge. CRFAP was built in 1955 as a settling basin for coal ash from the Y-12 steam plant. The pond was constructed by building a 19-m- (62-ft-) high earthen embankment across Upper McCoy Branch. Ash at the steam plant was mixed with water to form a slurry, then pumped to the crest of Chestnut Ridge and released through a large pipe. From the crest, the ash flowed by

gravity down the slope of Chestnut Ridge and into CRFAP. When built, the pond had a storage capacity of 16 ha-m (129 acre-ft) and was expected to have a 20-year capacity for ash. By 1967 the ash had filled the pond, and the slurry was allowed to overtop the spillway and flow down the upper McCoy Branch to Rogers Quarry. This practice was stopped in 1989. Over the course of time, the spillway and dam have deteriorated and vegetation has grown on the dam. The purpose of this remedial action is to prevent future failure of the embankment and subsequent release of coal ash slurry to the Upper McCoy Branch watershed. This CRFAP Stabilization Remedial Action Work Plan will address how the project is to be executed.

1589

V18/021218

Human and Ecological Remediation Goals for Soil Mercury at East Fork Poplar Creek, Oak Ridge, TN

Zafran, F.A.; Cornaby, B.W.; Hadden, C.T.

Science Applications International Corporation, Engineering and Environmental Compliance Group, McLean, VA; Science Applications International Corporation, Oak Ridge, TN

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 229) (1995)

Mercury, used in the past production of enriched lithium by the Department of Energy, is the principal chemical of concern in the 14-mile floodplain of East Fork Poplar Creek (EFPC). SAIC has developed risk-based remediation goal options (RGOS) for mercury in EFPC soils to protect the most sensitive human receptors. The existing chronic oral RfD for mercury is based on exposure of laboratory species to mercuric chloride. However, speciation and leaching/availability studies (conducted by EPA EMSL and Oak Ridge National Laboratory) indicated less soluble and less toxic mercury species, principally mercuric sulfide, with measurable quantities of metallic mercury also present, predominate in EFPC floodplain soils. SAIC derived human health RGOS using deterministic and probabilistic methods and incorporated the probability density function for bioavailability of mercury species from leaching/availability data generated by ORNL. Monte Carlo simulation was used in uncertainty analysis and supported the derivation of a protective, but realistic risk-based remediation goal of 400 mg mercury/kg soil. For ecological risk assessment, RGOS were based on risks through food chains from contaminants in soil. The authors describe a terrestrial food-chain model of contaminant transfer to primary producers, first-order consumers, mid-level predators, and top-level predators. The model uses published toxicity data, site-specific contaminant concentrations, and bioaccumulation factors calculated from measured body burdens of floodplain organisms to compute RGOS for various combinations of exposure parameters. Model calculations show that under reasonably conservative conditions, mid-level predators have the highest exposures relative to dietary limits and, therefore, require the lowest soil-mercury RGOS. Mercury concentrations of [approximately]500 mg/kg are protective of the receptor populations exposed through food chains at this site. (Complete text)

1590

V18/021574

Using Long Term Biological Monitoring Data to Evaluate the Recovery of Disturbed Systems

Loar, J.M.

Oak Ridge National Laboratory, Oak Ridge, TN

CONF-9511137; Global Environmental Protection: Science, Politics, and Common Sense, Proceedings of the Second Society of Environmental Toxicology and Chemistry (SETAC) World Congress and 16th Annual Meeting, Vancouver, British Columbia, Canada, November 5-9, 1995. Society of Environmental Toxicology and Chemistry, Pensacola, FL, 378 pp.; (p. 233) (1995)

Biological monitoring has been conducted in industrially impacted streams near US Department of Energy facilities in Tennessee and Kentucky for almost ten years. A comprehensive Biological Monitoring and Abatement Program, which was developed to meet National Pollutant Discharge Elimination System permit requirements, includes tasks on (1) toxicity testing; (2) bioaccumulation in aquatic and terrestrial biota; (3) bioindicators of fish health; and (4) fish, macroinvertebrate, and periphyton community surveys. These studies have been used successfully to characterize spatial trends and demonstrate temporal recovery resulting from remedial actions and pollution abatement activities, identify contaminant sources, and provide data for conducting ecological risk assessments. The program uses multiple lines of evidence to evaluate stream recovery and illustrates the importance of using an integrated approach when determining stream health. An overview of data collected from studies on East Fork Poplar Creek since 1985 is presented to illustrate the ability of the program to document recovery at several levels of biological organization, including individuals, populations, and communities. Unique attributes of each task are highlighted to demonstrate the flexibility of both the Program and its components. The development of an integrated database and GIS technology to more comprehensively evaluate the data is presented.

1591

V18/022999

Revised RCRA Closure Plan for the Interim Drum Yard (S-030) at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Smith, C.M.

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-19/R-2; 31 pp. (September 1994)

The Interim Drum Yard (IDY) facility is a containerized waste storage area located in the Y-12 exclusion area. It was used to store waste materials which are regulated by RCRA (Resource Conservation and Recovery Act); uranyl nitrate solutions were also stored there. The closure plan outlines the actions required to achieve closure of IDY and is being submitted in accordance with TN Rule 1200-1-11.05(7) and 40 CFR 265.110.

1592

V18/021070

Summary of Closure of the Interim Drum Yard Storage Facility at the Oak Ridge Y-12 Plant Under Rules Governing Hazardous Waste Management in Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-267; 1100 pp. (June 1996)

In September 1994, the RCRA Closure Plan for the Interim Drum Yard at the Y-12 Plant, Oak Ridge, TN, Y/ER-19 R2, was submitted to the Tennessee Department of Environment and Conservation (TDEC) for review and approval. The plan was approved by the TDEC in November 1995, and the described closure activities have been completed. This summary was prepared in accordance with the rules governing hazardous waste management in the state of Tennessee. This document contains descriptions of the steps taken to remove the waste from the site, sampling and analysis of the environs around the site, and evaluation of the site's suitability for release.

1593

V18/024259

Post-Closure Permit Application for the Kerr Hollow Quarry at the Y-12 Plant

Oak Ridge Y-12 Plant, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

Y/ER/SUB-95-005MS; 345 pp. (June 1995)

The Kerr Hollow Quarry (KHQ) is located on U.S. Department of Energy (DOE) property at the Y-12 Plant, Oak Ridge, Tennessee. The Oak Ridge Y-12 Plant was built by the U.S. Army Corps of Engineers in 1943 as part of the Manhattan Project. Until 1992, the primary mission of the Y-12 Plant was the production and fabrication of nuclear weapons components. Activities associated with these functions included production of lithium compounds, recovery of enriched uranium from scrap material, and fabrication of uranium and other materials into finished parts for assemblies. The Kerr Hollow Quarry was used for waste disposal of a variety of materials including water-reactive and shock-sensitive chemicals and compressed gas cylinders. These materials were packaged in various containers and sank under the water in the quarry due to their great weight. Disposal activities were terminated in November, 1988 due to a determination by the Tennessee Department of Environment and Conservation that the quarry was subject to regulations under the Resource Conservation and Recovery Act of 1993. Methods of closure for the quarry were reviewed, and actions were initiated to close the quarry in accordance with closure requirements for interim status surface impoundments specified in Tennessee Rules 1200-1-11-.05(7) and 1200-1-11-.05(11). As part of these actions, efforts were made to characterize the physical and chemical nature of wastes that had been disposed of in the quarry, and to remove any containers or debris that were put into the quarry during waste disposal activities. Closure certification reports document closure activities in detail. This report contains the post-closure permit application for the Kerr Hollow Quarry site.

1594

V18/023942

Revised Closure Plan for Kerr Hollow Quarry at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

DOE/OR/01-1103&D1; Y/ER-61&D1; 15 pp. (November 1992)

Kerr Hollow Quarry (KHQ) is a rock quarry which was operated in the 1940s as a rock and gravel quarry but was abandoned in the late 1940s when the quarry filled with water. Since at least 1951, the

Department of Energy's (DOE's) Oak Ridge Y-12 Plant and the Oak Ridge National Laboratory have used KHQ for the treatment of water-reactive materials, potentially explosive chemicals, and empty compressed gas cylinders. Wastes received at KHQ are defined as hazardous wastes only by the characteristics of reactivity, corrosivity, or ignitability. Treatment of these reactive, corrosive, and ignitable wastes at KHQ effectively eliminated the hazardous characteristics of the wastes. The KHQ facility was not intended for use as a hazardous waste storage or disposal facility. KHQ was used strictly for the emergency handling of these materials when personnel safety was the primary concern. Access to the quarry is limited by an existing 7-ft-high chain-link barbed-wire-topped fence, and the entrance gates are kept locked at all times except for authorized personnel entry and exit.

1595

V18/020982

Baseline and Postremediation Monitoring Program Plan for the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee [Rev. 1]

Science Applications International Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-262/R1; 78 pp. (July 1996)

The overall purpose of the Baseline and Postremediation Monitoring Program (PMP) Plan for the Lower East Fork Poplar Creek (Lower EFPC) Remedial Action Project is to confirm that remedial actions comply with the East Fork Poplar Creek (EFPC) Record of Decision (ROD) which specifies that those actions will be protective of human health and the environment, i.e., plant and animal populations. The PMP does not include sampling during remedial action construction. Rather, it deals with sampling before (baseline) and after (postremediation monitoring) construction has been completed. It is the intent of the PMP to use data from the Y-12 Plant Biological Monitoring and Abatement Program (BMAP) to evaluate compliance with the ROD as economically as possible.

1596

V18/020989

Best Management Practices Plan for the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, TN [Rev. 1]

Oak Ridge Y-12 Plant, Oak Ridge, TN; Foster Wheeler Environmental Corporation, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN

Y/ER-260/R1; 60 pp. (August 1996)

This plan was prepared in support of the Phase II Remedial Design Report to provide a site-specific plan for best management practices to be followed during the remediation of Lower East Fork Poplar Creek. This document includes sections on: site description, security, employee training, safety and health hazards, spill prevention and control, water quality monitoring, good housekeeping, sediment and erosion control, and inspections and environmental compliance practices and measures to be employed during Phase I and II of the remediation project for the Lower East Fork Poplar Creek Operable Unit. Appendix A contains maps of the sites. Appendix B of this document contains the Spill Prevention and Response Plan for the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee, which is not

being released separately.

1597 V18/020844

Configuration Management Plan for the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee

Camber Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-273; 25 pp. (June 24, 1996)

This configuration management plan for the Lower East Fork Poplar Creek (LEFPC) Remedial Action describes the elements of configuration management (CM) and their functions, establishes the scope of CM for the LEFPC, and defines the organizational roles and responsibilities. The plan also describes the change control processes which will ensure that changes to LEFPC configuration items (Cis) are properly identified, developed, technically reviewed, approved, implemented, validated, and documented. The plan is consistent with the CM standards, guidance documents, and procedures of the U.S. Department of Energy (DOE) and of Lockheed Martin Energy Systems, Inc. (Energy Systems). The plan is applicable to current and future activities of the LEFPC.

1598 V18/022379

Confirmatory Sampling and Analysis Plan for the Lower East Fork Poplar Creek Operable Unit, Oak Ridge, Tennessee [Rev. 1]

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-258/R1; 75 pp. (December 1996)

On December 21, 1989, the U.S. Environmental Protection Agency (EPA) placed the U.S. Department of Energy's (DOE's) Oak Ridge Reservation (ORR) on the National Priorities List (NPL). On January 1, 1992, a Federal Facilities Agreement (FFA) between the DOE Office in Oak Ridge (DOE-OR), EPA Region IV, and the Tennessee Department of Environment and Conservation (TDEC) went into effect. The Lower East Fork Poplar Creek (EFPC) site is designated as an ORR operable unit (OU) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and is included on the NPL. Both EFPC and its flood plain have been contaminated by releases from the Y-12 Plant since the mid 1950s. The remediation of EFPC must follow the specific procedures mandated by CERCLA, as amended by the Superfund Amendments and Reauthorization Act in 1986. In accordance with CERCLA, a feasibility study was prepared to assess remedial alternatives and a proposed plan identifying the preferred alternative was issued. The proposed plan was modified in response to public input and a Record of Decision was issued in 1995 committing to excavation of all soil in the EFPC flood plain where the mercury concentration exceeds 400 parts per million (ppm).

1599 V18/021435

Effective Use of Risk Assessments and the Public Comment Process to Achieve Acceptable Remediation Goals for Mercury-Contaminated Sites at the Oak Ridge Y-12 Plant, Oak Ridge, TN

Miller, J.Q.; Barnett, M.O.

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-265; 10 pp. (June 1996)

The effective use of scientific research data and the willingness to hear and involve the public in a manner that is in keeping with regulatory requirements are two important challenges affecting the cleanup of the Lower East Fork Poplar Creek floodplains -- a mercury-contaminated site in Oak Ridge, Tennessee. As a result of recalculating risk levels using new information, the remediation goals and the cleanup strategy for the Lower East Fork Poplar Creek floodplains have been significantly changed. These changes reflect an important reduction in cleanup costs while ensuring protection of human health and the environment. Use of the risk assessment process should yield an effective evaluation of information on the adverse effects to human receptors exposed to hazardous and radioactive materials. The keys to the risk assessments's effectiveness are having an accurate understanding of the contaminant and correctively applying the remediation goal methodology. Determining effectiveness is also related to future land use of the contaminated site, and future land uses will depend heavily upon the local community. Involving the public in the evaluations of the contamination and risk methodology has resulted in successfully achieving an acceptable remediation goal for all stakeholders. This project and its stakeholders have made the risk assessment process more effective by better defining the contaminant and adjusting assessment parameters in a way that affords adequate protection for human health and the environment while building stakeholder acceptance. As a result of this synergism, the remediation goal initially set at 50 parts per million (ppm) of mercury has been changed to 400 ppm, resulting in significant reductions in both the destruction of the floodplain landscape and project costs. The volume of soils to be excavated has been decreased from 1 million cubic yards to 25 thousand cubic yards, and the cost has been reduced from approximately \$1 billion to less than \$20 million. The Record of Decision for Lower East Fork Poplar Creek was approved in August 1995.

1600 V18/020852

Environmental Compliance Plan for the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-275; 20 pp. (July 1996)

The remedial action (RA) for Lower East Fork Poplar Creek (EFPC), as defined by the Record of Decision (ROD), requires that soil contaminated with greater than 400 parts per million (ppm) mercury be excavated and disposed. Based on the remediation goal, soil will be excavated from areas located at the National Oceanic Atmospheric Administration (NOAA) site and the Bruner site and disposed at the Industrial Landfill V at the Y-12 Plant.

1601 V18/022370

Mercury Concentrations in Air During the Phase I Remediation of the Lower East Fork Poplar Creek Floodplain at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Barnett, M.O.; Owens, J.G.; Lindberg, S.E.; Turner, R.R.

Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge,

TN

Y/ER-281; 15 pp. (January 1997)

During the Phase I remediation of Lower East Fork Poplar Creek (LEFPC), the mercury concentration in air was monitored continuously at a nearby off-site location. The purpose of the monitoring was to ensure that remediation did not adversely affect the off-site concentration of mercury in air. The concentrations of mercury in air did increase during the remediation. However, based on the results of a previous study, this increase was caused by the increase in sunlight intensity and temperature during remediation, which occurred in the summer months. In any case, all concentrations measured before, during, and after remediation were well below the standard of 300 ng/m³ recommended for continuous exposure to mercury in air.

1602

V18/024246

Phase 2 Remedial Design Report on the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN; Foster Wheeler Environmental Corporation, Oak Ridge, TN

DOE/OR-01-1449&D2; 198 pp. (July 1996)

The Phase II Remedial Design Report consists of construction drawings and specifications for excavating and restoring areas of the Lower East Fork Poplar Creek (LEFPC) floodplain having soils contaminated with mercury greater than 400 ppm. Several associated project plans are being provided under separate cover. The Phase II LEFPC Project Remedial Action consists of a variety of activities. The Bruner site will be remediated first to take advantage of the lower water table elevations at the Bruner site during the spring of the year and allow the water table elevations to recede prior to action at the site. Once mobilization is complete, vegetation will be removed from the areas where contaminated soils are located. Soils will be excavated using standard excavation equipment and based on the moisture content of the soils, will be sent to the landfill or for drying operations. Once the areas have been excavated, confirmatory sampling will be performed in the vertical directions and verification sampling will be performed to ensure all the contamination has been removed, prior to backfill activities. After sites are restored, demobilization will take place.

1603

V18/023445

Post Construction Report for Lower East Fork Poplar Creek Project - Phase I, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN; Foster Wheeler Environmental Corporation, Oak Ridge, TN

Y/ER/MS-3; 34 pp. (November 1996)

This Phase I Remedial Action (RA) effort was conducted in accordance with the Record of Decision (ROD) for Lower East Fork Poplar Creek (LEFPC) as a Comprehensive Environmental Response, Compensation, and Liability Act action. The LEFPC, Phase I RA removed approximately 5,560 cu yd of mercury-contaminated soils, greater than 400 ppm mercury, from selected portions of the National Oceanographic and Atmospheric Administration (NOAA) site LEFPC floodplain from July 8, 1996 to September 14, 1996. During excavation activities, pockets of

elevated radiologically contaminated soils (greater than 35 pCi/g) were located by the continuous monitoring of the excavation areas and of contaminated soils with radiological monitoring instruments. Through characterization sampling it has been determined that about 90 cu yd are less than 35 pCi/g uranium contaminated and will be transported to the Y-12 Landfill V for disposal. The remaining approximately 40 cu yd do not meet the Waste Acceptance Criteria (WAC) for radiological constituents included in the Special Waste Permit for Landfill V. The radiologically contaminated soil will be placed in 21st Century containers for storage at the K-25 site.

1604

V18/020843

Quality Assurance Project Plan for the Lower East Fork Poplar Creek Remedial Action, Oak Ridge, Tennessee

Camber Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-257; 30 pp. (June 1996)

This Quality Assurance Project Plan provides information on the Lower East Fork Poplar Creek (LEFPC) Project. The LEFPC Operable Unit (OU) site is 27ha (670 acres) and includes the soil, sediment, and groundwater in the floodplain along LEFPC and the Sewer Line Beltway. The site includes portions of the Oak Ridge Reservation (ORR) and commercial, residential, agricultural and miscellaneous areas within the City of Oak Ridge. Due to mercury and other contaminant releases from the Y-12 Plant since the 1950's, the floodplain downstream of the plant has become contaminated. The project scope includes award fee (AF) activities as well as the remedial design/remedial action activities which are under the incentive task order (ITO) proposal. AF activities/functions include Community Relations; preparation of the QA plan; Access Agreements; Engineering support; Construction support, and Design support; coordination with the contractor and scientific/lab services. ITO includes Project, Technical and Business Management functions including design and construction, preparation of the Configuration and Records Management Plans, overall Health and Safety, Quality Assurance, Environmental Compliance and Records Management.

1605

V18/022284

Remedial Action Work Plan for Phase II of the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee

Foster Wheeler Environmental Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

DOE/OR/01-1480&D1; 20 pp. (July 1996)

This plan has been prepared in response to direction from the U.S. Department of Energy (DOE) under Contract No. DE-AC05-84OR21400. Remediation of LEFPC will take place in two phases and at two separate locations: the "National Oceanic and Atmospheric Administration" (NOAA) site and the "Bruner" site. The first phase will accelerate remediation at the NOAA site and support commercial development, the Phase I remedial action (RA) will involve excavation of portions of the NOAA site and will be completed in summer of 1996 in accordance with the Phase I Remedial Design Report (RDR) and RAWP (DOE/OR/0-1448&D2). This Phase II action fits into the overall Oak Ridge Reservation (ORR) cleanup strategy by addressing the remaining contaminated

portions of the contaminated floodplain soil.

1606 V18/020983

Waste Management Plan for the Lower East Fork Poplar Creek Remedial Action Project, Oak Ridge, Tennessee [Rev. 1]

Oak Ridge Y-12 Plant, Environmental Restoration Waste Management Division, Oak Ridge, TN

Y/ER-264/R1; 25 pp. (August 1996)

The Lower East Fork Poplar Creek (LEFPC) Remedial Action project will remove mercury-contaminated soils from the floodplain of LEFPC, dispose of these soils at the Y-12 Landfill V, and restore the affected floodplain upon completion of remediation activities. This Waste Management Plan addresses management and disposition of all wastes generated during the remedial action for the LEFPC Project. Most of the solid wastes will be considered to be sanitary or construction/demolition wastes and will be disposed of at existing Y-12 facilities for those types of waste. Some small amounts of hazardous waste are anticipated, and the possibility of low-level or mixed waste exists, although these are not expected. Liquid wastes will be generated which will be sanitary in nature and which will be capable of being disposed of at the Oak Ridge Sewage Treatment Plant. This document provides the Environmental Restoration Program (ER) with information about the waste handling, container and labeling requirements, waste characterization, transportation, waste staging areas, and disposal and waste minimization practices to be employed during the remediation project for the LEFPC Operable Unit.

1607 V18/022774

Application of SAFER for the Upper East Fork Poplar Creek Characterization Area at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Lutz, C.T.; Provost, C.A.

CDM Federal Programs Corporation, Oak Ridge, TN

CONF-960804 (Vol. 2); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 2, 873 pp.; (pp. 1280-1285) (1996)

The Streamlined Approach for Environmental Restoration (SAFER) has been applied at the U.S. Department of Energy's Y-12 Plant in Oak Ridge, Tennessee. The Y-12 Plant is an operationally and hydrogeologically complex area located within the watershed of Upper East Fork Poplar Creek (UEFPC). The plant has been in operation since 1943 and nearly 175 potentially contaminated sites resulting from past waste management practices have been identified. The need to complete Remedial Investigations (RIs) for the sites in a timely and cost-effective manner has resulted in an approach that considers the entire watershed of UEFPC, which has been designated a "Characterization Area" (CA). This approach emphasizes the watershed rather than individual sites, focuses on key questions and issues, and maximizes the use of existing data. The goal of this approach is to focus work toward the resolution of key questions and decisions necessary to complete the remediation of the CA. An evaluation of the potentially contaminated sites, the development of key questions, and the compilation and analysis of

existing data are progressing. A SAFER workshop will be held in 1996, which will allow the project team and stakeholders to discuss the status of the RI, identify additional key questions and issues, and determine the activities necessary to complete the RI. This investigation demonstrates an approach to streamlining the RI process that could be applied successfully to other complex sites.

1608 V18/025526

Bear Creek Valley Characterization Area Mixed Wastes Passive Insitu Treatment Technology Demonstration Project: Status Report

Watson, D.; Leavitt, M.E.; Moss, D.

Oak Ridge National Laboratory, Oak Ridge, TN; Science Applications International Corporation, Oak Ridge, TN
CONF-970208; Proceedings of an International Containment Technology Conference and Exhibition, St. Petersburg, FL, February 9-12, 1997; (7 pp.) (1997)

Historical waste disposal activities within the Bear Creek Valley (BCV) Characterization Area (CA), at the U.S. Department of Energy (DOE) Oak Ridge Y-12 plant, have contaminated groundwater and surface water above human health risk levels and impacted the ecology of Bear Creek. Contaminates include nitrate, radioisotopes, metals, volatile organic compounds (VOCs), and common ions. This paper provides a status report on a technology demonstration project that is investigating the feasibility of using passive in situ treatment systems to remove these contaminants. Although this technology may be applicable to many locations at the Oak Ridge Y-12 Plant, the project focuses on collecting the information needed to take CERCLA removal actions in 1998 at the S-3 Disposal Ponds site. Phase 1 has been completed and included site characterization, laboratory screening of treatment media (sorbents and iron), and limited field testing of biological treatment systems. Batch tests using different Y-12 Plant waters were conducted to evaluate the removal efficiencies of most of the media. Phase 1 results suggest that the most promising treatment media are Dowex 21 k resin, peat moss, zero-valent iron, and iron oxides. Phase 2 will include in-field column testing of these media to assess loading rates, concerns with clogging, by-products, long-term treatment efficiency, and media stability. Continued testing of wetlands and algal mats will be conducted to determine if they can be used for in-stream polishing of surface water. Hydraulic testing of a shallow trench and horizontal wells will also be completed during Phase 2.

1609 V18/024012

Calendar Year 1995 Groundwater Quality Report for the Upper East Fork Poplar Creek Hydrogeologic Regime, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee: 1995 Groundwater Quality Data and Calculated Rate of Contaminant Migration

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/TS-1436 (Final); 638 pp. (February 1996)

This annual groundwater quality report (GWQR) contains groundwater quality data obtained during the 1995 calendar year (CY) at several hazardous and nonhazardous waste management facilities associated with the U.S. Department of Energy (DOE) Y-12 Plant located on the DOE Oak Ridge Reservation (ORR)

southeast of Oak Ridge, Tennessee. The sites addressed by this document are located within the East Fork Poplar Creek Hydrogeologic Regime (East Fork Regime). The East Fork Regime, which is one of the three regimes defined for the purposes of groundwater quality monitoring at the Y-12 Plant encompasses the Y-12 Plant. The annual GWQR for the East Fork Regime is completed in two parts. Part 1 (this report) consists primarily of data appendices and serves as a reference for the groundwater quality data. Part 2 of the report, to be issued mid-year, will contain an evaluation of the data with respect to regime-wide groundwater quality, present the findings and status of ongoing hydrogeologic studies, describe changes in monitoring priorities, and present planned modifications to the groundwater sampling and analysis activities.

1610 V18/024013

Calendar Year 1995 Groundwater Quality Report for the Upper East Fork Poplar Creek Hydrogeologic Regime, Y-12 Plant, Oak Ridge, Tennessee: 1995 Groundwater Quality Data Interpretations and Proposed Program Modifications

AJA Technical Services, Inc., Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/SUB/96-KDS15V/4; 155 pp. (August 1996)

This groundwater quality report (GWQR) contains an evaluation of the groundwater quality data obtained during the 1995 calendar year (CY) at several hazardous and nonhazardous waste management facilities associated with the U.S. Department of Energy (DOE) Y-12 Plant located on the DOE Oak Ridge Reservation (ORR) southeast of Oak Ridge, Tennessee. These sites lie within the boundaries of the Upper East Fork Poplar Creek Hydrogeologic Regime (East Fork Regime), which is one of the three hydrogeologic regimes defined for the purposes of groundwater quality monitoring at the Y-12 Plant. The purpose of the GWPP is to characterize the hydrogeology and to monitor groundwater quality at the Y-12 Plant and surrounding area to ensure protection of local groundwater resources in accordance with federal, state, and local regulations, DOE Orders, and Lockheed Martin Energy Systems, Inc., (Energy Systems, Inc.) corporate policy. The annual GWQR for the East Fork Regime is completed in two parts. Part 1 consists primarily of data appendices and serves as a reference for the groundwater quality data. Part 2 (this report) contains an evaluation of the data with respect to regime-wide groundwater quality.

1611 V18/020861

Compendium of Available Documentation on Upper East Fork Poplar Creek Study Areas, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

CDM Federal Programs Corporation, Oak Ridge, TN; Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-274; 450 pp. (July 1996)

The Y-12 Plant is one of the three major facilities on the ORR. The ORR contains both hazardous and mixed-waste sites that are subject to regulation promulgated under the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980

(CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. Following RCRA guidelines and Tennessee Department of Environment and Conservation requirements, the Y-12 Plant began investigation and monitoring of various sites within its boundaries in the mid-1980s. The entire ORR was placed on the National Priorities List of CERCLA sites in November 1989. Under CERCLA guidelines, a remedial investigation (RI) is required to define the nature and extent of contamination, to evaluate the risks to public health and the environment, and to determine the goals for the feasibility study (FS) and potential remedial actions. Completion of the RIs in a coordinated and timely manner lead to the establishment of the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) and the Bear Creek CA. The CA approach addresses the entire watershed. The overall objectives of the UEFPC CA RI are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to support an ecological risk assessment and a human health risk assessment, to support the evaluation of remedial alternatives for the FS, and to develop a Proposed Plan and a Record of Decision for the CA. As specified in the RI Work Plan for the UEFPC CA, the RI will compile and use existing data from the UEFPC CA to the greatest extent possible to meet these objectives; this Compendium of Available Documentation on Upper East Fork Poplar Creek Study Areas is the initial product of the existing data compilation.

1612 V18/022376

Mercury Abatement Report on the U.S. Department of Energy's Oak Ridge Y-12 Plant for Fiscal Year 1996

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-277; 90 pp. (November 1996)

This report summarizes the status of activities and the levels of mercury contamination in Upper East Fork Poplar Creek (UEFPC) resulting from activities at the Department of Energy's (DOE's) Y-12 Facility during fiscal year 1996 (FY96). The report outlines the status of ongoing and new project activities in support of project goals, the results of sampling and characterization efforts conducted during FY 1996, biological monitoring activities, and our conclusions relative to the progress in demonstrating compliance with the National Pollutant Discharge Elimination (NPDES) permit. Although the pace of mercury remediation activities at DOE's Y-12 Plant is ahead of the compliance schedule established in the NPDES permit, the resulting level of mercury in UEFPC is higher than predicted based on the projects completed. Fortunately, recently recognized opportunities are being pursued for implementation in the next two years to assist in meeting permit requirements.

1613 V18/022374

Quality Assurance Plan for the Upper East Fork Poplar Creek Characterization Area, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/ER-280; 15 pp. (December 1996)

This plan summarizes requirements for conducting work on the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA). The reader is referred to the Expanded Task Work

Agreement for Upper East Fork Poplar Creek Characterization Area, Remedial Investigation/Feasibility Study (RI/FS) (February 1996) for details regarding the activities, roles, and responsibilities summarized here. UEFPC is designated a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site and thus requires a remedial investigation (RI) and a feasibility study (FS).

1614

V18/022950

Sampling and Analysis Plan for Existing Wells for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1575&D1; 30 pp. (February 1997)

The overall objectives of the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) RI are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to perform an ecological risk assessment and a human health risk assessment, to support the evaluation of remedial alternatives for the FS, to determine the need for early actions, and to develop a Proposed Plan and Record of Decision for the CA. The RI will use historical data to the extent possible, but additional data will be collected as necessary. A data need that has been identified is additional groundwater data from existing wells located within or near the boundaries of known plumes. Groundwater samples will be collected from 29 existing wells.

1615

V18/022945

Sampling and Analysis Plan for Polychlorinated Biphenyls in Soil/Sediment for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1570&D1; 45 pp. (February 1997)

The overall objectives of the Upper East Fork Poplar Creek (UEFPC) Characterization area (CA) RI are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to perform an ecological risk assessment and a human health risk assessment, to support the evaluation of remedial alternatives for the FS, to determine the need for early actions, and to develop a Proposed Plan and Record of Decision for the CA. The UEFPC CA, which includes the main Y-12 Plant area, is an operationally and hydrogeologically complex area that contains numerous contaminants and contaminant sources, as well as ongoing industrial and defense-related activities. Polychlorinated biphenyls data collected will include surface water from sumps, the storm drain system and UEFPC; sediment from sumps and the storm drain system; groundwater from existing wells; and soil from along the banks of UEFPC and from PCB use areas. This Sampling and Analysis Plan specifically addresses soil and storm drain sediment sampling.

1616

V18/022952

Sampling and Analysis Plan for Volatile Organic Compounds in Storm Drains for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; Oak Ridge Y-12 Plant, Oak Ridge, TN; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1577&D1; 65 pp. (March 1997)

The overall objectives of the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) RI are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to perform an ecological risk assessment and a human health risk assessment, to support the evaluation of remedial alternatives for the FS, to determine the need for early actions, and to develop a Proposed Plan and Record of Decision for the CA. The RI will incorporate historical data to the extent possible, but additional data will be collected as new data needs are identified. One data need that has been identified is the lack of information concerning whether contaminated groundwater from the VOC plumes is seeping into the storm drain system. Water samples will be collected from the storm drains and analyzed for VOCs to provide the necessary information. Samples will be collected from 41 outfalls.

1617

V18/022953

Sampling and Analysis Plan for the Reduction of Mercury in Plant Effluent Surface Water for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; Oak Ridge Y-12 Plant, Oak Ridge, TN; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1573&D1; 15 pp. (March 1997)

The Oak Ridge Y-12 Plant is one of the three major facilities on the U.S. Department of Energy's (DOE's) Oak Ridge Reservation (ORR). The entire ORR was placed on the National Priorities List of Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) sites in November 1989. To facilitate the required remedial investigation (RI) of the Y-12 Plant area in a coordinated and timely manner, the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) and the Bear Creek CA were established. The CA approach considers the entire watershed and examines all the media within it. A thorough evaluation of the existing surface water data for UEFPC revealed data gaps and unacceptable levels of uncertainty that must be addressed before completion of the RI. Environmental data are routinely collected at the site by the Reduction of Mercury in Plant Effluent (RMPE) program. For the RI additional sample volume will be collected and analyzed for metals, uranium and cyanide when the first quarter 1997 RMPE samples are collected.

1618

V18/020995

Site Characterization Summary Report for Dry Weather Surface Water Sampling Upper East Fork Poplar Creek Characterization Area Oak Ridge Y-12

Plant, Oak Ridge, TN

Oak Ridge Y-12 Plant, Oak Ridge, TN; CDM Federal Programs Corporation, Oak Ridge, TN

Y/ER-229; 573 pp. (August 1996)

This report describes activities associated with conducting dry weather surface water sampling of Upper East Fork Poplar Creek (UEFPC) at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee. The major objective of the dry weather surface water sampling program was to characterize the nature and extent of hydrologically dependent contaminant transport to and within UEFPC under current (now recent) plant operating conditions using a mass balance approach. Sampling of all locations within the same time period was necessary to obtain an estimate of the total creek load and to allow the use of the mass balance approach. This activity is a portion of the work to be performed at UEFPC Operable Unit (OU) 1, as described in the RCRA Facility Investigation Plan for Group 4 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee and in the Response to Comments and Recommendations on RCRA Facility Investigation Plan for Group 4 at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee, Volume 1, Operable Unit 1. The report is designed to provide a summary of all project-related events to date.

1619 V18/022364

Upper East Fork Poplar Creek Characterization Area Remedial Investigation Sediment Sampling and Analysis Plan, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; CDM Federal Programs Corporation, Oak Ridge, TN

DOE/OR/01-1528&D1; 50 pp. (October 1996)

The overall objectives of the Upper East Fork Poplar Creek (UEFPC) Characterization Area (CA) RI are to evaluate the nature and extent of known and suspected contaminants, to provide the data necessary to perform an ecological risk assessment and a human health risk assessment (as appropriate), to support the evaluation of remedial alternatives for the FS, and to develop a Proposed Plan and Record of Decision for the CA. The UEFPC CA, which includes the main Y-12 Plant area, is an operationally and hydrogeologically complex area that contains numerous contaminants and contaminant sources, as well as ongoing industrial and defense-related activities.

1620 V18/023449

Resource Conservation and Recovery Act (RCRA) Closure Summary for the Uranium Treatment Unit
Oak Ridge Y-12 Plant, Oak Ridge, TN

Y/TS-1486; 169 pp. (May 1996)

This closure summary has been prepared for the Uranium Treatment Unit (UTU) located at the Y-12 Plant in Oak Ridge, Tennessee. The actions required to achieve closure of the UTU area are outlined in the Closure Plan, submitted to and approved by the Tennessee Department of Environmental and Conservation staff, respectively. The UTU was used to store and treat waste materials that are regulated by the Resource Conservation and Recovery Act. This closure summary details all steps that were performed to close the UTU in accordance with the approved plan.

1621

V18/021549

Draft Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components: Volume II - Appendixes

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM

DOE/EIS-0225-D (Vol. 2, App.); 351 pp. (March 1996)

This document consists of appendices to the draft environmental impact statement for the continued operation of the Pantex Plant. The environmental impact assessment methodologies discussed in this section address the full range of natural and human resources and issue areas pertinent to the continued operations at Pantex Plant. These methodologies are also applicable to the analysis of candidate sites considered for the potential interim storage of pits, as described in chapter 5 of this EIS.

1622

V18/021554

Draft Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components - Summary

U.S. Department of Energy, Albuquerque Operations Office, Albuquerque, NM

DOE/EIS-0225-D (Summary); 31 pp. (March 1996)

As a successor agency to the Atomic Energy Commission, the Department of Energy is required by the Atomic Energy Act of 1954, as amended, to provide for the safety and reliability of the Nation's nuclear weapon stockpile. Through Presidential direction and Congressional authorization and appropriation, the Department is given certain nuclear weapon stockpile requirements for the current and future years. These requirements relate to the development, production, assembly, disassembly, safety, reliability, and effectiveness of the Nation's nuclear weapons. Pantex Plant, northeast of Amarillo, Texas, is where DOE fulfills many of its responsibilities regarding the production of high explosive(s) (HE) components for nuclear weapons; assembly, modification, and disassembly of nuclear weapons; and maintenance and monitoring of the nuclear weapon stockpile. This report describes an evaluation of potential environmental impacts for the continued operation of the Pantex Plant.

1623

V18/022171

Monitoring DNAPL Pumping Using Integrated Geophysical Techniques

Newmark, R.L.; Daily, W.D.; Kyle, K.R.; Ramirez, A.L.

Lawrence Livermore National Laboratory, Livermore, CA
CONF-960477; SAGEEP '96, R.S. Bell and M.H. Cramer (eds.), Proceedings of the Ninth Annual Symposium on the Application of Geophysics to Engineering and Environmental Problems, Denver, CO, April 15-May 1, 1996. Environmental and Engineering Geophysical Society, Wheat Ridge, CO, 1353 pp.; (pp. 409-418) (1996)

The removal of DNAPL during pumping has been monitored using integrated in-situ geophysical techniques. At Hill Air Force Base in

Utah, a free-product DNAPL plume (consisting predominantly of TCE) is pooled in water-wet soil on a thick clay aquitard. Groundwater pumping at Operable Unit 2 (OU 2) began in 1994; to date, nearly 30,000 gallons of DNAPL have been recovered from the site. From September 1994 through September 1995, changes in the basin during DNAPL pumping were monitored using an integrated geophysical system. Fiber optic sensors and neutron logs verify the presence of DNAPL in the vicinity of three boreholes which form a cross section from the perimeter of the basin to its center. Cross borehole electrical resistance tomography (ERT) images the changes in formation electrical properties due to the removal of DNAPL, extending the understanding of DNAPL removal between the boreholes. During pumping, electrical resistivities decreased; we suggest that these decreases are directly caused by the reduction in DNAPL. During groundwater pumping, water with relatively low resistivity replaces some of the DNAPL pockets as the highly insulating DNAPL is removed. The results suggest that, as DNAPL is pumped from a nearby well, product slowly drains along the top of an aquitard and into the pump well, where it collects.

1624

V18/023558

Hanford Site Protective Isolation Surface Barrier: Taking Research and Development to Engineered Application

Myers, D.R.; Wing, N.R.

IT Hanford, Inc., Richland, WA

CONF-941124; *Insitu Remediation: Scientific Basis for Current and Future Technologies*, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 613-624) (1994)

The development of the Protective Isolation Barrier has been an ongoing program since 1985. This development effort has focussed on several technical areas. These technical areas include water infiltration, biointrusion, human intrusion, erosion/deposition, physical stability, barrier materials, computer modeling, long-term climate effects, natural analogs, and barrier design. This paper will briefly review the results of the research and development in the technical areas and then explain how the results of this work have influenced the design features of the prototype barrier. A good example of this is to explain how the type and depth of the soil layer used in the barrier is related to water infiltration, biointrusion, modeling, climate, analogs, and barrier materials. Another good example is to explain the relationship of the barrier sideslopes (basalt riprap and native soil) with human intrusion, biointrusion, barrier materials, and barrier design. In general, the design features of the prototype barrier will be explained in terms of the results of the testing and development program. After the basis for prototype barrier design has been established, the paper will close by reviewing the construction of the prototype barrier, sharing the lessons learned during construction, and explaining the ongoing testing and monitoring program which will determine the success or failure of this barrier concept and the need for additional design modifications.

1625

V18/023559

Long-Term Climate Change Task of the Hanford

Permanent Isolation Barrier Development Program

Petersen, K.L.

Westinghouse Hanford Company, Richland, WA

CONF-941124; *Insitu Remediation: Scientific Basis for Current and Future Technologies*, G.W. Gee and N.R. Wing (eds.), Proceedings of the 33rd Hanford Symposium on Health and the Environment, Pasco, WA, November 7-11, 1994. Battelle Press, Columbus, OH, Part 1, 704 pp.; (pp. 633-648) (1994)

The Hanford Site Permanent Barrier Development Program is developing an in-place disposal capability for low-level nuclear and hazardous waste for the U.S. Department of Energy at the Hanford Site in southeastern Washington State. Layered earthen and engineered barriers are being developed that will function in what is currently a semiarid environment (mean annual precipitation and temperature, 16 cm and 11.8C, respectively) for at least 1000 yr by limiting the infiltration of water through the waste. The Long-Term Climate Change Task has specific goals of: (1) obtaining defensible probabilistic projections of the long-term climate variability in the Hanford Site region at many different time scales in the future; (2) developing several test-case climate scenarios that bracket the range of potential future climate, including both greenhouse warming and cycling into another ice age; and (3) using the climate scenarios both to test and to model protective barrier performance. Results from the Carp Lake Pollen Coring Project (subcontracted to the University of Oregon) indicate that for the last approximately 75,000+ year the Columbia River Basin's long-term range of mean annual precipitation ranged from 25% to 50% below to 28% above modern levels, while temperature has ranged from 7 degrees C to 10 degrees C below to 2 degrees C above modern levels. Studying this long record provides confidence that such a range brackets potential natural climate change even if the earth cycles back into another ice age in the next few millennia.

1626

V18/021538

100 Areas Soil Washing Tradeoff Study

Belden, R.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00624; 23 pp. (November 1995)

The complex nature of cost analysis and systems work demands a level of effort to ensure that decisions made support the best interests of all parties. This tradeoff study will act as a formal decision analysis method for the evaluation of many variables. The documentation of the decision rationale and system design is essential for successful planning and implementation of any system. The Hanford Site offers unique problems for economic analysis of remediation alternatives. The variations in the size of sites, geographic locations, and possible cleanup scenarios all add to the complexity of the tradeoff analysis. A thorough examination of all alternatives must be held to a level of detail appropriate to current regulatory and budgetary considerations. This study will compare the economics of two specific alternatives for remediation of soils at the Hanford Site. Remove and dispose is compared to remove, treat, and dispose. The treatment analyzed in this study is volume reduction through soil washing.

1627

V18/023590

Radioactive Contamination Mapping System Detailed Design Report

Bauer, R.G.; O'Callaghan, P.B.

Bechtel Hanford, Inc., Richland, WA

BHI-00619; 56 pp. (August 1996)

The Hanford Site's 100 Area production reactors released radioactively and chemically contaminated liquids into the soil column. The primary source of the contaminated liquids was reactor coolant and various waste waters released from planned liquid discharges, as well as pipelines, pipe junctions, and retention basins leaking into the disposal sites. Site remediation involves excavating the contaminated soils using conventional earthmoving techniques and equipment, treating as appropriate, transporting the soils, and disposing of the soils at Environmental Restoration Disposal Facility (ERDF). To support remediation excavation, disposal, and documentation requirements, an automated radiological monitoring system was deemed necessary. The Radioactive Contamination Mapping System (RCMS) was designed to fulfill this need. This Detailed Design Report provides design information for the RCMS in accordance with Bechtel Hanford, Inc. Engineering Design Project Instructions.

1628 V18/020762

100 and 300 Area Burial Ground Remediation Study

Chiaramonte, G.R.

Bechtel Hanford, Inc., Richland, WA

BHI-00768; 50 pp. (April 1996)

This burial ground study report documents the results of an evaluation of alternatives for remediation of Hanford 100 and 300 Area burial grounds. The current remediation baseline assumes that the contents of all burial grounds will be removed and disposed at the Environmental Restoration Disposal Facility (ERDF). This baseline assumes that this approach will remediate the sites to a level that "does not preclude any future use." This study evaluates alternatives to this approach which provide overall protection of human health and the environment, pose less worker risk, and are more cost effective, but may require some restrictions on the use of portions of the 100 and 300 Areas. Information is provided in this report to support future decision-making by the U.S. Department of Energy (DOE), the regulators, and stakeholders.

1629 V18/023008

Remedial Action and Waste Disposal Project: 100-B/C Remedial Action Readiness Report

April, J.G.; Bryant, D.L.; Cislo, G.B.

Bechtel Hanford, Inc., Richland, WA

BHI-00886; 149 pp. (July 1996)

This Readiness Evaluation Report presents the results of the project readiness evaluation to assess the readiness of the 100-B/C source sites remediation. The 100-B/C Area is located at the Hanford Site in Richland, Washington. The evaluation was conducted at the conclusion of a series of readiness activities that began in May 1996. These activities included confirming the completion of project specific procedures, training of staff, obtaining support equipment, receipt of subcontractor submittals, approval of

subcontractor submittals, and mobilization and construction of site support systems.

1630 V18/023938

Remedial Action and Waste Disposal Project: 100-B/C Remedial Action Readiness Evaluation Plan

April, J.G.; Bryant, D.L.; Cislo, G.B.; Fecht, K.R.; Kerr, N.R.; Langstaff, A.L.; Myers, K.R.; Orewiler, R.I.; Perry, D.W.; Van Sickle, G.E.; Wesselman, M.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00854; 80 pp. (June 1996)

The Readiness Evaluation Plan presents methodology used to assess the readiness of the 100-B/C Remedial Action Project. Remediation of these sites involves the extraction, treatment if applicable, and final disposal of contaminated soil and debris associated with the high-priority waste sites in the 100 Areas. This remedial action was designed to meet the remedial action objectives identified in the ROD, as detailed in the Remedial Design Report/Remedial Action Work Plan for the 100 Area.

1631 V18/023004

Safety Analysis and Hazard Classification for the 100-B/C Site Remediation Project - Phase 1 [Rev. 1]

Adam, W.J.; Lehrschall, R.R.; Oestreich, D.K.

Bechtel Hanford, Inc., Richland, WA

BHI-00441 (Rev. 1); 23 pp. (July 1996)

The purpose of this report is to document the preliminary hazard classification (PHC) for the initial group of sites to be remediated by the 100-B/C Site Remediation Project. The project is targeted at excavation of contaminated solid from seven waste sites, and the transportation and disposal of these wastes at the Environmental Restoration Disposal Facility. The PHC for these remediation activities is rated as radiological.

1632 V18/023434

Temporary Septic Holding Tank at the 100-C Remedial Action Restroom Facility: Engineering Report [Rev. 1]

Jackson, G.J.

Bechtel Hanford, Inc., Richland, WA

BHI-00921 (Rev. 1); 35 pp. (October 1996)

The primary mission of the Hanford Site from 1943 to 1990 was to produce nuclear materials for national defense. Waste disposal activities associated with this mission resulted in the creation of more than 1,000 waste sites contaminated with radioactive and chemically hazardous constituents. Investigation and remediation of these waste sites is governed by the Tri-Party Agreement. The 100-C Remedial Action Restroom Trailer Facility will be required near the 105-C Reactor to support the 105-C Interim Storage Project. This project is part of the decommissioning of the eight surplus reactor buildings along the Columbia River in the 100 Area. This facility will be a temporary, modular building sized to provide restroom facilities for the supervisors, engineers, technicians, and craft personnel assigned to the project and engaged in the associated field work. This paper describes the geology and flooding potential, design criteria, operations, and maintenance.

1633 V18/023605

Temporary Septic Holding Tank at the 100-C Remedial Action Support Facility: Engineering Report

Jackson, G.J.

Bechtel Hanford, Inc., Richland, WA

BHI-00899; 92 pp. (August 1996)

The primary mission of the Hanford Site from 1943 to 1990 was to produce nuclear materials for national defense. Waste disposal activities associated with this mission resulted in the creation of more than 1,000 waste sites contaminated with radioactive and chemically hazardous constituents. Investigation and remediation of these waste sites is governed by the Tri-Party Agreement. The agreement grouped the waste sites into 78 operable units, each of which was to be investigated and remediated separately. The 100 C Remedial Action Support Facility will be required near the 105-C Reactor to support the 105-C Interim Storage Project. This project is part of the decommissioning of the eight surplus reactor buildings along the Columbia River in the 100 Area. This facility, will be a temporary, modular building sized to provide office and work space for the supervisors, engineers, and technicians assigned to the project and engaged in the associated field work. This report describes the project location, geology and potential flooding, design criteria, operations, and maintenance.

1634 V18/025391

Hanford 100-B/C Demonstration Project

Werdel, N.; Van Sickle, G.E.; April, J.G.

U.S. Department of Energy, Richland Operations Office, Richland, WA; Bechtel Hanford, Inc., Richland, WA; CH2M Hill Hanford, Inc., Richland, WA

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (9 pp.) (1997)

This paper presents the findings of the 100-B/C Demonstration Project conducted at the U.S. Department of Energy's Hanford Site in southeastern Washington State. The purpose of the 100-B/C Demonstration Project was to initiate remedial action in the 100 Area source sites and to address uncertainties in the remedial design planning. A series of objectives, defined through the Data Quality Objectives (DQO) process, were addressed during the excavation of three waste features. In addition, the opportunity to implement two new technologies was taken. These technologies consisted of advanced characterization using both the sonic cone penetrometer and gamma logging to delineate contamination boundaries during remediation of the 116-B-4 site and using the Sonsub [TM] soil excavator during the 116-C-1 site excavation. This project initiated remediation for the source sites at the Hanford Site and paved the way for the larger remediations in the 100 and 300 Areas. The lessons learned during the implementation of this project benefited the remedial designs and procurements for these larger projects and will benefit professionals involved in remediation throughout the U.S. Department of Energy complex.

1635 V18/021564

Mitigation Action Plan for Liquid Waste Sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Units

Weiss, S.G.

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-96-19; 22 pp. (May 1996)

A Record of Decision (ROD) was issued for remediation of waste sites in the 100-BC-1, 100-DR-1, and 100-HR-1 Operable Units in the 100 Area of the Hanford Site. This Mitigation Action Plan (MAP) explains how mitigation measures for these remedial activities will be planned and implemented. The new activities planned in the ROD are not anticipated to result in releases of hazardous substances and will minimize disturbance of currently undisturbed areas. However, certain actions required by the ROD may result in the redisturbance of areas of recovering vegetation. This MAP presents a strategy for limiting disturbances and identifies an opportunity for revegetating a previously disturbed site; the knowledge gained from this demonstration project can be applied to final revegetation of the rest of the remediated sites and sites disturbed during cleanup when remediation of an area is completed. This work will be conducted in coordination with the Natural Resource Trustees Council and Native American Tribes to help minimize impacts to natural resources and cultural resources from project activities and to restore the remediated sites to an appropriate level of habitat.

1636 V18/023437

Conceptual Site Models for Groundwater Contamination at 100-BC-5, 100-KR-4, 100-HR-3, and 100-FR-3 Operable Units

Peterson, R.E.; Raidl, R.F.; Denslow, C.W.

CH2M Hill Hanford, Inc., Richland, WA; IT Hanford, Inc., Richland, WA; Bechtel Hanford, Inc., Richland, WA

BHI-00917; 239 pp. (September 1996)

This document presents technical information on groundwater contamination in the 100-BC-5, 100-KR-4, 100-HR-3, and 100-FR-3 Operable Units on the Hanford Site in Richland, Washington. These operable units are defined for groundwater that underlies the retired plutonium production reactors and their associated support facilities. This technical information supports conceptual site models (CSM) for each operable unit. The goal in maintaining a CSM is to ensure that a reasonable understanding of contamination issues in each groundwater operable unit is available for selecting a final remediation alternative and for developing a record of decision. CSMs are developed for hazardous waste sites to help evaluate potential risks to human health and the environment from exposure to contamination.

1637 V18/023426

Data Quality Objectives for the 100-D Group 2 Waste Sites

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-69; 89 pp. (August 1996)

The 100-D Area contains 10 past-practice, liquid waste disposal sites associated with two plutonium-production nuclear reactors that

operated from 1944 to 1965. It is estimated that 134,000 loose cubic meters of soil and structural debris are contaminated with various radionuclides and metals. The 100-Area interim record of decision specified that the waste sites were to be remediated to the extent practicable to protect human health and the environment, and to allow unrestricted future use of the area. The Data Quality Objective process for the 100-D Area waste sites is a U.S. Environmental Protection Agency-required approach to planning and coordinating data acquisition. This process is also used as a decision-making tool to assess the use of historical or previously acquired data and establishes interfaces and promotes communication with key decision makers and other stakeholders.

1638 V18/023606

Preliminary Hazard Classification for the 100-D Site Remediation Project (Group 2)

Oestreich, D.K.

Bechtel Hanford, Inc., Richland, WA

BHI-00913; 19 pp. (September 1996)

This document provides the preliminary hazard classification (PHC) for the 100-D Group 2 Site Remediation Project. This report provides project description information in sufficient detail to support the assumptions and conclusions as provided in this PHC. The 100-D Group 2 Site Remediation Project is targeted at excavation of contaminated soils from nine waste sites in the 100-D Area and the transportation of these wastes to the Environmental Restoration Disposal Facility.

1639 V18/023431

Environmental Restoration Contractor Facility Safety Plan - MO-561 100-D Site Remediation Project

Donahoe, R.L.

Bechtel Hanford, Inc., Richland, WA

BHI-00957; 16 pp. (November 1996)

This safety plan is applicable to Environmental Restoration Contractor personnel who are permanently assigned to MO-561 or regularly work in the facility. The MO-561 Facility is located in the 100-D Area at the Hanford Site in Richland, Washington. This plan will: (a) identify hazards potentially to be encountered by occupants of MO-561; (b) provide requirements and safeguards to ensure personnel safety and regulatory compliance; (c) provide information and actions necessary for proper emergency response.

1640 V18/020760

Final Hazard Classification of the 100-D Pond Voluntary Remediation Project

Adam, W.J.

Bechtel Hanford, Inc., Richland, WA

BHI-00789; 19 pp. (May 1996)

The purpose of this document is to provide the final hazard classification for the voluntary remediation activities to be conducted at the 100-D Pond Treatment, Storage, and Disposal Facility. Based on the inventories calculated from characterization data and the releasable inventory, these activities are classified as radiological.

1641 V18/023591

Remedial Action and Waste Disposal Project: 100-D Ponds Readiness Evaluation Plan

Obenauer, D.F.

Bechtel Hanford, Inc., Richland, WA

BHI-00865; 14 pp. (June 1996)

This Readiness Evaluation Plan presents the methodology used to assess the readiness for excavation of sediments from the 100-D Ponds. Items determined to require a readiness evaluation have been summarized in a punchlist and are included in this Readiness Evaluation Plan. The scope of this Readiness Evaluation Plan includes an assessment of the organization, procedures, and regulatory approvals necessary for the safe excavation of materials from the 100-D Ponds and the subsequent transportation of materials to the low level burial ground (LLBG) for disposal.

1642 V18/023010

Remedial Action and Waste Disposal Project: 100-DR-1 Remedial Action Readiness Evaluation Plan

April, J.G.; Bryant, D.L.; Calverley, C.

Bechtel Hanford, Inc., Richland, WA

BHI-00902; 85 pp. (August 1996)

This plan presents the method used to assess the readiness of the 100-DR-1 Remedial Action Project. Remediation of the 100-D sites (located on the Hanford Site) involves the excavation (treatment if applicable) and final disposal of contaminated soil and debris associated with the high-priority waste sites in the 100 Areas.

1643 V18/021544

Work Plan for the Excavation of Contaminated Materials from 100-D Ponds

Ludowise, J.D.; Blumenkranz, B.D.; Moore, R.T.; Stankovich, M.T.

Bechtel Hanford, Inc., Richland, WA

BHI-00777; 57 pp. (May 1996)

The D Ponds were used as a treatment, storage and/or disposal (TSD) facility under the Resource Conservation and Recovery Act of 1976 (RCRA). The D-Ponds waste site is located in the 100-DR-1 Operable Unit of the 100 Area at the Hanford Reservation. The site consists of two surface ponds (now dry) separated by an earthen dike. The south pond was used as a settling pond for waste water from the 100-D Area and contains the sediment material to be removed. The north pond was used as a percolation pond and received clarified overflow from the settling pond. Two horizontal pipes, buried in the earthen dike, connect the two ponds and allowed the water to overflow from the settling pond to the percolation pond. This work plan describes the work required to remediate the D-Ponds waste site. The actions needed to remediate the site include the removal and disposal of contaminated sediments, piping and debris. This remedial action is required to be complete by 1998. The U.S. Department of Energy, Richland Operations Office is voluntarily accelerating the cleanup.

1644 V18/023599

Operation and Maintenance Manual for the Temporary Septic Holding Tank at the 100-D Remedial Action Support Facility [Rev. 2]

Kelty, G.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00781 (Rev. 2); 25 pp. (October 1996)

This manual was prepared to provide detailed information for the operation and maintenance of the sanitary wastewater holding system at the 100-D Remedial Action Support Facility located in the 100-DR-1 Operable Unit at the Hanford Site. This document describes operations, including the type and frequency of required maintenance, and system failure response procedures.

1645

V18/023604

Temporary Septic Holding Tank at the 100-D Remedial Action Support Facility: Engineering Report [Rev. 2]

Kelty, G.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00782 (Rev. 2); 137 pp. (October 1996)

The primary mission of the Hanford Site from 1943 to 1990 was to produce nuclear materials for the national defense. Waste disposal activities associated with this mission resulted in the creation of more than 1,000 waste sites contaminated with radioactive and chemical constituents. Investigation and remediation of the wastes sites is governed by the Tri-Party Agreement. This agreement grouped the waste sites into 78 operable units, each of which was to be investigated and remediated separately. Once actual remediation activities begin at the waste sites, a central support facility will be required at each of the reactor areas (100-B/C, 100-D, and 100-H). These facilities will provide office and work space for the supervisors, engineers, and technicians engaged in the field work. The central facilities will be temporary, modular buildings sized to accommodate the anticipated staff, which in turn is determined by the scope of the planned remediation activities. The paper describes the project location, geology and flooding potential, design criteria, operation, and maintenance.

1646

V18/022359

100-FR-3 Groundwater/Soil Gas Supplemental Limited Field Investigation Report

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-95-99; 35 pp. (April 1996)

In 1993, a Limited Field Investigation (LFI) was conducted for the 100-FR-3 Operable Unit which identified trichloroethylene (TCE) as a contaminant of potential concern (COPC). In groundwater samples collected for the LFI, TCE was detected in well 199-F7-1 at a concentration exceeding the U.S. Environmental Protection Agency (EPA) maximum contaminant level (5 $\mu\text{g/L}$) and Washington State groundwater criteria (3 $\mu\text{g/L}$). With the concurrence of the EPA and the Washington State Department of Ecology (Ecology), a supplemental LFI was conducted to determine the extent and potential source of TCE groundwater contamination associated with the 100-FR-3 Operable Unit. This report summarizes the activities and results of the groundwater/soil gas

supplemental LFI for the 100-FR-3 Operable Unit. The primary objective of this investigation was to assess the lateral distribution of TCE in shallow (3 to 5 ft below the water table) groundwater associated with the 100-FR-3 Operable Unit. The second objective was to assess soil gas (3 to 5 concentrations in the study area in an attempt to identify potential sources of TCE and develop a correlation between soil gas and groundwater concentrations. Finally, the third objective of the investigation was to refine the site conceptual model.

1647

V18/021552

Geophysical Investigation of the 116-H-1 Liquid Waste Disposal Trench, 100-HR-1 Operable Unit

Bergstrom, K.A.; Mitchell, T.H.

Bechtel Hanford, Inc., Richland, WA

BHI-00715; 30 pp. (April 1996)

A geophysical investigation and data integration were conducted for the 116-H-1 Liquid Waste Disposal Trench, which is located in the 100-HR-1 Operable Unit. The 116-H-1 Liquid Waste Disposal Trench is also known as the 107-H Liquid Waste Disposal Trench, the 107-H Rupture Effluent Trench, and the 107-H Trench. The trench was primarily used to hold effluent from the 107-H Retention Basin that had become radioactive from contact with ruptured fuel elements. The effluent may include debris from the ruptured fuel elements. The 116-H-1 Liquid Waste Disposal Trench was also used to hold water and sludge from the 107-H Retention Basin during the basin's deactivation in 1965.

1648

V18/025413

Site Specific Health and Safety Plan for Drilling in Support of Insitu Redox Manipulation

Tuttle, B.G.

Bechtel Hanford, Inc., Richland, WA

BHI-01001; 9 pp. (February 1997)

The 100-HR-3 Operable Unit encompasses groundwater contamination underlying the 100-D and 100-H Areas. The primary contaminant is Chromium VI. The chromium contamination presents negligible risk to site personnel by credible exposure pathways. This Health and Safety Plan outlines site specific health hazards and safety responses, specifies personnel training requirements, outlines personnel decontamination procedures, specifies personal protective equipment, and lists emergency procedures.

1649

V18/020764

100-HR-3 and 100-KR-4 Pump-and-Treat Drilling Description of Work

Auten, J.E.; Myers, D.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00770; 31 pp. (May 1996)

This document describes the installation of wells necessary to implement the 100-HR-3 and 100-KR-4 Interim Remedial Action. The placement of wells is based on numerical modeling and requirements contained in the Record of Decision dated 4-1-1996. All of the wells drilled for this project will be designed as potential

production wells. Five wells will be drilled in the 100-H Area to supplement seven existing wells. Initially, three of the wells will be injection wells; the remaining two wells will be used for compliance monitoring wells. These wells will be used in conjunction with two existing wells. In the 100-K Area, thirteen wells will be drilled to supplement two existing wells; five of the wells be used as extraction wells, four of the wells will be used as injection wells, and the remaining four wells will be used as compliance monitoring wells.

1650 V18/022593

Design Criteria and Design Basis for the 100-HR-3 and 100-KR-4 Pump-and-Treat Projects [Rev. 1]

McKinley, W.S.; Winters, J.N.

Bechtel Hanford, Inc., Richland, WA

BHI-00772 (Rev. 1); 44 pp. (June 1996)

The 100-HR-3 and 100-KR-4 Operable Units are located in the 100 Area at the Hanford Site in Richland, Washington. The document describes the project objectives and design criteria to be used for the 100-HR-3 and 100-KR-4 groundwater pump-and-treat design activities.

1651 V18/025465

Mitigation Action Plan for the 100-HR-3 and 100-KR-4 Pump and Treat Project

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-107; 21 pp. (November 1996)

This project involves drilling 22 wells, improving access roads to existing and new wells, laying connecting pipes, and constructing groundwater treatment facilities in the 100-KR-4 Area and 100-HR-3 Operable Units. Drilling is expected to be completed by September 1996, but the treatment operations will continue for approximately 10 years.

1652 V18/023441

Remedial Design Report and Remedial Action Work Plan for the 100-HR-3 and 100-KR-4 Groundwater Operable Units' Interim Action

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-96-84; 213 pp. (September 1996)

This document is a combination remedial design report and remedial action work plan for the 100-HR-3 and 100-KR-4 Operable Units (located on the Hanford Site in Richland, Washington) interim action. The interim actions described in this document represent the first of an ongoing program to address groundwater contamination in each operable unit. This document describes the design basis, provides a description of the interim actions, and identifies how they will meet the requirements set forth in the interim action Record of Decision.

1653 V18/025464

Well Summary Report: 100-HR-3 and 100-KR-4 Interim Remedial Action Wells

Johnson, V.M.; Mehlhorn, M.; Myers, D.A.; Walker, L.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00953; 550 pp. (December 1996)

The 23 wells described in this summary report were drilled to support interim actions associated with the 100-HR-3 and 100-KR-4 Operable Units. This document provides a summary of data obtained from the wells drilled to support the interim actions. An additional well was added to the scope of the work; that well addresses the recently discovered chromium "hot spot" in the 100-D Area. Also included are geologic cross-sections and detailed test data and field logs.

1654 V18/023433

Approach and Plan for Cleanup Actions in the 100-IU-2 and 100-IU-6 Operable Units of the Hanford Site

Bechtel Hanford, Inc., Richland, WA

DOE/RL-95-108; 25 pp. (October 1996)

The purpose of this document is to summarize waste site information gathered to date relating to the 100-IU-2 and 100-IU-6 Operable Units (located at the Hanford Site in Richland, Washington), and to plan the extent of evaluation necessary to make cleanup decisions for identified waste sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1981. This is a streamlined approach to the decision-making process, reducing the time and costs for document preparation and review.

1655 V18/025452

Site-Specific Waste Management Instruction for the 100-KR-4 Operable Unit Drilling [Rev. 1]

Hadley, J.T.

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-96-65 (Rev. 1); 14 pp. (August 1996)

This site-specific waste management instruction provides guidance for the management of waste generated as a result of groundwater well installations in the 100-KR-4 Operable Unit (OU). The well installations are necessary to implement the Remedial Action (RA) option (pump-and-treat using ion exchange) to prevent discharge of hexavalent chromium at levels above those considered protective of aquatic life in the Columbia River and riverbed sediments.

1656 V18/023425

Mitigation Action Plan for the 100-KR-4, 100-HR-3 Pump and Treat

Weiss, S.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00874; 22 pp. (October 1996)

This project involves drilling 22 wells, improving access roads to existing new wells, laying connecting pipes, and constructing groundwater treatment facilities in the 100-KR-4 and 100-HR-3 Operable Units. These facilities are located at the Hanford Site in Richland, Washington. The drilling is expected to be completed by October 1996, but the treatment operations will continue for approximately 10 years. Thirteen of the new wells are to be placed in the 100-K Area, five in the 100-H Area, and four in the 100-D

Area. A 4 km (2.5 mi) pipeline will run from the wells at the 100-D Area to the treatment facility at the 100-H Area. The 116-K-2 Trench received reactor effluents from 1955 to 1971. It is 1,460 m long by 16.4 m wide by 5.5 m deep with spoil pits at the surface on both sides. Washouts occurred during operation, causing several surface contamination areas between the trench and river that were covered with a few feet of soil.

1657 V18/025454

100-N Pilot Project: Proposed Consolidated Groundwater Monitoring Program

Borghese, J.V.; Hartman, M.J.; Luttrell, S.P.; Perkins, C.J.; Zoric, J.P.; Tindall, S.C.

Bechtel Hanford, Inc., Richland, WA

BHI-00725; 186 pp. (November 1996)

This report presents a proposed consolidated groundwater monitoring program for the 100-N Pilot Project. This program is the result of a cooperative effort between the Hanford Site contractors who monitor the groundwater beneath the 100-N Area. The consolidation of the groundwater monitoring programs is being proposed to minimize the cost, time, and effort necessary for groundwater monitoring in the 100-N Area and to coordinate regulatory compliance activities. The integrity of the subprograms requirements remained intact during the consolidation effort. The purpose of this report is to present the proposed consolidated groundwater monitoring program and to summarize the process by which it was determined.

1658 V18/023001

Engineering Evaluation/Cost Analysis for 100-N Area Waste

Mihalik, L.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00785; 34 pp. (August 1996)

The 100 Area of the Hanford Site was placed on the U.S. Environmental Protection Agency's National Priorities List (NPL) in November 1989 under the 'Comprehensive Environmental Response, Compensation, and Liability Act of 1980.' The 100 Area NPL site includes the 100-N Area, which is in the early stages of the cleanup process. To facilitate the disposal of wastes generated in preparation for cleanup, the U.S. Department of Energy, Richland Operations Office in cooperation with the Washington State Department of Ecology and the U.S. Environmental Protection Agency, has prepared this Engineering Evaluation/Cost Analysis (EE/CA). The scope of this EE/CA includes wastes from cleanout of the EDB and deactivation facilities. Volumes and costs for disposal of investigation-derived waste are also included.

1659 V18/023440

Insitu Redox Manipulation Field Injection Test Report: Hanford 100-H Area

Fruchter, J.S.; Amonette, J.E.; Cole, C.R.

Pacific Northwest National Laboratory, Richland, WA

PNNL-11372; 336 pp. (November 1996)

This report presents results of an In Situ Redox Manipulation

(ISRM) Field Injection Withdrawal Test performed at the 100-H Area of the U.S. Department of Energy's (DOE's) Hanford Site in Washington State in Fiscal Year 1996 by researchers at Pacific Northwest National Laboratory (PNNL). The test is part of the overall ISRM project, the purpose of which is to determine the potential for remediating contaminated groundwater with a technology based on in situ manipulation of subsurface reduction-oxidation (redox) conditions. The ISRM technology would be used to treat subsurface contaminants in groundwater zones at DOE sites.

1660 V18/022360

Insitu Treatability Test Plan

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-95-107; 185 pp. (August 1996)

The purpose of this treatability test is to support the selection of long-term remedial alternatives for contaminated groundwater underlying the 100-N Area of the Hanford Site in Richland, Washington. This test will provide the following: (1) verify laboratory scale testing of the in situ treatment zone (ISTZ) technology (i.e., permeable clinoptilolite in a trench) under actual field conditions as a pilot study; (2) provide data to evaluate against the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) criteria, and to scale up to a full-scaled treatment phase; (3) provide preliminary implementability information that will support remediation activities in the evaluation of alternatives for contaminated groundwater at the 100-N Area. The corrective measures study (CMS) is scheduled for completion by November 1996; and (4) provide information, such as effectiveness of the ISTZ as a long-term remedial action to address 90Sr release to the Columbia River at N-Springs to the final evaluation report.

1661 V18/023602

Data Quality Objectives Summary Report for 105-N Basin Sediment Disposition

Pisarcik, D.J.

Bechtel Hanford, Inc., Richland, WA

BHI-00930; 207 pp. (October 1996)

During stabilization of the 105-N Basin, sediments that have accumulated on basin surfaces will be vacuumed, collected in the North Cask Pit of the basin complex, and eventually removed. The environmental assessment for the deactivation of the N Reactor Facilities describes two potential disposition paths for the 105-N Basin sediment: transfer in slurry form to a double-shell tank if determined to be a transuranic waste, or disposal in solid form as a low-level waste. Interim storage of the sediments may be required if a transfer to the Tank Waste Remediation System cannot meet scheduled milestones. Selection of a particular alternative depends on the final characterization of the accumulated sediment, regulatory requirements, cost/benefit analyses, and 105-N Stabilization Project schedule requirements. The 105-N Basin Sediment Process is being conducted in two phases. The scope of the first phase includes identification of the sampling requirements, and the specific analyses required to support evaluation of the sediment disposition options. The objectives of the first phase of

the 105-N Basin Sediment Data Quality Objectives (DQO) Process include the following: identify the relevant acceptance criteria for each of the disposition options; and develop a sampling and analysis plan (SAP) sufficient to allow evaluation of sediment analysis results against each set of acceptance criteria.

1662 V18/021210

Subproject Plan for Demonstration of 3M Technology for Treatment of N Basin Water

Plastino, J.C.

Bechtel Hanford, Inc., Richland, WA

BHI-00739; 18 pp. (February 1996)

A dissolved radionuclides removal demonstration is being conducted at the 105-N Basin as part of the 100-N Area Projects' policy of aggressively integrating innovative technologies to achieve more cost effective, faster, and/or safer deactivation operations. This subproject plan demonstrates new technology (marketed by the 3M [TM] Company) that absorbs specific ions from water. The demonstration will take place at the spent fuel basin at the N Reactor facility. The 105-N Basin contains 1 million gal of water consisting of approximately 32 Ci of dissolved Sr-90 at a concentration of 8.4 uCi/L and 7.3 Ci of dissolved Cs-137 at a concentration of 1.92 uCi/L. The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement [Ecology et al. 1990]) Milestone M-16-01E-T2 requires the initiation of pretreatment and removal of all N Reactor fuel storage basin waters by September 30, 1996, pursuant to the N Reactor Deactivation Program Plan (WHC 1993). 105-N Basin dewatering is on the critical path for overall deactivation of N Reactor by March 1997. The 105-N Basin Deactivation Program Plan (BHI 1995) includes removing debris, hardware, algae and sediment from the basin, followed by pretreatment (filtration) and removal of the 105-N Basin water. Final water removal is currently scheduled for September 30, 1996. The recommended method for the 105-N Basin water is the treatment of the water at the Effluent Treatment Facility (ETF) in the 200 East Area. The demonstration of the 3M technology could be a feasible treatment alternative to the ETF if the ETF is not available to meet the project schedule or if additional pretreatment is needed to reduce the inventory of radioactive species to be handled at the ETF. Demonstration of this technology could be of value for other fuel basins at the Hanford Site and possibly other U.S. Department of Energy (DOE) sites and non-DOE nuclear power plants.

1663 V18/020759

N-Springs Pump and Treat Database User Guide

Bechtel Hanford, Inc., Richland, WA

BHI-00748; 37 pp. (April 1996)

The N-Springs Pump and Treat Database is an access database system that contains information regarding daily operations, daily process analytical data, and performance monitoring analytical data. The purpose of the N-Springs Pump and Treat Database User Guide is to describe how to access the database. The system is part of an expedited response action at the 100-N Area located at the Hanford Site.

1664 V18/023016

Sampling and Analysis Plan for N-Springs Expedited Response Action (ERA) Pump-and-Treat Waste Media for Characterizing Spent Ion Exchange Resin (Clinoptilolite)

Stankovich, M.T.

Bechtel Hanford, Inc., Richland, WA

BHI-00783; 22 pp. (July 1996)

This Sampling and Analysis Plan details the administrative procedures to be used to conduct sampling activities for characterization of spent ion-exchange resin, clinoptilolite, generated from the N-Springs pump-and-treat expedited response action. N-Springs (riverbank seeps) is located in the 100-N Area of the Hanford Site. Groundwater contained in the 100-NR-2 Operable Unit is contaminated with various radionuclides derived from wastewater disposal practices and spills associated with 100-N Reactor Operations.

1665 V18/023430

Project Planning in Support of the 100-NR-1 and 100-NR-2 Corrective Measures Study

Krug, A.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00233; 158 pp. (August 1996)

The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) requires the development of a corrective measures study (CMS) for the waste sites and groundwater in the 100-N Area (located at the Hanford Site in Richland, Washington). The formal screening, evaluation, and comparison of remediation alternatives is known as a CMS. Two CMSs are planned for the 100-N Area. The DOE, the Environmental Protection Agency, the Washington State Department of Ecology, and the Environmental Restoration Contractor technical staff met to establish the schedule, determine remediation goals, evaluate past data, agree on volume estimating strategies for remediation, and agree on assumptions to be used in writing the CMS. This document summarizes these planning activities and documents the CMS planning as it occurred.

1666 V18/023589

N-Springs Expedited Response Action Performance Evaluation Report

Mukherjee, B.B.

Bechtel Hanford, Inc., Richland, WA

DOE/RL-95-110; 394 pp. (July 1996)

Groundwater in the 100-NR-2 Operable Unit (OU) has been contaminated with various radionuclides, metals, and ionic constituents because of waste water disposal practices and spills associated with 100-N Reactor operations. Of primary concern are the presence of high levels of strontium-90 in the groundwater and the discharge of Sr-90 contaminated groundwater to the nearby Columbia River through historic river bank seeps known as N-Springs. In accordance with the requirements of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement), remediation alternatives are currently being evaluated

to address the hazardous substances and constituents in the soil and groundwater at the 100-NR-1/100-NR-2 OUs. Because of concern regarding the release of Sr-90 to the river, the Washington State Department of Ecology (Ecology) and the US Environmental Protection Agency (EPA) issued an action memorandum on September 23, 1994 to the U.S. Department of Energy (DOE), Richland Operations Office (RL), to take immediate actions consisting of a combination of a groundwater pump-and-treat system and a sheet pile barrier wall at N-Springs. By letter, dated March 23, 1995, Ecology and EPA agreed that a sheet pile construction test in December 1994 showed that the installation of the jointed hinge sheet pile wall could not be achieved in the manner specified. Ecology and EPA directed RL to proceed with the installation of the Expedited Response Action (ERA) pump-and-treat system and to (1) continue assessing accurately the flux of strontium to the river, (2) further characterize geologic and hydrologic conditions, and (3) assess design and installation alternatives related to modified barriers and expected performance.

1667 V18/023603

Less Than 90 Day Storage Training Plan for the 103-B, 1701-BA, and 1714-C Buildings

Snider, P.M.

Bechtel Hanford, Inc., Richland, WA

BHI-00842; 15 pp. (October 1996)

The 103-B, 1701-BA, and 1714-C Less Than 90 Day Storage Area stores characteristic wastes generated in the demolition of the 103-B, 1701-BA, and 1714-C Complex. Wastes (lead-based painted components) are packaged and stored in vendor shipment containers. This is the Environmental Restoration Contractor team training plan for the 103-B, 1701-BA, and 1714-C subgrade demolition Less Than 90 Day Storage of Hazardous Waste. This document is intended to meet the requirements of Washington Administrative Code 173-303-330 and the Hanford Dangerous Waste Permit. Training unrelated to compliance with WAC 173-303-330 is not addressed in this training plan. WAC 173-303-330(1)(d)(2, 5, 6) requires that personnel be familiarized, where applicable, with waste feed cut-off systems, response to groundwater contamination incidents, and shutdown of operations. These are not applicable to 103-B, 1701-BA, and 1714-C Subgrade Demolition Less Than 90 Day Storage, and therefore are not covered in this training plan.

1668 V18/021543

Radiological Characterization Survey Methodology and Sampling and Analysis Strategy for the 104-B-1 Tritium Vault and 104-B-2 Tritium Laboratory

Harris, R.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00810; 25 pp. (May 1996)

This document describes the radiological characterization survey and sample collection and sample analysis for the 104-B-1 Tritium Vault and 104-B-2 Tritium Laboratory. The analytical data will be used to identify the radiological contamination and presence of hazardous materials to allow for disposal of the demolition debris.

1669

V18/022587

Example of a Dose Assessment for the Unrestricted Release of Material with Small Amounts of Volumetric Radioactive Contamination

Ottley, D.B.; Rittmann, P.D.; Bratvold, T.E.

Westinghouse Hanford Company, Richland, WA

CONF-9607135; Proceedings of the 41st Annual Meeting of the Health Physics Society, Seattle, WA, July 21-25, 1996; Health Physics 70(6):3a (June 1996)

The Hanford 105 K Reactor Basin and Transfer Area roofing material unintentionally became slightly contaminated through unfiltered building roof exhausters. Rain water carried surface contamination through cracks in the aged roof to the underlying fibrous material. This process resulted in volumetric contamination of the roof. Each roof was sectioned into sampling areas depending on the potential for contamination and to perform as low as reasonably achievable (ALARA) analyses. The principal radionuclides of concern are Cs-137 and Sr-90/Y-90. The Westinghouse Hanford Company (WHC) volumetric release criteria for these radionuclides is 0.37 Bq/g (10 pCi/g). Areas of the roof exceeding this release limit had a concentration, as determined by gamma spectroscopy, of 0.63 Bq/g (17 pCi/g). Sr-90/Y-90 concentrations were conservatively assumed to be the same as Cs-137 based on characterization studies. Trace amounts of Am-241 and CO-60 were also detected in a few areas. A dose assessment to determine potential impacts of this unrestricted material release was performed using the computer code RESRAD. The resultant dose was less than 10 nSv/y (0.001 mrem/y). A cost/benefit analysis indicated a \$17,000,000 per person-Sv (\$170,000 per person-rem) averted savings which meets the ALARA criteria. A savings of \$350,000 will be realized by the unrestricted release and burial of this material in the radiologically clean Hanford Central Landfill. The approval for this release came from DOE-HQ in accordance with DOE Order 5400.5 and was the first to be received by WHC.

1670

V18/022167

Construction Close-Out Report for 1100-EM-1, 1100-EM-2, and 1100-EM-3 Operable Units, Hanford, Washington

Bechtel Hanford, Inc., Richland, WA

DOE/RL-95-80; 32 pp. (April 1996)

This report provides summary descriptions of waste sites, remedial investigations, cleanup actions, and revegetation, as well as other information about the 1100 Area at the Hanford Site, in Richland, Washington. The intent is to provide the documentation necessary for the close-out of remedial work in the 1100 Area and for the delisting from the National Priorities List (NPL). The content and format of this report follows the U.S. Environmental Protection Agency (EPA) guidance.

1671

V18/021569

Geophysical Investigations in the Group II Sites 100-D Area

Bergstrom, K.A.; Mitchell, T.H.

Bechtel Hanford, Inc., Richland, WA

BHI-00786; 68 pp. (May 1996)

This document contains the results of a geophysical investigation of nine Group II sites: (1) 116-D-7 and 116-DR-9 Retention Basins, (2) 116-DR-1 and 116-DR-2 Liquid Effluent Trenches, and (3) 107-D-1, 107-D-2, 107-D-3, 107-D-4, and 107-D-5 Sludge trenches. All nine sites were directly associated with the operation of the retention basins which are located in the 100-DR-1 Operable Unit. An area south of 116-D-7 was also investigated as an area that may have contained buried debris. The objectives of this investigation include: (1) locate, map, and/or verify locations of subsurface pipelines and utilities; (2) locate and map five sludge disposal trenches; (3) map the extent of 116-DR-1 and 116-DR-2 liquid disposal trenches; and (4) locate and accurately map any unknown features (e.g., major concentration of debris, pipelines, and utilities) that could be a factor during subsurface remediation work.

1672 V18/023451

Site Specific Waste Management Instruction for the 116-F-4 Soil Storage Unit

Hopkins, G.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00889; 22 pp. (August 1996)

This Site Specific Waste Management Instruction provides guidance for management of waste generated during the excavation and remediation of soil and debris from the 116-4 soil storage unit located at the Hanford Site in Richland, Washington. This document outlines the waste management practices that will be performed in the field to implement federal, state, and US Department of Energy requirements.

1673 V18/023594

Work Plan for the Retrieval of Contaminated Soil from the 116-F-4 Soil Storage Unit

Ludowise, J.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00868; 51 pp. (July 1996)

The 116-F-4 pluto crib was excavated in 1993 as a treatability test to study field radionuclide analysis and dust control techniques. Approximately 410 cu m (540 cu yd) of contaminated soil was removed from the crib and stored in a modular soil storage unit in the southwest corner of the 105-F exclusion area. In 1996, the waste will be retrieved from the storage unit and the storage unit will be dismantled. The waste and dismantled storage unit will be loaded and transported to the Environmental Restoration Disposal Facility. The purpose of this work plan is to provide guidance for retrieval and disposal of the 116-F-4 pluto crib contaminated soil and associated storage unit.

1674 V18/025519

1301-N and 1325-N Liquid Waste Disposal Facilities Limited Field Investigation Report

Sykes, K.L.

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-11; 475 pp. (December 1996)

This report summarizes the results of the 1301-N and 1325-N Liquid Waste Disposal Facility limited field investigation (LFI) and qualitative risk assessment to meet the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) Milestone M-15-12A. The purposes of this LFI project were to supplement previous field investigations, verify historical information, and provide the necessary information to the Washington State Department of Ecology, U.S. Environmental Protection Agency, and the U.S. Department of Energy so they can address the following two objectives: determine if immediate action on soil at 1301-N and/or 1325-N is required to protect groundwater and determine if, for the long-term, soil remediation is required to protect groundwater from a future potential impact, and, if so, when remediation should be performed.

1675 V18/021453

Description of Work for Vadose Zone Characterization of the 1301-N and 1325-N Liquid Waste Disposal Facilities [Rev. 1]

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-94-104 (Rev. 1); 30 pp. (December 1995)

This description of work details the field activities associated with a limited field investigation (LFI) of soil contamination beneath the 1301-N and 1325-N Liquid Waste Disposal Facilities (LWDFs), and will serve as a field guide for those performing the work. These field activities will provide data for the evaluation of remedial alternatives, and to confirm that the 1301-N and 1325-N LWDFs are high-priority sites. In addition, the data will be used to verify and refine the facility conceptual models and evaluate the potential for an impact to groundwater resulting from drainage of residual crib/trench effluent and leaching of contaminants beneath the facilities. Three vadose zone boreholes will be drilled to investigate the distribution of radionuclides, metal contaminants, and moisture in the soil column beneath the LWDFs. This document contains the following descriptive information: site background and general subsurface conditions; safety and health general requirements; soil screening, drillings, soil sampling and geophysical logging field activities; quality assurance/quality control requirements; and scheduling information.

1676 V18/023447

Engineering Evaluation/Cost Analysis for Disposal of Structural Concrete and Soil from the 183-H Solar Evaporation Basin

Badden, J.W.; Miller, L.R.

Bechtel Hanford, Inc., Richland, WA

BHI-00872; 26 pp. (August 1996)

This engineering evaluation/cost analysis (EE/CA) is intended to aid the US Department of Energy, Richland Operations Office in selecting a preferred response action alternative for removing contaminated structural concrete and soils stockpiled next to the 183-H evaporation basin. It was conducted under the Resource Conservation and Recovery Act of 1976. This EE/CA evaluates possible alternative response actions and documents the decision

making process.

1677 V18/020671

Groundwater Monitoring Plan for the 183-H Solar Evaporation Basins

Hartman, M.J.

Westinghouse Hanford Company, Richland, WA

WHC-SD-EN-AP-180; 93 pp. (September 28, 1995)

Groundwater monitoring at the 183-H Solar Evaporation Basins is regulated under Washington Administrative Code (WAC) 173-303-645. This document proposes a final-status, compliance monitoring program for the site. The monitoring network consists of eight existing wells: H4-6 and H3-2A (upgradient), H4-3, H4-4, H4-9, H4-12A, H4-18, and H4-12C (downgradient). Well H4-12C is completed at the base of the unconfined aquifer; the other wells are screened at the water table. Concentration limits are identified for 4 contaminants of concern: chromium (122 ppb), nitrate (45,000 ppb), technetium-99 (900 pCi/L), and uranium (20 [mu]g/L). The limit for chromium was based on background concentrations because there are upgradient sources of chromium. The limits for the other constituents are maximum contaminant levels or drinking water standards. A set of four independent groundwater samples will be collected from each well semiannually. Samples will be analyzed for the following: the constituents of concern (i.e., nitrate, chromium, uranium, and technetium-99); additional constituents to aid data interpretation (alkalinity, anions, and metals); field parameters routinely acquired at the well head (e.g., pH, conductivity, turbidity, and temperature). The tolerance-interval approach is the recommended statistical method. If concentration limits are exceeded, confirmation samples will be collected to reduce the chance of a false positive.

1678 V18/025328

RCRA Closure of a Permitted Mixed Waste Unit and Contaminated Soil: A Cooperative Effort Between the U.S. Department of Energy, the Environmental Restoration Contractors, and the State of Washington

Badden, J.W.; Miller, R.; Mihalic, M.A.

CH2M Hill Hanford, Inc., Richland, WA; Bechtel Hanford, Inc., Richland, WA

CONF-970335; Waste Management '97: Working Towards a Cleaner Environment, Proceedings of a Conference on HLW, LLW, Mixed Wastes and Environmental Restoration, Tucson, AZ, March 2-6, 1997; (8 pp.) (1997)

Cooperative teaming between the State of Washington of Ecology (Ecology), the U.S. Department of Energy, Richland Operations Office (RL), and its Environmental Restoration Contractor (ERC) resulted in the successful closure of a mixed waste unit and associated contaminated soil at the Hanford Site. Success was measured by the achievement of large cost savings, waste minimization, and timely closure of the unit. Regulatory obstacles were significant. The 183-H Solar Evaporation Basins (183-H) were used for storage and evaporation of large volumes of radiological process waste waters. The basins also received small quantities of RCRA listed wastes which defined the entire volume of process wastewaters as listed waste. Leakage from 183-H caused large areas

of underlying soils and groundwater to be contaminated by these listed chemical and radiological constituents. After removal and storage of the remaining mixed waste liquid and sludge from 183-H, decisions were needed on the disposition of the large volumes of listed soil and structural concrete. To avoid high disposal costs associated with permitted mixed waste landfills, a regulatory strategy was developed to remove the listed waste designation from the concrete and soil. Disposal costs were further reduced by regulatory approval of concrete and soil disposal in a landfill permitted to accept only CERCLA waste. During soil removal it was discovered that contamination went deeper than earlier characterization information indicated. A decision was made between RL, the ERC, and Ecology to integrate remaining RCRA postclosure actions on deep soil and groundwater contamination to remedial actions associated with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) operable unit. This decision avoided unnecessary and costly landfill closure options. This project provided evidence that the RCRA regulations can allow closure of a complex unit in a protective manner while avoiding unnecessary and costly actions.

1679 V18/023427

200 Areas Soil Remediation Strategy - Environmental Restoration Program

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-67; 51 pp. (September 1996)

The remediation and waste management activities in the 200 Areas of the Hanford Site (located in Richland, Washington) currently range from remediating groundwater, remediating source units (contaminated soils), decontaminating and decommissioning of buildings and structures, maintaining facilities, managing transuranic, low-level and mixed waste, and operating tank farms that store high-level waste. This strategy focuses on the assessment and remediation of soil that resulted from the discharge of liquids and solids from processing facilities to the ground (e.g., ponds, ditches, cribs, burial grounds) in the 200 Areas and addresses only those waste sites assigned to the Environmental Restoration Program.

1680 V18/021561

Focused Feasibility Study of Engineered Barriers for Waste Management Units in the 200 Areas

Bechtel Hanford, Inc., Richland, WA

DOE/RL-93-33; 245 pp. (May 1996)

The 200 Areas of the Hanford Site are included on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. Under the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) ten aggregate area management studies were prepared for the 200 Areas in support of RI/FS activities. The aggregate areas management studies recommended that focused feasibility studies (FFS) be performed for those alternatives that have broad application and are considered viable from effectiveness, implementability, and cost standpoints. One particular alternative recommended for study is remediation with surface barriers. This FFS was undertaken based on that recommendation. It evaluates four conceptual barrier designs for different types of waste sites. The Hanford Barrier, the Modified RCRA Subtitle C Barrier, and the

Modified RCRA Subtitle D Barrier are considered baseline designs for particular types of waste sites for the purpose of the FFS evaluation. The Standard RCRA Subtitle C Barrier is also evaluated. Design criteria were determined by screening against regulatory criteria and recognized design standards. The four designs were evaluated against the design criteria and against CERCLA evaluation criteria. Proposed implementation logic for barrier evaluation is presented in a flow chart.

1681 V18/025524

RCRA Corrective Measure Study for the 200-PO-1 Operable Unit

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-66; 107 pp. (December 1997)

This Resource Conservation and Recovery Act of 1976 (RCRA) corrective measures study (CMS) report supports the RCRA Facility Investigation process for the 200-PO-1 Groundwater Operable Unit in the 200 East Area of the Hanford Site, located in Richland, Washington. This CMS evaluates the need for interim actions and potential corrective measure that could be used should interim actions be necessary. An evaluation of final actions would be coordinated with evaluations of actions at the source operable unit. This CMS identifies, screens, and develops potential corrective measures alternatives for three major contaminant plumes associated with a single RCRA treatment, storage, or disposal unit and not with the remainder of the operable unit evaluated.

1682 V18/024263

RCRA Facility Investigation Report for the 200-PO-1 Operable Unit

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-95-100; 238 pp. (July 1996)

Contaminants present in the 200-PO-1 Groundwater Operable Unit in the 200 East Area of the Hanford Site originated from historical liquid waste disposal during operations of the Plutonium/Uranium Extraction (PUREX) Plant and the B Plant in the 200 East Area. The liquid discharges are a product of chemical processing activities which resulted in disposal of radionuclides, heavy metals, and organic solvents directly to the soil column via cribs, trenches, and ponds. Due to the volume of liquids disposed and the physical and chemical characteristics of specific constituents present in the waste stream, some of the constituents have impacted the groundwater in the 200 East Area. The unconfined aquifer is encountered approximately 60 to 90 m (200 to 300 ft) bgs. A number of disposal events discharged enough liquid to the vadose zone such that contaminants were readily mobilized to the groundwater. Contaminants remaining in the vadose zone are not as likely to undergo additional mobilization since current annual precipitation is only approximately 6 in./year.

1683 V18/021540

Design, Operations, and Maintenance of the Soil Vapor Extraction Systems for the 200 West Area Carbon Tetrachloride Expedited Response Action

Tranbarger, R.K.

Bechtel Hanford, Inc., Richland, WA

BHI-00395; 32 pp. (May 1996)

This report provides the design, operating, and maintenance guidelines for the soil vapor extraction (SVE) systems implemented as part of the 200 West Area Carbon Tetrachloride Expedited Response Action (ERA). Additionally, this document provides general information regarding the ERA, the SVE system design, and the general approach towards soil vapor extraction. The remaining content of this document includes the following: regulatory compliance; summary of vadose zone physical and containment characteristics; past and present SVE system designs and potential design upgrades; general design and monitoring considerations for the SVE systems; descriptions of the SVE system components and their respective functions; safety requirements; operation of the SVE systems including startup, surveillances, shutdown, GAC canister changeouts, and wellfield characterization; monitoring requirements; SVE optimization; and instrument calibrations, preventive maintenance, and spare parts and site inventory requirements.

1684 V18/024255

Environmental Assessment for the Salvage/Demolition of 200 West Area, 200 East Area, and 300 Area Steam Plants

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/EA-1177; 58 pp. (October 1996)

This environmental assessment has been prepared to assess potential environmental impacts associated with the US Department of Energy's proposed action: the salvage/demolition of the 200 West Area, 200 East Area, and 300 Area Steam Plants and steam distribution piping. Impact information will be used by the US Department of Energy, Richland Operations Office Manager, to determine if the proposed action is a major federal action significantly affecting the quality of the human environment. If the proposed action is determined to be major and significant, an environmental impact statement will be prepared. If the proposed action is determined not to be major and significant, a Finding of No Significant Impact (FONSI) will be issued and the action can proceed. The proposed action involves the salvage and demolition of the 200 West Area, 200 East Area, and 300 Area steam plants and their associated steam distribution piping, equipment, and ancillary facilities. Activities include the salvaging and recycling of all materials, wastes, and equipment where feasible, with waste minimization efforts utilized.

1685 V18/020758

Engineering Evaluation/Conceptual Plan for the 200-UP-1 Groundwater Operable Unit Interim Remedial Measure

Bechtel Hanford, Inc., Richland, WA

BHI-00187-Rev.1; 54 pp. (March 1996)

This report presents an engineering evaluation and conceptual plan for an interim remedial measure (IRM) to address a uranium and technetium-99 groundwater plume in the 200-UP-1 Groundwater Operable Units located in the 200 West Area of the Hanford Site.

This report provides information regarding the need for an IRM and its potential achievable objectives and goals. The report also evaluates alternatives to contain elevated concentrations of uranium and technetium-99 and to obtain information necessary to develop final remedial actions for the operable unit.

1686 V18/023446

200-ZP-1 Interim Remedial Measure (IRM) - Phase 2 and 3: Remedial Design Report [Rev. 1]

Bechtel Hanford, Inc., Richland, WA

DOE/RL-96-07 (Rev. 1); 93 pp. (July 1996)

This 200-ZP-1 remedial design report presents the objectives and rationale developed for the design and implementation of the selected interim remedial measure (IRM) for the 200-ZP-1 Operable Unit, located in the 200 West Area of the Hanford Site. The IRM was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986, the Hanford Federal Facility Agreement and Consent Order (also known as the Tri-party Agreement), and the National Oil and Hazardous Substance Pollution Contingency Plan.

1687 V18/025412

200-ZP-1 Phase Interim Remedial Measure: Quarterly Report - October-December 1996

Buckmaster, M.A.; Ford, B.H.; McMahon, W.J.; Strobe, S.A.; Swanson, L.C.

Bechtel Hanford, Inc., Richland, WA

BHI-00952-02; 76 pp. (March 1997)

A groundwater pump-and-treat system is being operated at the 200-ZP-1 Operable Unit under authority of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement). The purpose of the pump-and-treat system is to: (1) minimize further migration of the high-concentration portion of the carbon tetrachloride plume and the co-contaminants chloroform and trichloroethylene in the 200-ZP-1 Operable Unit and (2) provide data to evaluate final remedy selection. This report summarizes and evaluates treatment, hydraulic, and hydrochemistry data collected for the 200-ZP-1 interim remedial measure (IRM) from October through December 1996. Section 2.0 discusses treatment system performance, Section 3.0 discusses the hydraulic contaminant response of the aquifer, and Section 4.0 provides a list of the references used to compile this quarterly report.

1688 V18/023015

218-W-8 and 218-E-7 Vaults Regrading and Reposting Final Report

Hayward, W.M.

Bechtel Hanford, Inc., Richland, WA

BHI-00881; 11 pp. (July 1996)

This report describes the remediation activities performed to stabilize the surface contamination in the soil near the 218-W-8 Vaults, which are located in the 200 West Area at the Hanford Site in Richland, Washington. The 218-E-7 and 218-W-8 Vaults are of identical construction. The vaults received laboratory process

sample waste from the 222-T Building in 1945 through 1952.

1689 V18/021558

200-BP-5 Operable Unit Treatability Test Report

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-96-59; 411 pp. (April 1996)

The 200-BP-5 Operable Unit was established in response to recommendations presented in the 200 East Groundwater Aggregate Area Management Study Report (AAMSR). Recognizing different approaches to remediation, the groundwater AAMSR recommended separating groundwater from source and vadose zone operable units and subdividing 200 East Area groundwater into two operable units. The division between the 200-BP-5 and 200-PO-1 Operable Units was based principally on source operable unit boundaries and distribution of groundwater plumes derived from either B Plant or Plutonium/Uranium Extraction (PUREX) Plant liquid waste disposal sites.

1690 V18/021557

Preliminary Engineering Assessment of Treatment Alternatives for Groundwater from the Hanford 200 Area 200-BP-5 Plumes

Bechtel Hanford, Inc., Richland, WA

BHI-00456; 51 pp. (May 1996)

This report presents the results of the Preliminary Engineering Assessment of Treatment Alternatives (PEATA), an engineering evaluation of potential treatment alternatives for groundwater extracted from the 200-BP-5 Area's 216-BY Cribs and 216-B-5 Reverse Well plumes. The primary objective of the PEATA was to identify treatment technologies that are worth further consideration (i.e., treatability testing or a more refined engineering evaluation). It will also provide a basis for evaluating the results of the treatability testing that is currently being conducted on the presumptive remedy of ion exchange with disposal of spent resin and will serve as a guide for selection of other technologies for additional testing. Because there are little data or past experience with groundwater similar to the BY-Crib and B-5 Reverse Well Plumes, treatment efficiencies cannot be predicted with certainty and rigorous treatment system designs and costs cannot be developed. This applies to all alternatives, including the presumptive remedy of ion exchange. The approach for this study was to develop conceptual designs and approximate costs for the treatment technologies that were most likely to be effective on the BY-Crib and B-5 Reverse Well groundwater.

1691 V18/023012

Results of the Groundwater Quality Assessment Program at the 216-A-29 Ditch RCRA Facility

Votava, J.M.

Westinghouse Hanford Company, Richland, WA

WHC-SD-EN-EV-032; 62 pp. (October 23, 1995)

This report presents the findings of the groundwater quality assessment program for the 216-A-29 Ditch. The information presented in this report indicates that the Ditch has affected the

quality of the groundwater in the unconfined aquifer beneath the facility. The results indicate that the 216-A-29 Ditch is the source of elevated specific conductance in well 299-E25-35 and that the source is nonhazardous. This report describes the current monitoring status of the 216-A-29 Ditch, groundwater chemical data interpretation, and recommends the reinstatement of an indicator-evaluation monitoring program in accordance with 40 CFR 265.93(d)(6).

1692 V18/021215

Decommissioning of the 216-B-3 Effluent Disposal Pond
Smith, D.L.

Bechtel Hanford, Inc., Richland, WA

BHI-00802; 18 pp. (February 1996)

The decommissioning of the 216-B-3 pond had to be compatible with future remediation activities at the pond. The 216-B-3 pond had received RCRA and Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)-regulated waste. However, remediation of the site may not occur for many years because of an overall strategy to concentrate on other higher priority waste sites at the Hanford Site. Therefore, there would be an undetermined length of time between decommissioning and final remediation during which the pond would sit idle. The Hanford Site is in an arid area with only 18 cm of precipitation annually. The potential for waste to move downward in the soil column after the pond was decommissioned was small. However, once the bottom sediments have been exposed, mechanical and biotic transport of the waste would be possible. The main objective of the decommissioning was to place the pond in a configuration that would minimize biotic and wind-driven contamination from the site between the period of decommissioning and remediation. The second objective was to minimize the impacts to characterization and final remediation of the pond resulting from decommissioning of the site.

1693 V18/023044

Engineering Evaluation/Cost Analysis for the 233-S Plutonium Concentration Facility

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/RL-96-93; 90 pp. (January 1997)

Plutonium contamination is the hazardous substance of concern in the 233-S Plutonium Finishing Facility. Contamination spread is a characteristic of the history of the building since it has been a surplus facility. Migration of the plutonium contamination has been found on the outside of the facility and has required decontamination and stabilization in past years. It is reasonable to assume that because of the inherent nature to emit particles, contamination will continue a slow migration until the residual inventory is removed and safely disposed. The quantity of residual plutonium, the dispersible nature of the material, and the fissile potential are characteristics of a hazard category 2, nuclear facility. The hazard associated with the three removal alternatives can be controlled using known and previously demonstrated procedures and technologies. During the remedial design phase, detailed work plans will be developed based on the suspected and known hazards related to the 233-S Plutonium Concentration Facility and the selected

removal action. Safety and health requirements that are identified in the text of this EE/CA and subsequent action memorandum will be implemented in the plans and procedures of the remedial design report and subsequent work procedures. Programmatic safety and health requirements will be provided by compliance with appropriate procedures and management system. The combination of specific requirements implemented from the selected ARARs and standards to be considered and the safety management system will ensure no undue risk is incurred in the selected removal action.

1694 V18/023009

T Plant Secondary Containment and Leak Detection Upgrades

Carlson, T.A.

Westinghouse Hanford Company, Richland, WA

WHC-SD-W259-ER-001; 146 pp. (October 19, 1995)

The W-259 project will provide upgrades to the 2706-T/TA Facility to comply with Federal and State of Washington environmental regulations for secondary containment and leak detection. The project provides decontamination activities supporting the environmental restoration mission and waste management operations on the Hanford Site.

1695 V18/021221

Superfund Record of Decision (EPA Region 10): Hanford 300 Area (USDOE), 300-FF-1 and 300-FF-5 Operable Units, Benton County, WA, July 17, 1996

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC

EPA/ROD/R10-96/143; 84 pp. (August 1996)

The decision document presents the selected final remedial and interim remedial actions for portions of the U.S. DOE Hanford 300 Area, Hanford Site, Benton County, Washington. The ROD addresses actual or threatened releases from the waste sites in the 300-FF-1 Operable Unit and the groundwater in the 300-FF-5 Operable Unit. The third operable unit (300-FF-2) consists of the remaining waste sites in the 300 Area NPL site and any associated groundwater that is not part of 300-FF-5.

1696 V18/020664

300-FF-1 Operable Unit Predesign Report

Hadley, J.T.

Bechtel Hanford, Inc., Richland, WA

BHI-00713; 31 pp. (January 1996)

The objective of this report is to provide a brief overview of the 300-FF-1 Operable Unit remediation project and package all pertinent project information to effectively transfer the project to the remedial design subcontractor. This is achieved by summarizing the following: site description; Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA) documents; proposed remedy; and general design criteria. The 300-FF-1 Operable Unit is a source/vadose zone operable unit for the northeast portion of the 300 Area near the Columbia River. The 300-FF-1 Operable Unit contains CERCLA sites and a RCRA site.

1697

V18/023429

Mitigation Action Plan for 300-FF-1 Remedial Action

Weiss, S.G.

Bechtel Hanford, Inc., Richland, WA

BHI-00884; 18 pp. (October 1996)

A record of decision was issued (dated July 1996), for remediation of waste sites in the 300-FF-1 Operable Unit in the 300 Area of the Hanford Site. The selected remedies for the 300-FF-1 and 300-FF-5 waste sites include selective excavation and disposal of contaminated soil and debris from the process waste units, excavation and removal of the 618-4 Burial Ground, and institutional controls for groundwater. This mitigation action plan explains how cultural resources will be managed and how revegetation for these remedial activities will be planned.

1698

V18/021466

Sample Activity Report for Cobalt Sampling at the 300-FF-1 South Process Pond

Carlson, R.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00618; 41 pp. (November 1995)

This report has been prepared to summarize the sampling conducted under the Cobalt Sampling Plan for the South Process Pond (SPP). The sampling plan was prepared to support near-term decisions being made with respect to cleanup criteria for cobalt-60 in the SPP within the 300-FF-1 Operable Unit. Statistically based sampling was designed to provide sufficient data to state confidence and error in estimating the mean of cobalt-60 concentrations in the SPP surface soils. Process knowledge and sample data taken in 1987 and 1991 indicate that the major SPP contaminants are cobalt-60 and uranium with some metals at low concentrations. Specifically, the cobalt-60 data indicate the current average concentration of cobalt-60 in the surface soils of the pond as near 8 pCi/g based on eight surface samples. The sampling event was designed to verify the average cobalt-60 concentration by taking enough randomly located samples to make statistical statements regarding the data. Sampling procedures conformed to the requirements established by the Environmental Restoration Contractor Team Environmental Investigations Procedures. The sampling plan called for only four biased samples. During the sampling, additional biased samples were taken to investigate several hot spots in the SPP.

1699

V18/023601

Temporary Septic Holding Tank at the 300-FF-1 Remedial Action Central Support Facility: Engineering Report

Jackson, G.J.

Bechtel Hanford, Inc., Richland, WA

BHI-00925; 30 pp. (September 1996)

The 300-FF-1 Remedial Action Support Facility will be required in the 300 Area (at the Hanford Site in Richland, Washington) to support the remedial actions planned for the 300-FF-1 Operable Unit. In conjunction with this project, soils laden with radiological contamination will be excavated, removed, and transported to a

permitted disposal facility, if required based upon characterization. This facility will be a temporary, modular building sized to provide office and work space for the supervisors, engineers, and technicians assigned to the project and engaged in the associated field work. Electrical and potable water service to the 300-FF-1 Support Facility will be provided via permanent connections to existing systems. A temporary septic system is desired as opposed to connecting to the existing sewer system due to regulatory issues. The paper describes the project location, geology and flooding potential, design criteria, operations, and maintenance.

1700

V18/023582

Category 2 and 4 Investigation-Derived Waste Readiness Evaluation Plan

Ludowise, J.D.

Bechtel Hanford, Inc., Richland, WA

BHI-00919; 13 pp. (August 1996)

This Readiness Evaluation Plan presents the methodology used to assess the readiness for loading investigation-derived waste drums on trucks for transport to the Environmental Restoration Disposal Facility. The scope of this plan includes an assessment of the organizations, procedures, and regulatory approvals necessary for the handling of investigation-derived waste containers and the subsequent transportation of materials to the Environmental Restoration Disposal Facility.

1701

V18/023005

Description of Work for Routine Groundwater Sampling at the Environmental Restoration Disposal Facility

Ford, B.H.

Bechtel Hanford, Inc., Richland, WA

BHI-00873; 26 pp. (September 1996)

This document provides a description of work and field implementation guidance for the routine (post-baseline) groundwater monitoring sampling program at the Environmental Restoration Disposal Facility. The purpose of this program is to (1) meet the intent of the applicable or relevant and appropriate requirements; (2) document baseline groundwater conditions; (3) monitor those conditions for change; and (4) allow for modifications to groundwater sampling if required by the leachate management program.

1702

V18/020756

Geologic Field Inspection of the Sedimentary Sequence at the Environmental Restoration Disposal Facility

Fecht, K.R.; Weekes, D.C.

Bechtel Hanford, Inc., Richland, WA

BHI-00230; 33 pp. (April 1996)

The sedimentary sequence in the Environmental Restoration Disposal Facility (ERDF) excavation was examined during construction to document the geologic features identified during site characterization and to determine if additional engineering measures to the base design would be required. Periodic field inspections were made of vertical exposures created by earth-moving equipment during excavation of the disposal cells. Inspections were also made

of the trench sidewalls in the final excavation. This report presents the results of the field inspections of the sedimentary sequence at the ERDF.

1703 V18/023438

Preoperational Baseline and Site Characterization Report for the Environmental Restoration Disposal Facility: Volume 2 [Rev. 1]

Weekes, D.C.; Ford, B.H.; Jaeger, G.K.

Bechtel Hanford, Inc., Richland, WA

BHI-00270 (Vol. 2, Rev. 1); 626 pp. (September 1996)

This document is Volume 2 in a two-volume series that comprises the site characterization report for the Environmental Restoration Disposal Facility. Volume 1 contains data interpretation and information supporting the conclusions in the main text. This document presents original data in support of Volume 1 of the report. The following types of data are presented: well construction reports; borehole logs; borehole geophysical data; well development and pump installation; survey reports; and preoperational baseline chemical data and aquifer test data. This does not represent the entire body of data available. Other types of information are archived at Bechtel Hanford, Inc. (BHI) Document Control.

1704 V18/023595

Preoperational Baseline and Site Characterization Report for the Environmental Restoration Disposal Facility: Volume 1 [Rev. 1]

Weekes, D.C.; Ford, B.H.; Jaeger, G.K.

Bechtel Hanford, Inc., Richland, WA

BHI-00270 (Vol. 1, Rev. 1); 340 pp. (September 1996)

This site characterization report provides the results of the field data collection activities for the Environmental Restoration Disposal Facility site. Information gathered on the geology, hydrology, ecology, chemistry, and cultural resources of the area is presented. The Environmental Restoration Disposal Facility is located at the Hanford Site in Richland, Washington.

1705 V18/020755

Remedial Action and Waste Disposal Project: ERDF Readiness Evaluation Plan

Casbon, M.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00792; 35 pp. (May 1996)

This Readiness Evaluation Plan presents the methodology used to assess the readiness of the Environmental Restoration and Disposal Facility. The scope of this plan includes and assessment of the facilities, organizations, procedures, and regulatory approvals necessary for the safe startup of the waste transportation to and disposal in the Environmental Restoration and Disposal Facility.

1706 V18/023581

Remedial Action and Waste Disposal Project: Environmental Restoration Disposal Facility (ERDF) Readiness Evaluation Plan [Rev. 1]

Casbon, M.A.

Bechtel Hanford, Inc., Richland, WA

BHI-00792-01; 56 pp. (June 1996)

This Readiness Evaluation Report presents the results of the project readiness evaluation to assess the readiness of the Environmental Restoration Disposal Facility (ERDF). The evaluation was conducted at the conclusion of a series of readiness activities that began in January 1996. These activities included completion of the physical plant; preparation, review, and approval of operating procedures; definition and assembly of the necessary project and operational organizations; and activities leading to regulatory approval of the plant and operating plans.

1707 V18/023596

Safety Analysis for the Environmental Restoration Disposal Facility [Rev. 2]

Oestreich, D.K.; Casbon, M.A.; Kerr, N.R.

Bechtel Hanford, Inc., Richland, WA

BHI-00370 (Rev. 2); 67 pp. (August 1996)

This document provides the auditable safety analysis that includes the Final Hazard Classification for the Environmental Restoration Disposal Facility (ERDF). The ERDF is located in the 600 Area between the 200 East and 200 West Areas on the Hanford Site. The ERDF will serve as the disposal site for radioactive, hazardous/dangerous, and mixed waste that is excavated during waste management/site remediation in the Hanford Site's 100, 200, and 300 Areas.

1708 V18/022720

Degradation of Transuranic Waste Drums in Underground Storage at the Hanford Site

Duncan, D.R.; Demiter, J.A.; DeRosa, D.C.

Westinghouse Hanford Company, Richland, WA

CONF-960804 (Vol. 1); Spectrum '96: Nuclear and Hazardous Waste Management, Proceedings of an International Topical Meeting, Seattle, WA, August 18-23, 1996. American Nuclear Society, La Grange Park, IL, Vol. 1, 887 pp.; (pp. 229-233) (1996)

In situ inspections were performed on tarp-covered 55-gallons drums of transuranic (TRU) waste stored underground at the Hanford Site. These inspections were part of a task to characterize TRU drums for extent of corrosion degradation and uncertainty in TRU designation (inaccuracy in earlier assay determinations may have led to drums that actually were low-level waste to be termed TRU), and to attempt to correlate accuracy of existing records with actual drum contents. Two separate storage trench sites were investigated; a total of 90 drums were inspected with ultrasonic techniques and 104 additional drums were visually inspected. A high-humidity environment in the underground storage trenches had been reported in earlier investigations and was expected to result in substantial corrosion degradation. However, corrosion was much less than expected. Only a small percentage of drums had significant corrosion (with one breach) and the maximum rate was estimated at 0.051 mm/yr (2 mils/yr). The corrosion time of underground exposure was 14 to 15 years. These inspection results should be applicable to other similar environments (this applicability should

be restricted to arid climates such as the Hanford Site) where drums are stored underground but shielded from direct soil contact by a tarp or other means. Soil contact would lead to more rapid corrosion.

1709 V18/020761

Preliminary Hazard Classification for N-Basin Intrusive Activities

Larson, A.R.; Smith, R.I.

Bechtel Hanford, Inc., Richland, WA

BHI-00856; 24 pp. (May 1996)

This document defines the inventory of both radioactive and hazardous materials in the N Basin Segment to establish a preliminary hazard classification for the N Basin intrusive activities effort. This document uses the methodology as outlined in DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports". The preliminary hazard classification for the N Basin Segment intrusion activities is Category 3.

1710 V18/022088

Stabilization of the N Reactor Fuel Storage Basin

Schilperoot, D.L.; Gallivan, S.M.

Bechtel Hanford, Inc., Richland, WA; Columbia Energy & Environmental Services, Inc., Richland, WA

CONF-941148 (Vol. 2); DDER-94: Decommissioning, Decontamination, and Environmental Restoration at Contaminated Nuclear Sites, M.G. White (ed.), Proceedings of an Embedded Topical Symposium of the American Nuclear Society Winter Meeting, Washington, DC, November 13-18, 1994. American Nuclear Society, Inc., La Grange Park, IL, Vol. 2, 241 pp.; (pp. 374-378) (1994)

An overview of the N Reactor Fuel Storage Basin Stabilization Project is presented. Project scope, permitting, ALARA planning, equipment, and waste issues are discussed. The project is divided into three phases: Phase I involves the removal of all solid materials from the basin, including hardware, debris, and sediment, and the inspection for suspect fuel chips; Phase II involves the removal of basin water; Phase III involves the stabilization of basin surfaces using a sealant or fixative. A key system developed for the project is the Remotely Operated Sediment Extraction Equipment (ROSEE) System, which will be used to remove sediments from the basin floor. All basin hardware, debris, sediments, and water will be disposed of prior to project closeout. Upon completion of the project, the basin will be left in a dry and stable condition while awaiting future decommissioning activities.

1711 V18/025525

Borehole Data Package for Well 699-37-47a: Purex Plant Cribs - CY 1996

Lindberg, J.W.; Williams, B.A.; Spane, F.A., Jr.

Pacific Northwest National Laboratory, Richland, WA

PNNL-11515; 202 pp. (February 1997)

A new groundwater monitoring well (699-37-47A) was installed in 1996 as a downgradient well near the PUREX Plant Cribs

Treatment, Storage, and Disposal Facility at Hanford. This document provides data from the well drilling and construction operations, as well as data from subsequent characterization of groundwater and sediment samples collected during the drilling process. The data include: well construction documentation, geologist's borehole logs, results of laboratory analysis of groundwater samples collected during drilling and of physical tests conducted on sediment samples collected during drilling, borehole geophysics, and results of aquifer testing including slug tests and flowmeter analysis. This well (699-37-47A) was constructed in support of the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) milestone M-24-00H and interim milestone M-24-35 and was funded under Project W-152.

1712 V18/021222

Plutonium Finishing Plant (PFP) Stabilization Final Environmental Impact Statement (EIS), Hanford Site, Richland, Benton County, Washington

U.S. Department of Energy, Richland Operations Office, Richland, WA

DOE/EIS-0244F; 557 pp. (May 1996)

This Final EIS is prepared pursuant to the NEPA (42 United States Code 4321 et seq.) and the Council on Environmental Quality implementing procedures (40 Code of Federal Regulations 1500). The continued presence of relatively large quantities of chemically reactive materials in their present form and location within the PFP Facility poses an unacceptable long-term risk. The purpose of this action is to expeditiously and safely reduce radiation exposure to workers and the risk to the environment. The preferred alternative for resolution of the safety issue is removal of readily retrievable plutonium-bearing material in hold-up at the PFP Facility and stabilization of these and other plutonium-bearing materials at the PFP Facility through the following four treatment processes: (1) ion exchange, vertical calcination, and thermal stabilization of plutonium-bearing solutions; (2) thermal stabilization using a continuous furnace for oxides, fluorides, and process residues; (3) repackaging of metals and alloys; and (4) pyrolysis of polycubes and combustibles.

1713 V18/022224

Plutonium Vulnerability Issues at Hanford's Plutonium Finishing Plant

Feldt, E.; Templeton, D.W.; Tholen, E.

U.S. Department of Energy, Office of Environmental Management, Washington, DC; U.S. Department of Energy, Richland Operations Office, Richland, WA; Science Applications International Corporation, Energy Systems Group, Washington, DC

CONF-951139 (Vol. 2); Superfund 16: Proceedings of a Hazardous Waste Conference and Exhibition, Washington, DC, November 6-8, 1995. E.J. Krause and Associates, Bethesda, MD, Vol. 2, 817 pp.; (pp. 1312-1318) (1994)

The Plutonium Finishing Plant (PFP) at the Hanford, Washington Site was operated to produce plutonium (Pu) metal and oxide for national defense purposes. Due to the production requirements and methods utilized to meet national needs and the abrupt shutdown of the plant in the late 1980s, the plant was left in a condition that

poses a risk of radiation exposure to plant workers, of accidental radioactive material release to the environment, and of radiation exposure to the public. In early 1994, an Environmental Impact Statement (EIS) to determine the best methods for cleaning out and stabilizing Pu materials in the PFP was started. While the EIS is being prepared, a number of immediate actions have been completed or are underway to significantly reduce the greatest hazards in the PFP. Recently, increased attention has been paid to Pu risks at Department of Energy (DOE) facilities resulting in the Department-wide Plutonium Vulnerability Assessment and a recommendation by the Defense Nuclear Facilities Safety Board (DNFSB) for DOE to develop integrated plans for managing its nuclear materials.

1714 V18/021563

Design Analysis Supporting 101-SY Water Decon System

Cleveland, K.J.

Westinghouse Hanford Company, Richland, WA

WHC-SD-WM-DA-189; 90 pp. (September 5, 1995)

This document contains the results of stress analysis and component sizing for the 101-SY mitigation pump, Water Decon System. Calculations included are a stress analysis of the High Pressure Manifold, the threaded connection on the Yoke Water Connector and a sizing of an air receiver tank.

1715 V18/022169

Johnston Atoll Plutonium Contaminated Soil Cleanup Project: 5th Quarterly Report - 1 August 94 to 31 October 1994

Doane, R.W.; Grant, R.H.

TMA/Eberline, Oak Ridge, TN

DNA-TR-95-102; 302 pp. (September 1996)

Thermo NUTech is the prime contractor for the Defense Nuclear Agency (DNA), responsible for the operation and maintenance of the Johnston Atoll plutonium Contaminated Soil Cleanup Project. During this production period, the Scope of Work included movement of soil to and from the plant, processing contaminated soil through the Segmented Gate System (SGS) and Soil Washing System, packaging of waste soil for shipment, identification and implementation of process improvements, data collection and validation, and compliance with all applicable regulations governing environmental safety and health. The SGS utilizes arrays of sensitive radiation detectors coupled with sophisticated computer software to segregate contaminated soil from a moving feed supply on conveyor belts. Contaminated soil is diverted to a 'hot path' for plutonium particles greater than 5000 Bq or to a supplemental soil washing process designed to remove dispersed low level contamination from a soil fraction consisting of very small particles. Low to intermediate levels of contamination are removed from the soil to meet DNA's criteria for unrestricted use of less than 500 Bq per kilogram of soil, with no hot particles. The low level concentrate is expected to be packaged for shipment to an approved defense waste disposal site.

1716 V18/023002

Johnston Atoll Plutonium Contaminated Soil Cleanup Project: Quarterly Report No. 3 - February 7-April 30, 1994

Doane, R.W.; Grant, R.H.

Thermo Nutech, Oak Ridge, TN

DNA-TR-95-100; 414 pp. (November 1996)

During this production period, the Scope of Work included movement of soil to and from the plant, processing contaminated soil through the Segmented Gate System (SGS) and Soil Washing System, packaging of waste soil for shipment, identification and implementation of process improvements, data collection and validation, and compliance with all applicable regulations governing environmental safety and health. The SGS utilizes arrays of sensitive radiation detectors coupled with sophisticated computer software to segregate contaminated soil from a moving feed supply on conveyor belts. Contaminated soil is diverted to a 'hot' path for plutonium particles greater than 5000 Becquerels or to a supplemental soil washing process designed to remove dispersed low level contamination from a soil fraction consisting of very small particles. Low to intermediate levels of contamination are removed from the soil to meet criteria for unrestricted use of less than 500 Becquerels per kilogram of soil, with no 'hot' particles.

1717 V18/024256

Parameter Study of the Two-Phase Groundwater Transport in the Soil Surrounding a Growing Hemispherical Insitu Vitrification Melt

Schreiber, W.C.; Lowery, P.S.; Roberts, J.S.

University of Alabama, Department of Mechanical Engineering, Tuscaloosa, AL; Pacific Northwest Laboratory, Richland, WA

CONF-961105 (Vol. 4); Proceedings of an American Society of Mechanical Engineers (ASME) Heat Transfer Division 1996 International Mechanical Engineering Congress and Exhibition: Natural Convection Within a Horizontal Circular Cylinder Heated from Below and Cooled from Above, Numerical Methods for Coupled Fluid-Thermal-Structural Interaction, Thermal Analysis in Waste Processing and Disposal, Heat Transfer in Fire and Combustion Systems, D.W. Pepper, R.W. Douglass and J.C. Heinrich (eds.), Atlanta, GA, November 17-22, 1996. ASME, New York, NY, Vol. 4, 443 pp.; (pp. 75-81) (1996)

Numerical simulation is used to test the effect of several parameters on the water balance and pressure field surrounding a growing hemispherical In Situ Vitrification (ISV) melt. In the current project, a hemispherical annulus of unsaturated soil contained between a growing melt and an impervious wall is modeled. Water vapor vents to atmospheric conditions. The soil is considered a porous media; consequently, fluid velocity can be modeled by Darcy's equation. The capillary pressure and relative permeability are modeled using the equations derived by van Genuchten. The computer model employs a grid which adapts to the transient boundary of the growing melt. The parameters considered include: initial liquid saturation, soil permeability, and melt growth rate. The combined effect of capillary pressure and permeability is also studied. The variation of these parameters in a Hanford soil are studied for their effect on pressure history at the melt interface and total liquid mass history. Transport of heat and mass in the soil is

illustrated graphically in terms of the saturation and pressure fields as well as mass flux of liquid and vapor water.

1718

V18/021379

Quarry Water Treatment Plant

U.S. Department of Energy, Oak Ridge Operations Office,
Weldon Spring Site Remedial Action Project, St. Charles,
MO

Informational Bulletin; 6 pp. (July 1995)

The first of several steps in the environmental response action for the Weldon Spring Quarry was to remove and treat the water so that the bulk waste stored in the quarry could be excavated. This Informational Bulletin explains the process of treating the quarry water so that it can be released safely to the Missouri River. The treatment system consists of an equalization basin, a water treatment plant, and two effluent ponds.

1719

V18/023967

Sampling and Analysis Plan for Instream and Storm Event Surface Water for the Upper East Fork Poplar Creek Characterization Area Remedial Investigation at the Oak Ridge Y-12 Plant, Oak Ridge, Tennessee

U.S. Department of Energy, Washington, DC; CDM Federal
Programs Corporation, Oak Ridge, TN

DOE/OR/01-1583&D1; 15 pp. (March 1997)

The purpose of this sampling and analysis plan (SAP) is to provide some of the data necessary to complete the RI and FS. Specifically, the new surface water data generated by implementing this SAP will support the human health and ecological risk assessments and will provide information concerning site-related contamination sources, flow pathways, migration pathways, and exposure points. This SAP describes in detail the plan to sample instream and storm event surface water. The SAP contains purpose and scope, sampling methods and locations, analytical methods and quantification goals, laboratory reporting format requirements, and a schedule. The SAP also contains sections addressing health and safety, best management practices, waste management, and quality assurance and quality control.