RECEIVED

DEC 19 1995

OSTI

Facility Effluent Monitoring Plan for the Waste Receiving and Processing Facility Module 1

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Westinghouse
Hanford Company Richland, Washington

Management and Operations Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

Approved for Public Release

LEGAL DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced from the best available copy.
Available in paper copy and microfiche.

Available to the U.S. Department of Energy
and its contractors from
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831
(615) 576-8401

Available to the public from the U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

Printed in the United States of America

DISCLM-1.CHP (1-91)

Facility Effluent Monitoring Plan for the Waste Receiving and Processing Facility Module 1

C. J. Lewis

Date Published
October 1995

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

**Westinghouse
Hanford Company**

P.O. Box 1970
Richland, Washington

Management and Operations Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

Approved for Public Release

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED *JR*

MASTER

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

RELEASE AUTHORIZATION

Document Number: WHC-EP-0885

Document Title: Facility Effluent Monitoring Plan for the Waste
Receiving and Processing Facility Module 1

Release Date: 10/19/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

October 19, 1995

APPROVAL

Document Title: Facility Effluent Monitoring Plan for the Waste Receiving and Processing Facility Module 1.

Prepared By:

Chris Lewis
C.J. Lewis, Engineer
WRAP 1 Environmental Compliance

10/9/95
Date

Approved By:

R.J. Bortolus
R.J. Bortolus, Manager
WRAP 1 Engineering and Environmental Compliance

10/9/95
Date

Approved By:

L.P. Diediker
L.P. Diediker, Manager
Effluent Monitoring

T.P. Frejo 10/9/95

10-9-95
Date

Approved By:

L.W. Vance
L.W. Vance, Principal Quality Assurance Engineer
Analytical and Environmental Quality Assurance

10/10/95
Date

This page intentionally left blank.

FACILITY EFFLUENT MONITORING PLAN FOR
THE WASTE RECEIVING AND PROCESSING FACILITY MODULE 1

ABSTRACT

A facility effluent monitoring plan is required by the U.S. Department of Energy in Order 5400.1¹ for any operations that involve hazardous materials and radioactive substances that could impact employee or public safety or the environment. This document is prepared using the specific guidelines identified in A Guide for Preparing Hanford Site Facility Effluent Monitoring Plans, WHC-EP-0438². This facility effluent monitoring plan assesses effluent monitoring systems and evaluates whether they are adequate to ensure the public health and safety as specified in applicable federal, state, and local requirements.

This facility effluent monitoring plan shall ensure long-range integrity of the effluent monitoring systems by requiring an update whenever a new process or operation introduces new hazardous materials or significant radioactive materials. This document must be reviewed annually even if there are no operational changes, and it must be updated as a minimum every three years.

¹ General Environmental Protection Program, DOE Order 5400.1, U.S. Department of Energy, Washington, D.C., 1988.

² A guide for Preparing Hanford Site Facility Effluent Monitoring Plans, WHC-EP-0438-1, Westinghouse Hanford Company, Richland, Washington, 1992.

This page intentionally left blank.

TABLE OF CONTENTS

1.0 WASTE RECEIVING AND PROCESSING FACILITY EFFLUENT MONITORING PLAN	1
1.1 INTRODUCTION	1
1.1.1 Policy	1
1.1.2 Purpose	1
1.1.3 Scope	1
1.1.4 Discussion	2
2.0 FACILITY DESCRIPTION	3
2.1 BRIEF FACILITY PHYSICAL DESCRIPTION	3
2.2 BRIEF PROCESS DESCRIPTION	3
2.2.1 Boxed Waste	3
2.2.2 Drummed Waste	3
2.2.2.1 Shipping and Receiving Area	5
2.2.2.2 Nondestructive Examination and Nondestructive Assay Area	6
2.2.2.3 Process Area	7
2.2.2.4 Sample Management Area	8
2.3 IDENTIFICATION AND CHARACTERIZATION OF POTENTIAL SOURCE TERMS	8
3.0 APPLICABLE REGULATIONS	11
3.1 U.S. DEPARTMENT OF ENERGY ORDERS	11
3.1.1 General Environmental Protection Program (DOE Order 5820.2A)	11
3.2 FEDERAL REGULATIONS	11
3.2.1 National Emission Standards for Hazardous Air Pollutants (40 CFR 61)	11
3.2.2 State Operating Permit Program (40 CFR 70)	14
3.2.3 Identification and Listing of Hazardous Waste (40 CFR 261)	14
3.2.4 Designation, Reportable Quantities, and Notification (40 CFR 302)	14
3.3 INDUSTRY STANDARDS UNDER AMERICAN NATIONAL STANDARDS INSTITUTE	15
3.3.1 Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities (ANSI N13.1-1969)	15
3.3.2 Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents (ANSI N42.18-1980)	15
3.4 WASHINGTON STATE REGULATIONS	15
3.4.1 Air Operating Permit Program (WAC 173-401)	15
3.4.2 Ambient Air Quality Standards and Emission Limits For Radionuclides (WAC 173-480)	16
3.4.3 Radiation Protection - Air Emissions (WAC 246-247)	16
3.4.4 Water Quality Standards for Groundwater (WAC 173-200)	16
3.4.5 State Waste Discharge Permit Program (WAC 173-216)	16

3.4.6	Dangerous Waste Regulations (WAC 173-303)	16
3.5	LOCAL REGULATIONS	17
3.5.1	Benton County Air Pollution Control Authority (80-7)	17
3.6	AIR EMISSIONS	17
3.7	LIQUID EFFLUENTS	18
4.0	IDENTIFICATION AND CHARACTERIZATION OF EFFLUENT STREAMS	19
4.1	IDENTIFICATION AND CHARACTERIZATION OF SOURCE TERMS CONTRIBUTING TO EACH EFFLUENT STREAM	19
4.1.1	Routine Operating Conditions	20
4.1.2	Upset Operating Condition	21
5.0	EFFLUENT POINT OF DISCHARGE DESCRIPTION	23
5.1	MAIN STACK	23
5.2	LIQUID EFFLUENT DISCHARGE LOCATION	26
5.2.1	TRUPACT Bay Drain Basin	26
5.2.2	Compressor Condensate Drain Basin	26
6.0	EFFLUENT MONITORING/SAMPLING SYSTEM DESIGN CRITERIA	27
6.1	AIRBORNE EFFLUENTS	27
6.1.1	Measurement of Effluent Flow Rate	27
6.1.2	Sample Extraction Probes	28
6.1.3	Sample Transport Lines	28
6.1.4	Record Sampling	28
6.1.5	Continuous Air Monitors	29
7.0	CHARACTERIZATION OF CURRENT EFFLUENT MONITORING SYSTEM	31
7.1	INSTRUMENTATION DESCRIPTION	31
7.1.1	Probe Mounting Features	31
7.1.2	Sample Probes	32
7.1.3	Velocity Probes	32
7.1.4	Temperature Probe	32
7.1.5	Sample Collectors	33
7.1.6	Sample Transport Tubing	33
7.1.7	Continuous Air Monitors	33
7.2	TECHNICAL SPECIFICATIONS PERTAINING TO THE EFFLUENT MONITORING	33
8.0	HISTORICAL MONITORING/SAMPLING DATA FOR EFFLUENT STREAMS	35
9.0	SAMPLE ANALYSIS	37
9.1	ANALYTICAL LABORATORY AND PROCEDURES	37
9.1.1	Record Sample Exchange	37
9.1.2	CAM Filter Exchange	37
9.1.3	Sample Data Examination and Delivery	37
9.1.4	Laboratory Sample Analysis Instructions	37
9.1.5	Laboratory Analysis	38
9.1.6	Laboratory Procedures	38
9.2	SAMPLE AND DATA AND TRACKING	38

9.3	U.S. DEPARTMENT OF ENERGY ANALYTICAL AND LABORATORY GUIDELINES	39
10.0	NOTIFICATIONS AND REPORTING REQUIREMENTS	41
10.1	ENVIRONMENTAL OCCURRENCE	41
10.1.1	Occurrence Identification and Immediate Response . .	41
10.1.2	Occurrence Categorization	41
10.2	PERIODIC ROUTINE EFFLUENT MONITORING REPORTS	42
11.0	INTERFACE WITH THE OPERATIONAL ENVIRONMENTAL SURVEILLANCE PROGRAM .	43
11.1	DESCRIPTION	43
11.2	PURPOSE	43
11.3	BASIS	44
11.4	MEDIA SAMPLED AND ANALYSES PERFORMED	45
11.5	LOCATIONS	45
11.6	PROGRAM REVIEW	46
11.7	SAMPLER DESIGN	46
11.8	COMMUNICATION	46
11.9	REPORTS	46
12.0	QUALITY ASSURANCE	49
12.1	PURPOSE	49
12.2	OBJECTIVE	49
12.3	REQUIREMENTS	49
13.0	INTERNAL AND EXTERNAL PLAN REVIEW	51
14.0	COMPLIANCE ASSESSMENT	53
14.1	296-W-004 MAIN STACK	53
14.1.1	Comparison of Instrument Specifications With Required Standards	53
14.1.2	Comparison of Instrument Specifications With Monitoring Criteria	53
14.1.3	Comparison of Instrument Specifications With Effluent Characteristics	53
15.0	SUMMARY AND CONCLUSIONS	55
16.0	REFERENCES	57

TABLES

2-1	Radioactive Material Potential Source Term (Based on one operational shift per day)	9
2-2	WRAP 1 Estimated Hazardous Material Potential Source Term	10
3-1	Applicable Regulations, Standards, and Permits	12
4-1	WRAP 1 Gaseous and Liquid Effluent Streams	19
5-1	Technical Design Data for the WRAP 1 Exhaust Stack	24
7-1	Monitoring/Sampling Instrumentation Alarm Setpoints and Calibration Guidance for the WRAP 1 Facility.	34
9-1	WRAP 1 Effluent Data Processing Codes	37
9-2	Minimum Quantifiable Concentrations for Specific Radionuclides as Measured in Bi-Weekly Air Samples	38
9-3	Data Analyses and Statistical Treatment	40

FIGURES

2-1	Drum Waste Flow in WRAP 1	5
5-1	Gaseous Effluent Flow Diagram	27

LIST OF TERMS

AED	Aerodynamic Equivalent Diameter
AGV	Automated Guided Vehicle
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
BACT	Best Available Control Technology
BARCT	Best Available Radionuclide Control Technology
CAM	Continuous Air Monitor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CWC	Central Waste Complex
DOE	U.S. Department of Energy
DMS	Data Management System
ECOLOGY	Washington State Department of Ecology
EDE	Effective Dose Equivalent
EDP	Electronic Data Processing
EM	Environmental Monitoring
EMP	Effluent Monitoring Plan
EMS	Environmental Monitoring/Sampling System
EPA	U.S. Environmental Protection Agency
FEMP	Facility Effluent Monitoring Plan
GEA	Gamma Energy Assay
HEPA	High Efficiency Particulate Air
HVAC	Heating, Ventilating, and Air Conditioning
LLW	Low Level Waste
MEI	Maximum Exposed Individual
NDA	Non-Destructive Assay
NDE	Non-Destructive Examination
NESHAPs	National Emissions Standards for Hazardous Air Pollutants
OEMP	Operational Environmental Monitoring Program
PAN	Passive Active Neutron
PCS	Plant Control System
PNL	Pacific Northwest Laboratory
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
RCG	Radioactivity Concentration Guide
RCRA	Resource Conservation and Recovery Act
RL	U.S. Department of Energy, Richland Operations
RQ	Reportable Quantity
TSD	Treatment Storage and Disposal Facility
WAC	Washington Administrative Code
WHC	Westinghouse Hanford Company

This page intentionally left blank.

1.0 WASTE RECEIVING AND PROCESSING FACILITY EFFLUENT MONITORING PLAN

1.1 INTRODUCTION

Since 1970, a large quantity of radioactive solid waste has been produced through out the U.S. Department of Energy (DOE) complex. Until 1988, much of this waste was buried in retrievable storage with the intention of eventually repackaging the waste and sending it to final disposal; this is referred to as retrievable waste. The waste generated after 1988 is referred to as newly generated waste. These are the primary feed streams for the Waste Receiving and Processing Facility Module 1 (WRAP 1). WRAP 1 will receive Low Level Waste (LLW), Transuranic Waste (TRU), Mixed Waste (MW), and TRU Mixed Waste for verification and certification. The purpose of this section is to provide information on the policy, purpose, and scope of the WRAP 1 Facility Effluent Monitoring Plan (FEMP). This section also provides background information on the preparation of the FEMP.

1.1.1 Policy

It is the policy of the DOE and Westinghouse Hanford Company, (WHC) to conduct effluent monitoring to determine whether the public and the environment are adequately protected during DOE operations at the Hanford Site, and whether those operations are in compliance with DOE and other applicable federal, state, and local emission standards and requirements. It is also the policy of DOE and WHC that effluent monitoring programs meet high standards of quality and credibility.

1.1.2 Purpose

The purpose of this FEMP is to assess the magnitude of routine and potential liquid and airborne effluent releases from WRAP 1 to determine the compliance and verify that the effluent monitoring systems and sampling programs meet applicable federal, state, and local regulations. Where potential environmental problems are identified from monitoring, an evaluation is needed to determine if any remedial actions or mitigation measures are required.

1.1.3 Scope

The scope of this document includes program plans for monitoring and characterizing radioactive and nonradioactive hazardous materials discharged in WRAP 1 effluents. This FEMP includes complete documentation for both airborne and liquid effluent monitoring systems that monitor radioactive and nonradioactive hazardous pollutants that could be discharged to the environment under routine and/or upset conditions. This FEMP describes the airborne and liquid effluent paths and the associated sampling and monitoring systems of the WRAP 1 facility.

1.1.4 Discussion

The characterization of the radioactive and nonradioactive constituents in each effluent stream provides the underlying rationale for the sampling and monitoring programs. The method of characterization discussed in this plan identifies potential pollutants at the point of generation and tracks the constituents in effluent streams as they move from their generation point to the point of discharge.

Included is information from the facility effluent monitoring plan determination for the Waste Receiving and Processing Facility Module 1, evaluating whether or not WRAP 1 meets the criteria which requires a FEMP. The determination was made in accordance with a *Guide for Preparing Hanford Site Effluent Monitoring Plans*, WHC-EP-0438-1 (WHC 1992a).

A FEMP is required if the total projected dose from radionuclides exceeds 0.1 mrem/year effective dose equivalent (EDE) for an off site individual. Also, a FEMP is required if any regulated material discharged over a 24-hour period from a facility exceeds 100% of the Reportable Quantity (RQ) as listed in 40 CFR 302.4 or is designated a permitted quantity in Washington Administrative Code (WAC) 173-303-70 through 173-303-103. A FEMP is also required if a liquid effluent is regulated by the National Pollutants Discharge Elimination System (NPDES) and contains radionuclides that will cause any person consuming that effluent to receive an EDE greater than 4.0 mrem/year. DOE orders also require a FEMP evaluation to consider anticipated facility upset conditions.

WRAP 1 will have two liquid effluent discharges. They are required to be permitted under WAC 173-216, *State Waste Discharge Permit Program*. Neither of these streams will exceed the radionuclide dose limits or the regulated materials RQ values, and therefore are not regulated under the NPDES. The facility exhaust stack has been estimated to have the potential to emit greater than 0.1 mrem/year limit set by the National Emissions Standards for Hazardous Air Pollutants (NESHAPs). It is due to this stream that a FEMP is required for the facility. In-depth details of the stack effluent stream and the associated monitoring and sampling systems are included in this FEMP.

2.0 FACILITY DESCRIPTION

2.1 BRIEF FACILITY PHYSICAL DESCRIPTION

The WRAP 1 facility is located in the 200 West area of the Hanford Site, which is situated in the south-central region of Washington State. It is housed in the new 2336-W Building, which will be located south of 23rd Street and west of Dayton Avenue, just north of the Central Waste Complex (CWC). The facility is a metal building consisting of pre-insulated, prefinished metal, interlocking roof and wall sandwich panels. The outside dimensions are approximately 61 meters (200 feet) by 73 meters (240 feet). WRAP 1 will provide waste processing, shipping and receiving, mechanical, electrical, and HVAC rooms, as well as administrative areas all located on the 4,066 m² (43,700 ft²) main floor; with a control room, computer room, and non-radiological HVAC equipment located on the 215 m² (2,300 ft²) second floor.

2.2 BRIEF PROCESS DESCRIPTION

Throughout the 50 years of Hanford operations, large quantities of radioactive solid waste has been produced. The majority of this waste was buried. From 1970 up until 1988, any of this waste designated as TRU waste was buried in retrievable storage. This constitutes the retrievable waste stream for WRAP 1. Due to changing designation requirements for TRU waste, it is estimated that 50% of the retrievable waste will be TRU and/or TRU Mixed and 50% will be LLW and/or MW. All potential TRU generated since 1988 is stored in above ground storage facilities. This waste and any TRU generated in the future is considered newly generated waste. The newly generated waste and the retrievable waste will be the feed streams for WRAP 1.

2.2.1 Boxed Waste

Waste entering WRAP 1, either retrieved or newly generated, will be packaged in drums or boxes. Newly generated TRU Standard Waste Boxes and LLW boxes are received into WRAP 1 for verification and confirmation. The boxes undergo nondestructive examination (NDE) and nondestructive assay (NDA) only. Capabilities are not provided within WRAP 1 to open and sort waste contents in boxes. If non-compliant items or conditions are determined after NDE or NDA, the boxes are returned to the generator or moved to storage elsewhere in the CWC for future processing. Since the boxed waste will not add to the total radioactive or restricted material emissions from WRAP 1, it will not be covered in this document.

2.2.2 Drummed Waste

Both newly generated and retrieved drummed waste can pass through three main areas during processing at WRAP 1. These areas include the shipping/receiving area, NDE and NDA Area, and the actual processing area. See Figure 2-1 for a high level process flow diagram.

2.2.2.1 Shipping and Receiving Area

The shipping and receiving area provides approximately 350 square meters (3,800 square feet) of interim storage for incoming and outgoing waste. Incoming shipments of waste packages arrive daily. Containers and the respective delivery vehicles are visually inspected, the associated paperwork is reviewed and a radiological survey is performed. Any discrepancies noted are resolved either with the shipper and/or generator, flagged for resolution by WRAP 1 operations personnel, or returned to the generator.

Interim storage within the shipping and receiving area is handled by an automated storage and retrieval system. Segregation of the waste occurs within this storage system. Waste is segregated by container type and compatibility. Mixed waste is segregated from waste that is only radioactively contaminated. Processed waste is segregated from unprocessed waste or waste awaiting analytical results. Transuranic waste is segregated from low-level waste. Retrieved waste is segregated from newly generated waste. Along with the administratively controlled placement of containers within the automated storage and retrieval system, containment pallets could be used to segregate the waste containers and to contain any leaks.

Space is provided to accommodate the storage of at least 216 containers. A concrete wall provides shielding around the automated storage and retrieval system for radiological protection of personnel. Space also is provided in the shipping and receiving area for storage of up to eight waste boxes. Container storage locations are recorded on a computerized tracking system, which selects individual containers for processing, to match current process requirements.

Containers shipped from WRAP 1 are examined visually to ensure acceptable condition, proper identification, marking, labeling, and closure. Appropriate marking and labels are selected, filled out, and applied to comply with U.S. Department of Transportation (49 CFR) and Washington State labeling requirements. Each container will be weighed, and radiological surveys will be performed and documented.

Most low-level waste containers are banded four to a pallet and transported by flatbed trucks or enclosed vans to the Low-Level Burial Grounds. Mixed waste and transuranic waste ready for interim storage is transported to other storage areas in the Central Waste Complex.

Transuranic and transuranic mixed waste containers that are ready for shipment to disposal have their own loading and storage area in WRAP 1. In this area, the containers are stretch-wrapped in a seven-drum configuration for loading into TRUPACT³-II shipping casks. Two seven-packs of containers

³ Transuranic package transporter.

or two standard waste boxes (SWB)⁴ are loaded into each cask. Up to three casks can be on each trailer. The TRU waste is then shipped to the WIPP for disposal or to another approved waste disposal site.

2.2.2.2 Nondestructive Examination and Nondestructive Assay Area

The NDE and NDA provides approximately 700 square meters (7,500 square feet) for radiography and nondestructive assay equipment. The NDE equipment uses penetrating radiation to examine the content of each incoming waste container. The NDA is used to determine the radionuclide content of each waste container.

Nondestructive examination systems are used to identify dense waste items that could influence NDA, to indicate the physical appearance of the waste, and to identify if liquids or other noncompliant⁵ waste forms are present. Such identifications are noted in the data management system to ensure that noncompliant items are removed in a waste process enclosure within the process area.

Nondestructive assay indicates the radionuclide content and distribution in the waste. Two assay techniques are used in WRAP 1. They are passive-active neutron interrogation and segmented gamma energy scan. The passive-active neutron counting methods are used to detect and measure the quantity of uranium, plutonium, curium, and californium isotopes. The gamma energy equipment assays uranium-233, uranium-235, some plutonium isotopes, neptunium-237, americium-241, americium-243, and fission and activation products. These measurements are used to sort the waste as either transuranic or low-level waste and to group the low-level waste into Category 1, Category 3, or greater than Category 3 (DOE 1993b).

Separate NDE and NDA lines are provided for containers and boxes. Space is provided within the NDE and NDA area for the storage of 12 waste containers.

⁴ SWB is the name of a specific box designed expressly for transport in a TRUPACT-II to the WIPP repository or another approved waste disposal site. Each SWB is approximately 139 centimeters (55 inches) wide by 162 centimeters (72 inches) long by 83 centimeters (37 inches) high with round ends with either a welded or gasket bolted lid. Each SWB is constructed of 12-gauge painted carbon steel with carbon steel reinforcement and is equipped with one or more carbon composite filtered vents. Each SWB has an empty weight of 368 kilograms (810 pounds) with a nominal capacity of 1.8 cubic meters (63.5 cubic feet) and 2,727 kilograms (6000 pounds) gross.

⁵ Noncompliant waste refers to materials that cannot be accepted for transportation or disposal at WIPP or that cannot be accepted for disposal on the Hanford Facility without further processing.

Containers certified in the NDE and NDA area are routed to the shipping and receiving area. Containers not meeting confirmation requirements are processed through WRAP 1 or stored at CWC pending treatment capability or noncompliant condition resolution.

2.2.2.3 Process Area

The process area provides approximately 650 square meters (7,000 square feet) used for low-level waste process, transuranic waste process, and restricted waste management gloveboxes. The area is designed to provide secondary containment when waste drums are opened in the process gloveboxes. Automatic dry chemical fire extinguishing systems are provided inside the gloveboxes. Two separate lines are provided to segregate low-level waste from transuranic waste.

In the process gloveboxes, drums are opened, the contents sorted, LLW and empty TRU containers are compacted, compliant waste is loaded out into new drums, and noncompliant waste items are transferred to a restricted waste management glovebox. Samples are taken, field screening is performed, and limited treatment occurs on noncompliant items in a restricted waste management glovebox. Venting or puncturing of aerosol cans also occurs within the restricted waste management gloveboxes. The sampling and screening occurs for both verification and/or characterization (to determine proper handling and/or laboratory analysis methods), depending on the waste stream.

Because much of the waste is contained in small inner packages inside the drums, a NDE system is located within the process gloveboxes to assist in the identification of noncompliant items. A small NDA system located within the transuranic waste process glovebox is used to identify high-gram loaded waste packages which exceeds the 200 gram facility limit.

Limited treatment of noncompliant waste is performed in the restricted waste management glovebox. Noncompliant materials include, but are not limited to the following:

- Aerosol cans
- Reactive metals
- Chelating compounds
- Chemically incompatible materials
- Corrosives
- Explosives
- Gas cylinders not permanently vented
- Lead
- Free liquids
- Mercury
- Particulate materials
- Pyrophoric materials.

Waste requiring treatment other than what WRAP 1 can provide is repackaged, labeled, and transferred to the CWC for storage pending identification or development of an appropriate treatment.

Waste sampling occurs in the restricted waste management enclosures, and to a lesser degree in the process enclosures, to determine the presence and characteristics of any dangerous waste constituents. Field screening techniques are used as much as practical to assist in the characterization of the waste, narrowing down the list of potential analytes for laboratory analysis.

Samples of waste are transferred to the sample management area for packaging and transferred to an onsite laboratory or shipped offsite to a laboratory for analysis. Samples are collected and analyzed in accordance with WAC 173-303-110 and SW-846 (USEPA 1986).

Interim storage is provided for empty drums and waste containers while awaiting laboratory analysis. The storage area is surrounded by concrete shield walls and roof to protect operating personnel. The total space provided is for 24 containers. If there is insufficient space in this storage area, excess drums are stored either in the automated storage and retrieval system located in the shipping and receiving area or transferred elsewhere.

2.2.2.4 Sample Management Area

The sample management area receives samples from the low-level waste process, transuranic waste process, and restricted waste management enclosures. The sample management area is used to package samples for transport to appropriate onsite or offsite analytical laboratories. All samples have a bar code label and are accompanied by chain-of-custody documentation. Chain-of-custody within WRAP 1 can be achieved electronically.

The sample management area contains storage space for samples, which includes refrigerated storage, and laboratory supplies.

2.3 IDENTIFICATION AND CHARACTERIZATION OF POTENTIAL SOURCE TERMS

This section summarizes the potential source terms present in the WRAP 1 facility. Tables 2-1 and 2-2 summarize the source term information presented in the FEMP determination for both radioactive and regulated materials.

Table 2-1 Radioactive Material Potential Source Term
(Based on one operational shift per day)

Radionuclides	Process Rate (Ci/year) 1shift	Release Rate Multiplier	Resultant Emission (Ci/year)	Modeled Dose Factor (mrem/Ci)	Unabated Emissions (mrem/yr)	% of Total
Volatiles						
H-3	6.67e-01	1.00e+00	6.67e-01	0.00	0.00	0.00
C-14	2.47e-01	1.00e+00	2.47e-01	0.00	0.00	0.00
Kr-85	3.43e+02	1.00e+00	3.43e+02	0.00	0.00	0.00
Particulates						
Co-60	1.20e+02	1.00e-03	1.20e-01	1.72e-02	2.06e-03	4.72e-03
Sr-90 Y-90	5.77e+04	1.00e-03	5.77e+01	2.60e-02	1.50e+00	3.43e+00
Ru-106 Rh-106	3.33e+00	1.00e-03	3.33e-03	1.24e-02	4.13e-05	9.45e-05
Cs-137 Ba-137	5.87e+04	1.00e-03	5.87e+01	1.42e-02	8.33e-01	1.90e+00
Ce-141	3.60e-31	1.00e-03	3.60e-34	8.14e-03	2.93e-36	6.70e-36
Ce-144 Pr-144	1.74e+02	1.00e-03	1.74e-01	8.14e-03	1.41e-03	3.23e-03
Pm-147	7.50e+02	1.00e-03	7.50e-01	1.16e-03	8.70e-04	1.99e-03
Eu-155	2.74e-01	1.00e-03	2.74e-04	1.42e-02	3.90e-06	8.90e-06
Th-232	1.04e-04	1.00e-03	1.04e-07	4.83e+00	5.01e-07	1.14e-06
U-233	1.24e+01	1.00e-03	1.24e-02	1.92e+00	2.37e-02	5.43e-02
U-235	1.68e+00	1.00e-03	1.68e-03	1.76e+00	2.96e-03	6.77e-03
Np-237	3.83e-01	1.00e-03	3.83e-04	7.05e+00	2.70e-03	6.18e-03
Pu-241	1.81e+04	1.00e-03	1.81e+01	8.17e-02	1.48e+00	3.39e+00
Pu-238	2.40e+03	1.00e-03	2.40e+00	4.76e+00	1.14e+01	2.61e+01
Pu-239	4.17e+03	1.00e-03	4.17e+00	5.15e+00	2.15e+01	4.90e+01
Pu-240	9.97e+02	1.00e-03	9.97e-01	5.14e+00	5.12e+00	1.17e+01
Am-241	9.63e+01	1.00e-03	9.63e-02	7.79e+00	7.50e-01	1.71e+00
Am-243	1.50e+02	1.00e-03	1.50e-01	7.79e+00	1.17e+00	2.68e+00
Pu-242	5.67e-02	1.00e-03	5.67e-05	5.15e+00	2.92e-04	6.67e-04
Cm-245	1.17e+00	1.00e-03	1.17e-03	0	0.00	0.00
Cf-252	2.46e+01	1.00e-03	2.46e-02	0	0.00	0.00
Totals	1.44e+4				4.38e+01	

* The original source term was based on 3 operational shifts per day. The table is based on one operating shift per day, which is the WRAP 1 current scope.

** The emissions estimates for either one shift or three shifts per day are greater than the limit of 0.1 mrem/year. Therefore there is no difference in the sampling and monitoring requirements.

*** The Clean Air Assessment Package 1988 (CAP-88) computer code was used to calculate the EDE.

Table 2-2 WRAP 1 Estimated Hazardous Material Potential Source Term

WRAP 1 Listed Hazardous Chemical Amounts Compared to 40 CFR 302.4 RQ's					
Listed Hazardous Substances	Annual Material Processed in Kg/yr	*Total Zone 1 Emissions		Hazardous Chemical Reportable Quantity Kg/24 hour period	% of Reportable Quantity released per day, 365 days per year
		Annual Average Emission Rate Kg/yr	Peak Daily Rate Kg/day		
carbon tetrachloride	313	18.1	0.5	2270	0.02%
formaldehyde	13	0.09	0.0	454	<0.001%
xylene	422	1.9	0.05	454	0.01%
toluene	381	5.4	0.15	454	0.03%
2-butanone	327	17.4	0.48	2270	0.02%
4-methyl 2-pentanone	68	0.23	0.01	2270	<0.001%
acetone	313	37.0	1.01	2270	0.045%
ethyl benzene	82	0.36	0.01	454	0.002%
methanol	531	32.7	0.90	2270	0.04%
n-butyl alcohol	27	0.09	0.01	2270	<0.001%
ammonium hydroxide	27	10.6	0.29	454	0.064%
dichlorodifluoro methane	490	489.9	13.4	2270	0.6%
polychlorinated biphenyls	272	0.27	0.01	454	0.22%
cadmium	10	0.01	0.00	454	<0.001%
mercury	10	0.01	0.00	454	<0.001%
lead (3)	2,722	2.7	0.07	454	15%

* The primary emission of hazardous substances will come from Zone I.

** Based on upset condition.

3.0 APPLICABLE REGULATIONS

Conditions and requirements for monitoring existing or potential releases of radioactive and other chemicals to the environment are contained in DOE orders and federal, state and local laws, regulations, and permits. Table 3-1 gives a brief summary of the regulations and standards applicable to this FEMP. Since the regulations enforced by these agencies may differ, WHC may enforce more restrictive requirements as a matter of policy. These policies can be found in WHC-CM-7-5, *Environmental Compliance*.

3.1 U.S. DEPARTMENT OF ENERGY ORDERS

3.1.1 General Environmental Protection Program (DOE Order 5820.2A)

The DOE Order 5820.2A, *Radioactive Waste Management* (DOE 1988) establishes policies, guidelines, and minimum requirements by which the DOE manages its radioactive and mixed waste and contaminated facilities.

3.2 FEDERAL REGULATIONS

3.2.1 National Emission Standards for Hazardous Air Pollutants (40 CFR 61)

Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," (40 CFR 61) establishes exposure limits and monitoring requirements. The exposure limits, for members of the public, from radionuclide emissions is an EDE not to exceed 10 mrem/year. Compliance with this standard is measured by calculating the highest EDE where a person resides or abides using an EPA-approved method.

Emissions of radionuclides must be measured at all release points that have a potential to discharge radionuclides into the air in quantities that could cause an EDE in excess of 1% of the standard. If the EDE caused by all emissions is less than 1% of the standard, the facility is exempt from the EPA monitoring requirements. All radionuclides that could contribute greater than 10% of the potential EDE for a release point shall be measured individually. For other release points that have a potential to release radionuclides into the air, periodic confirmatory measurements shall be made to verify low emissions.

Table 3-1 Applicable Regulations, Standards, and Permits.

Agency/Originator	Regulation, Standard, or Permit	HA	HI	RA	RI	Summary/Application
U.S. Department of Energy (DOE), Washington, D.C.	DOE Order 5820.2A (DOE 1988b) Radioactive Waste Management	X	X	X	X	Sets radioactive waste management requirements
	DOE/EP-0096 (DOE 1983), A Guide for Effluent Radiological Measurement at DOE Facilities			X		
	DOE/EH-0173T (DOE 1991b) Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance			X	X	Provides guidance for effluent sampling and monitoring.
U.S. Environmental Protection Agency (EPA), Washington, D.C.	40 CFR 60 Standards of Performance for New Stationary Sources			X		Establishes monitoring requirements for air pollutants.
	40 CFR 61 National Emission Standards for Hazardous Air Pollutants	X		X		Sets national emission standards for hazardous air pollutants (NESHAP)
	40 CFR 61 Subpart A General Provisions	X				Regulates hazardous pollutants
	40 CFR 61 Subpart H National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities			X		Sets emissions standards/monitoring requirements for radionuclides
	40 CFR 70 State Operating Permit Program	X		X		Requires air operating permit programs for states; Washington State program regulated under WAC 173-401
	40 CFR 261 Identification and Listing of Hazardous Waste	X	X			Identifies and lists hazardous wastes
	40 CFR 302 Designation, Reportable Quantities, and Notification	X		X		Identifies the allowable release limits of hazardous and radioactive constituents.
American National Standards Institute, (ANSI) New York, New York	N 13.1* (ANSI 1969) Guidance to Sampling Airborne Radioactive Materials in Nuclear Facilities			X		Sets standards for effluent monitoring systems
	N 42.18* (ANSI 1974) Specification and Performance of On-site Instrumentation for Continuously Monitoring Radioactivity in Effluents			X	X	Recommendations for the selection of instrumentation for the monitoring of radioactive effluents

Agency/Originator	Regulation, Standard, or Permit	HA	HL	RA	RL	Summary/Application
U.S. Department of Energy (DOE), Washington, D.C.	DOE Order 5820.2A (DOE 1988b) Radioactive Waste Management	X	X	X	X	Sets radioactive waste management requirements
Washington State Department of Ecology, Olympia WA	WAC 173-216 State Waste Discharge Permit Program		X		X	Governs discharges to ground and surface waters
	WAC 173-220 National Pollutant Discharge Elimination system Permit		X		X	Governs wastewater discharges to navigable waterways; controls NPDES permit process
	WAC 173-303 Dangerous Waste Regulations		X			Regulates dangerous wastes; prohibits direct release to soil columns
	WAC 173-400 General Regulations for Air Pollution Sources	X				Sets emissions standards for hazardous air pollutants
	WAC 173-401 Air Operating Permit Program	X		X		Establishes an operating permit for hazardous (regulated) air pollutants, including radionuclides
	WAC 173-460 Control for New Sources of Toxic Air Pollutants	X				Sets standards or new sources of toxic air pollutants
	WAC 173-480 Washington State Ambient Air Quality Standard and Emission Limits for Radionuclides	X		X		Endorses the 10 mrem/year EDE-EPA standards (40 CFR 61, Subpart H)
Washington State Department of Health, Olympia, Washington	WAC 246-247 Radiation Protection - Air Emissions			X		Sets standards for registration, permitting, notification, new sources, review, monitoring, and reports.
	Notice of Construction (DOH 1993a, DOH 1993b)			X		
U.S. Environmental Protection Agency (EPA)	FF-01 Radioactive Airborne Emissions (DOH 1993c)			X		Collective emissions from registered sources shall meet the emissions requirements of WAC 173-480
Benton County Air Pollution Control Authority, (APCA) Richland, Washington	General Regulation 80-7/Proposed Regulation	X				Regulates air quality

Notes:

HA = hazardous airborne.
 HL = hazardous liquid.
 regulations.
 RA = radioactive airborne.

RL = radioactive liquid.
 *Refers to standards that are referenced in the DOE and EPA

To determine whether a release point is subject to emission measurement requirements, it is necessary to evaluate the potential for radionuclide emissions for that release point. In evaluating the potential of a release point to discharge radionuclides into the air, the estimated radionuclide release rates shall be based on the discharge of the effluent stream that would result if all pollution control equipment did not exist, but the facility operations were otherwise normal.

Subpart H also states that effluent streams shall be directly monitored continuously with an in-line detector or representative samples of the effluent stream shall be withdrawn continuously from the sampling site following the guidance presented in American National Standards Institute (ANSI) N13.1 (ANSI 1969). The requirements for continuous sampling are applicable to batch processes when the unit is in operation. Periodic sampling (grab samples) may be used only with EPA's prior approval. Such approval may be granted in cases where continuous sampling is not practical and radionuclide emission rates are relatively constant. In such cases, grab samples shall be collected with sufficient frequency to provide a representative sample of the emissions.

3.2.2 State Operating Permit Program (40 CFR 70)

This regulation defines the minimum elements required by the *Federal Water Pollution Control Act of 1972* for state operating permit programs and corresponding standards and procedures by which the administrator will approve, oversee, and withdraw approval of state operating permit programs.

3.2.3 Identification and Listing of Hazardous Waste (40 CFR 261)

This part identified those solid wastes which are subject to regulation as hazardous waste.

3.2.4 Designation, Reportable Quantities, and Notification (40 CFR 302)

The regulations in "EPA Designation, Reportable Quantities, and Notification Requirements for Hazardous Substances Under CERCLA" (40 CFR 302) designate hazardous substances and identify reportable quantities and notification requirements for release of these hazardous substances under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)* and the *Safe Drinking Water Act of 1974*, as amended.

Any unpermitted release of any of these designated hazardous substances must be reported. Therefore, if the possibility exists for a facility to release any of the designated substances, waste streams must be monitored for their presence and monitoring practices must be provided in a FEMP.

3.3 INDUSTRY STANDARDS UNDER AMERICAN NATIONAL STANDARDS INSTITUTE

3.3.1 Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities (ANSI N13.1-1969)

The primary objective for sampling airborne radioactivity in effluents is to measure the release of radioactive materials to the environment. This is accomplished through sampling near the point of release.

The objective of ANSI N13.1 (ANSI 1969) is to set forth the principles that apply in obtaining valid samples of airborne radioactive materials and to prescribe acceptable methods and materials for gaseous and particulate sampling.

ANSI N13.1 (ANSI 1969) is limited to the collection of samples and does not address measurement of the radioactive materials collected. The exclusion of radiochemical measurement from the scope must not be construed to mean that the measurement of samples is of lesser importance than sampling.

3.3.2 Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents (ANSI N42.18-1980)

The objective of continuously monitoring instrumentation is to measure the quantity, and/or the rate of release of radionuclides in the effluent stream and to provide useful documentation for scientific and logical purposes.

This standard applies to continuous monitors that measure normal releases, detect inadvertent releases, show general trends, and annunciate radiation levels that have exceeded predetermined values.

This standard specifies detection capabilities, physical operating limits, reliability, and calibration requirements and sets forth minimum performance requirements for effluent monitoring.

3.4 WASHINGTON STATE REGULATIONS

3.4.1 Air Operating Permit Program (WAC 173-401)

The provisions in this regulation establish the element of a comprehensive Washington State air operating permit program consistent with the requirements of the *Federal Clean Air Act of 1977*. All sources (hazardous and radionuclides pollutants) subject to this regulation shall have a permit to operate that assures compliance by the service with all applicable requirements.

3.4.2 Ambient Air Quality Standards and Emission Limits For Radionuclides (WAC 173-480)

Although the standard for Washington State establishes a 25-mrem/year EDE for public exposure to radionuclide emissions, facilities must comply with the most restrictive of federal, state, or local law. Therefore, the exposure limit that must be complied with is 10 mrem/year; however, compliance is calculated at the point of maximum annual air concentration in an unrestricted area where any member of the public may be located (fence boundary).

3.4.3 Radiation Protection - Air Emissions (WAC 246-247)

This regulation specifies new source review, notification, registration, and permitting requirements associated with any source of radioactive air emissions in Washington State, including those on the Hanford Site. One requirement listed in WAC 246-247 is the semiannual (twice yearly) reporting of emissions from each registered stack or vent onsite. By agreement with Washington State Department of Health, only annual reporting is required.

3.4.4 Water Quality Standards for Groundwater (WAC 173-200)

The water quality standards to protect groundwater to the level of drinking water standards is contained in "Water Quality Standards for Groundwater of the State of Washington (WAC 173-200). These standards limit exposure to gross alpha, gross beta, tritium, ⁹⁰Sr, and ²²⁶, ²²⁸Ra. For radionuclides that are not specifically listed, exposures are limited by the federal standard to an EDE not to exceed 4 mrem/year.

3.4.5 State Waste Discharge Permit Program (WAC 173-216)

The purpose of this state regulation is to implement a state permit program, applicable to the discharge of waste materials from industrial operations into ground and surface waters of the state. However, this regulation excludes point service discharge of pollutants into navigable waters of the state, which is regulated by the "National Pollutant Discharge Elimination System Permit Program" (WAC 173-220). This regulation also excludes the injection of fluid through wells, which is regulated by "Underground Injection Control Program" (WAC 173-218).

3.4.6 Dangerous Waste Regulations (WAC 173-303)

Any release of a dangerous or hazardous substance (as designated by the Washington [State] Administration Code) to the environment, except permitted releases, must be reported. Waste streams that have the potential to contain dangerous waste constituents must be monitored accordingly.

3.5 LOCAL REGULATIONS

3.5.1 Benton County Air Pollution Control Authority (80-7)

The local air pollution control authority has jurisdiction over all air emissions except radionuclide emissions in Benton County areas, including the Hanford Site. Currently, there are no local standards more restrictive than the previously mentioned state and federal limits; therefore state and federal standards apply.

3.6 AIR EMISSIONS

DOE Order 5400.5 (DOE 1990) provides requirements for the monitoring of radioactive and nonradioactive airborne effluents from DOE facilities at the Hanford Site. This order states that DOE-controlled facilities must comply with NESHAPs (40 CFR 61).

Additional EPA requirements on hazardous substances are contained in the *Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)*. This regulation provides information on reportable quantities of nonradioactive hazardous substances. Unlisted hazardous substances designated by CERCLA are regulated in accordance with the EPA toxicity of the contaminant.

In Washington State, airborne effluents are regulated by the Washington State Department of Ecology through regulations in the WAC, Title 173, Chapters 173-400 through 173-480, as amended, pursuant to the *Washington Clean Air Act of 1967* (RAW 70.94, as amended). General regulations for air pollution sources are presented in WAC 173-400, including emission standards for sources emitting hazardous air pollutants found in WAC 173-400-075.

WAC 246-247, *Radiation Protection Air Emissions*, specifies new source review, notification, registration, and permitting requirements associated with any source of radioactive air emissions in Washington State, including those on the Hanford Site. By agreement with the Washington State Department of Health, only annual reporting is required.

WAC 173-480, *Ambient Radionuclides*, defines maximum allowable levels for radionuclides in the ambient air and defines required levels for control of emissions.

While both WAC 246-247 and 173-480 list outdated maximum EDE standards, each contains a caveat stating that more stringent federal standards take precedence over the EDE standards specified by the WAC. Therefore, each effectively endorses the 10 mrem/year EDE standard of NESHAP (40 CFR 61), Subpart H.

Regulations, including DOE Orders, state that DOE facilities must comply with the requirements set forth in NESHAP (40 CFR 61). Other regulations (e.g., 40 CFR 52, "Approval and Promulgation of Implementation Plans"; and DOE Orders 5400.1 (DOE 1988a), 5400.5 (DOE 1990a), DOE/EH-0173T (DOE 1991b), and 5484.1 (DOE 1981) state that DOE facilities must comply with the applicable requirements set forth in the *Washington Clean Air Act of 1967*.

3.7 LIQUID EFFLUENTS

Depending on where a liquid effluent (wastewater) is discharged, certain regulations apply. These regulations are implemented through issuance of permits by federal, state, and/or local agencies. It is the responsibility of the facility, through the Richland Operations Office (RL), to apply for the permit appropriate to the effluent being discharged. Before applying for any permits, the applicant must know the source of wastewater discharges and where the wastewater is being discharged to.

Each type of discharge permit identified will typically contain discharge limitations and monitoring requirements. However, the limitations and monitoring requirements will vary depending on the source and type of wastewater being discharged. Washington State controls discharges to ground water and surface water of the state, under WAC-173-216, *State Waste Discharge Permit Program*, and issues permits for such discharges.

4.0 IDENTIFICATION AND CHARACTERIZATION OF EFFLUENT STREAMS

This section discusses source terms (radiological and non-radiological) for the WRAP 1 facility that need to be considered potential contributors to public exposures and evaluated against instrumentation design criteria. Both routine operational conditions and hypothetical upset conditions are presented.

WRAP 1 will have both gaseous and liquid effluent streams. According to the FEMP determination, the air effluent stream has the potential to exceed the radioactive emissions set by NESHAPs (40 CFR 61). The liquid effluent streams will be identified, but do not exceed, nor have the potential to exceed the radioactive and regulated material criteria identified by applicable regulations. These descriptions include an identification of the potential source terms contributing to each stream.

4.1 IDENTIFICATION AND CHARACTERIZATION OF SOURCE TERMS CONTRIBUTING TO EACH EFFLUENT STREAM

This section describes the source terms that contribute to the WRAP 1 effluent streams during routine or upset operating conditions. General Information on the effluent streams is listed in table 4-1.

Table 4-1 WRAP 1 Gaseous and Liquid Effluent Streams

STREAM	DISCHARGE DESIGNATION	EFFLUENT DESCRIPTION	HAZARDOUS CHEMICAL CONTENT	RADIOACTIVE MATERIAL CONTENT	COMMENTS
Air Effluent	Main Stack 296-W-004	Main Filtered Exhaust Effluent discharge	Reference Table 2-2	Reference Table 2-1	Low Radioactive Potential
Liquid Effluent	Misc. Stream #424	TRUPACT Unload Bay Drain	No hazards exceeding RQ values	None	None
Liquid Effluent	Misc. Stream #407	Compressor Condensate Discharge	No hazards exceeding RQ values	None	Oil/Water Separator pass prior to discharge

* Specific details on the emission points are provided in the FEMP determination

4.1.1 Routine Operating Conditions

During normal operating conditions, the only effluent stream which has the potential to exceed either the radioactive or hazardous material emission limits is the main stack. This is the only exhausting point for the process area (Zone II) and the process glove boxes (Zone I). The shipping and receiving area, material assay area, storage area, some material transport routes, and administrative areas are considered part of the Zone III exhaust system. There is a negative pressure gradient from Zone II to Zone I to provide maximum confinement of radioactive contamination. Zones I and II will use a once-through, push-pull type ventilation system.

The glovebox lines in which the radioactive materials are processed are considered Zone I ventilation areas. Zone I obtains inlet air from the room in which they are located, which is considered Zone II. Zone I and Zone II exhausts are each ducted to their own HEPA filtration banks; each bank consisting of two stages of HEPA filters before being combined and subsequently discharged to the atmosphere. Zone I and Zone II each have two banks of HEPA filters, with one serving as backup to the other. During routine maintenance activities (e.g., filter change-out) or if an equipment component fails, the exhaust flow is diverted to the backup filter bank.

Utilization of particulate control measures, as described above, allows for high-efficiency removal of particulates and provides system redundancy for a possible failure of one of the emission control units. In addition, the WRAP 1 gloveboxes are equipped with non-testable HEPA filters on both the inlet and outlet flows to minimize the radionuclide contamination of the exhaust ducts and final filter banks.

High-efficiency particulate filtration before discharge of the radionuclide contaminated air to the atmosphere is a nuclear industry standard. HEPAs are disposable, extended-medium, dry filters with a rigid casing enclosing the full depth of the pleats. They have a particle removal efficiency range of 99.95 percent to 99.99 percent for 0.3 micron thermally-generated, monodispersed dioctylphthalate (or Di-2-ethylhexyl sebacate) particles, and a maximum pressure drop of 1 in. of water column when clean and operated at rated airflow capacity. The core of a HEPA filter is generally made by pleating a continuous web of fiberglass paper back and forth over corrugated separators that add strength to the core and provide air passages between the pleats. The core is then sealed in a wood or metal casing. The filter paper itself is composed of very fine (i.e., submicron) glass fibers in a matrix of larger (i.e., 1 to 4 micron) fibers and held together with an organic binder.

Hazardous materials that may be released in the stack emissions will fall well short of exceeding their reportable quantities for a 24 hour period. This can be seen in Table 2-2. Table 2-1 identifies that the radioactive emissions from the stack has the potential to exceed the 0.1 mrem/year EDE

limit identified for single facilities. The method used to calculate the EDE for the WRAP 1 facility was based on 40 CFR, Part 61, Appendix D methodology. This is an extremely conservative method, however it is the best available method to anticipate radionuclide quantities given a partially characterized feed stream. As WRAP 1 operations progress, actual emissions data will become available for comparison to the potential emission estimates.

4.1.2 Upset Operating Condition

In the case of an upset condition, WRAP 1 will not release material listed in the 40 CFR 302.4 table of hazardous substances in quantities equaling or exceeding the RQ amount for any 24 hour period. Given the primarily solid nature of the waste processed in WRAP 1, the release of radionuclides during an upset condition would not exceed emission estimates given in Table 2-1.

This page intentionally left blank.

5.0 EFFLUENT POINT OF DISCHARGE DESCRIPTION

This section characterizes the effluent discharge points within the WRAP 1 facility. This characterization includes the identification of all contributing streams, physical dimensions, monitoring system location, flow rates, and other pertinent information.

5.1 MAIN STACK

The WRAP 1 main stack exhausts HEPA filtered process and ventilation air from the Zone I and Zone II areas. The areas that contribute to these zones include the LLW processing glovebox, TRU processing glove box, and the LLW and TRU restricted waste management gloveboxes. Since the Zone III areas provide the make up air for the Zone II area, it indirectly contributes to the total air effluent stream. The Zone I area is filtered through a HEPA filtration system which will consist of two stages and a pre-filter. There is an identical bank in parallel with the first which can be used in case of failure or HEPA change out. Zone II exhaust is routed through a separate two stage HEPA filtration system with back up. The Zone I and Zone II streams are joined after filtration, and exhausted through the stack. See Figure 5-1 for an overall piping schematic for the filtration and exhaust system.

The fourteen meter (46 feet) fabricated steel stack (ID # 296-W-004) is located at the north west corner of the building. It has a diameter of 0.81 meter (32 inches), with isokinetic sampling and monitoring probes located approximately 11.3 meters (37 feet) from the base of the stack. The sample is transported through tubing to a monitoring cabinet which is located on the inside of the north west corner of the building. The cabinet contains a record sampler, an alpha continuous air monitor, a beta continuous air monitor, and associated flow and temperature measuring instrumentation. The monitoring cabinet is equipped with local annunciator alarms, as well as interface capabilities with the Plant Control System (PCS) alarms. The record sampler uses a 47 millimeter diameter media size filter for particle collection distribution. Since the sampling and monitoring equipment is housed in a cabinet and located within the facility, they are not exposed to any harsh environmental conditions.

The isokinetic probe assembly consists of a multi-point velocity probe, temperature probe, and three independent, low particle loss, multi-point nozzle arrays for particulate sample collection. The probe assemblies are mounted by direct insertion into the stack mounting flange. All of the sample transport tubing changes in direction have radii curvatures greater than five tube diameters. See Table 5-1 for pertinent designed sampling and monitoring technical data.

Table 5-1 Technical Design Data for the WRAP 1 Exhaust Stack

Technical Data	Designed	Measured
Average Flow Rate	463,830 CLM (16380 CFM)	Not Available
Minimum Flow Rate	28,317 CLM (1000 CFM)	Not Available
Maximum Flow Rate	510,270 CLM (18020 CFM)	Not Available
Ambient Stack Air Temperature	21°C (70°F)	Not Available

Figure 5-1 Gaseous Effluent Flow Diagram

5.2 LIQUID EFFLUENT DISCHARGE LOCATION

5.2.1 TRUPACT Bay Drain Basin

The WRAP 1 facility is equipped with a TRUPACT loading and unloading bay with a full length floor drain. The purpose for the drain is to divert the melting snow and ice to proper disposal location in the winter months. The TRUPACT bay will also be equipped with potable water for hosing off vehicles if the need arises. The drain runs out of the east side of the facility to a 1135 liter (300 Gallon) sand interceptor. From the sand interceptor, the stream is discharged to a gravel drain basin. This is a discharge method accepted by Ecology provided the drain basin is wider than it is deep; which is the case for WRAP 1. The discharge stream from the TRUPACT bay has been included in the Hanford Site *Plan and Schedule for Disposition and Regulatory Compliance for Miscellaneous Streams*, (DOE 1994) as well as listed in the Site inventory of miscellaneous streams. The sludge which accumulates in the drain is sampled for hazardous and radioactive constituents and any liquid is sampled for hazardous and radioactive material during clean out.

5.2.2 Compressor Condensate Drain Basin

WRAP 1 has a mechanical room which houses two compressors, an air dryer, several pumps, and a domestic water heater. The condensate which builds up in the compressor is combined with the air dryer condensate and discharged to a gravel basin on the north side of the facility. The condensate passes through an oil/water separator prior to discharge to the environment in order to isolate the oil blow through which usually occurs in compressors. The dimensions of the gravel basin are 1.5 meters wide by 1.5 meters long by 0.5 meters deep. The compressor condensate discharge stream has been added to the Hanford site *Plan and Schedule for Disposition and Regulatory Compliance for Miscellaneous Streams*, (DOE 1994) as well as listed in the site inventory of miscellaneous streams. The effluent will be periodically sampled pending the establishment of Ecology guidelines on sampling and analysis.

6.0 EFFLUENT MONITORING/SAMPLING SYSTEM DESIGN CRITERIA

This section presents the design criteria for the gaseous effluent monitoring system within the WRAP 1. The two miscellaneous liquid effluents streams do not have permanent monitoring systems since there is no rad emission potential, and minimal hazardous potential. The air effluent sampling/monitoring is based on design criteria found in 40 CFR 60 appendix A, 40 CFR 61 Subpart H, 40 CFR 61 appendix B, DOE/EP-0096 (DOE 1983), DOE/EH-0173T (DOE 1991b), and ANSI N13.1 (ANSI 1969).

6.1 AIRBORNE EFFLUENTS

The NESHAP establishes requirements and procedures for measuring radionuclide emissions from point sources. The requirements are contained in 40 CFR 61.93. The following sections present methods that the NESHAPs mandates for an airborne radionuclide effluent monitoring system. The essential requirements for design and operation of an airborne effluent release monitoring system mandated by NESHAPs for DOE facilities are listed as follows:

- Effluent flow rate must be measured using EPA Method 2 in Large stacks and vents or EPA Method 2A in pipes and small vents.
- Radionuclides shall be directly monitored or extracted, collected and measured.
- The placement of the sampling/monitoring probes must be derived using EPA Method 1.
- If the measurement is not performed in situ, the guidance in ANSI N13.1 (ANSI 1969) must be followed for sample extraction.
- Radionuclides must be measured according to 40 CFR 61, appendix B, Method 114.
- A quality assurance program must be conducted that meets the performance requirements described in 40 CFR 61, Appendix B, Method 114.

6.1.1 Measurement of Effluent Flow Rate

NESHAPs requires that flow rate measurements be made of the gaseous effluent stream as it is exiting the stack. The flow rate is useful in deriving total emission rates from the concentration or activity levels measured in the extracted samples. EPA method 2, found in 40 CFR 60, Appendix A, is specified by NESHAPs to determine velocity and volumetric flow rates for stacks.

6.1.2 Sample Extraction Probes

The sample extraction probes shall be designed for representative isokinetic sample extraction based on the average stack velocity. The NESHAP requires that ANSI N13.1 (ANSI 1969) is used as the standard guidelines for the design of an effluent monitoring system. The standard encompasses the design and location of the probes as well as the transport system for moving the sample from the orifice of the probe to the sample collection device or analyzer. ANSI N13.1 guidelines are designed to ensure that the sample which is collected and/or measured gives a good representative sample of the effluent stream at the point of extraction. Several factors can affect the sample representation during the collection and transport processes. These include inertial separation, deposition sample loss/dilution, and physical or chemical changes. ANSI N13.1 provides guidance for mitigating the impact of these factors which are listed below.

- NESHAPs requires that the more stringent EPA method 1 be used for sample probe location in the stack. This requires the sample probes to be located a minimum of 8-duct diameters down stream and 2-duct diameters upstream of major flow disturbance points.
- Independent sample extraction probes are required to be provided for the record sample loop and the continuous air monitor loops. However, a Hanford approved flow splitter may be used to divert one stream to the Record sampler and CAM.
- ANSI N13.1 (ANSI 1969) recommends that sampling lines be avoided whenever possible and always kept at a minimum length, so as to prevent deposition losses of heavy particles.
- Sample extraction probes are to be flange mounted to the stack to facilitate periodic removal, inspection, and cleaning activities.

6.1.3 Sample Transport Lines

Sample transport lines are to be installed in a manner which will minimize particle loss attributed to gravity settling, turbulent impaction, and electrostatic effects. This requires bends and lengthy runs of sample lines be kept to a minimum. ANSI N13.1 (ANSI 1969) requires the line bend radii to be at least 5 times greater than the inside diameter of the transport line.

6.1.4 Record Sampling

The record sample air stream shall be routed through a 47-mm filter media in order to obtain a collective sample of the effluent stream for laboratory analysis. Sample flow rate indicating and totalizing capabilities along with a flow rate regulator shall be include in the record sampling

system. The flow rate regulator will compensate for filter loading effects and maintain a constant sampling flow rate.

6.1.5 Continuous Air Monitors

Each continuous air monitor (CAM) is supplied a representative sample of the effluent stream by regulating the sample line flow rate. The CAM alarm setpoints shall be adjusted to activate at release concentrations as low as possible without resulting in an excessive number of alarms because of normal fluctuations in either background radiation. CAM failure annunciation shall be provided and the CAM system will be checked periodically to verify system response.

This page intentionally left blank.

7.0 CHARACTERIZATION OF CURRENT EFFLUENT MONITORING SYSTEM

This section provides a complete description of the effluent monitoring system and the technical specifications related to the WRAP 1 facility effluent stack.

7.1 INSTRUMENTATION DESCRIPTION

The gaseous effluent monitoring/sampling system operates isokinetically. The stack has sample probes which divert a representative sample of the exhaust stream via transport tubing to the sampling and monitoring cabinet. The transport lines are heat traced in order to prevent condensation within the tubing. Inside the sampling/monitoring cabinet, a record sampler collects a sample for lab analysis, an alpha and a beta CAM continually monitor the sample for limit exceeding particle concentrations. The stack also houses a temperature probe and a velocity probe. The flow through the system is established and maintained by a vacuum pump, and measured by a rotameter. A brief discussion and specification listing of the monitoring system instrumentation is given in the following sections.

The isokinetic probe assembly consists of a multi-point velocity probe, temperature probe, and three independent, low particle loss, multi-point nozzle arrays for particulate collection. The probe assemblies are mounted by direct insertion into the stack mounting flange.

7.1.1 Probe Mounting Features

There are three stack sampling points, one each for alpha and beta monitoring, as well as record sampling. The sampling points are positioned and designed in accordance with 40 CFR 61.93.

The sampling probe assemblies are located at least eight stack diameters downstream from any flow perturbation, and two stack diameters from the top of the stack.

The complete probe assembly is mounted perpendicular to the stack air flow by a mounting flange.

1. The individual probes are coupled to the mounting flange by ANSI B16.5 NPT-type fittings.
2. Each probe assembly will be off-set so as not to interrupt the air flow to any of the other flanges.
3. Each nozzle array has thread on sampling nozzles spaced evenly and symmetrically on the assembly in accordance to ANSI N13.1 (ANSI 1969).

The probe assemblies and all associated transport tubing is fabricated from type 316 stainless steel.

7.1.2 Sample Probes

Each nozzle orifice is tapered according to ANSI N13.1 (ANSI 1969) and faces directly into the exhaust stream.

The sample nozzles are sized to extract samples at the same velocity as the effluent stream (hence isokinetic) when the particle aerodynamic equivalent diameter (AED) exceeds 0.5 microns.

Each sample probe is designed to deliver a representative sample of the exhaust stream having a loss of less than 25% for a 5.0 micron AED particle and 60% for a 15 micron AED particle. This is in accordance with ANSI N13.1 (ANSI 1969)

7.1.3 Velocity Probes

The multi-point velocity probe measures the flow rate of the exhaust stream.

The velocity probe is off-set from the sample probes in order to prevent flow disturbances and adverse affects in the flow readings.

Velocity sensor specifications:

1. No more than $\pm 2.0\%$ error for velocity direction for velocity direction deviation angles of $\pm 15.0^\circ$ in either yaw or rotational axis.
2. Each flow sensor is rated for an accuracy within $\pm 2.0\%$ for readings and an accuracy within $\pm 0.5\%$ of full scale of the site conditions.
3. The total stack flow accuracy is within $\pm 10\%$ for the normal operating range of 16380 CFM, and within $\pm 25\%$ of the minimum flow rate or 1000 CFM.

7.1.4 Temperature Probe

The stack air temperature probe supplies the set point to the sample line heat trace controllers to maintain the sample lines at the stack temperature.

7.1.5 Sample Collectors

The filter assemblies are located in the Isokinetic Stack Effluent Monitoring System (ISEMS) cabinet. They are as close as practical to the sample points so as to minimize the amount of particle loss in the transport tubing.

Filter assembly characteristics:

1. A standard 47 mm diameter media size filter is used for particle collection.
2. A compression ring is used to ensure a tight seal against the support backing.
3. The filter assemblies have tapered expansion and contraction cones both upstream and downstream in order to ensure even particle distribution.

7.1.6 Sample Transport Tubing

The sample transport tubing is fabricated out of 316 stainless steel.

In order to aid in the prevention of particle plate out, the minimum possible lengths of tubing are used and any direction change in the transport tubing is made with radii curvatures greater than five tube diameters. The overall bend radius does not exceed ninety degrees as per ANSI 1969

Easily accessible calibration taps are located in the sample lines to allow in-place verification of the sample line flow rate.

7.1.7 Continuous Air Monitors

The alpha and beta CAM's are located in the ISEMS cabinet and measure the radioactive particulate concentrations in the exhaust streams.

7.2 TECHNICAL SPECIFICATIONS PERTAINING TO THE EFFLUENT MONITORING

The WRAP 1 facility only continually monitors the gaseous effluent stream from the Zone I and Zone II areas. Hazardous materials in the effluent stream are periodically sampled, but not continually monitored. The reason for this is that there will never be inventories of listed hazardous chemicals which exceed their respective RQ values in a 24 hour period. The potential radioactive emissions, as seen in table 2-1, classifies WRAP 1 as a category A emission facility, and therefore requires continuous monitoring and sampling. Table 7-1 summarizes the equipment, alarm set points, and calibration type and frequency for the stack effluent monitoring and sampling equipment.

Table 7-1 Monitoring/Sampling Instrumentation Alarm Setpoints and Calibration Guidance for the WRAP 1 Facility.

INSTRUMENT TYPE		CALIBRATION FREQUENCY	ALARM SETPOINTS	COMMENTS
Continuous Air Monitors	Alpha	At least annually, with monthly source and daily operability checks	5000 x DCG	Alpha Monitoring
	Beta	At least annually, with monthly source and daily operability checks	5000 x DCG	Beta/Gamma Monitoring
Record Sampler		Annual checks		Flow Measure

If a high set point alarm is detected from one of the stack CAM's, the ventilation system will automatically shut down so the cause of the alarm can be determined. In the event of a monitoring system failure, back-up CAM's are available for temporary use, so as to not interrupt the continuous monitoring of the effluent stream. If a HEPA filter is breached, the flow of effluent from each zone can be routed through the back-up set of filter banks. The alternate HEPA banks are also used during the change-out process of the main banks.

8.0 HISTORICAL MONITORING/SAMPLING DATA FOR EFFLUENT STREAMS

This section will present monitoring and sampling data for the effluent streams which require a FEMP. The effluent from the process area and the gloveboxes are the only streams which have the potential to exceed the EDE limits and requires a FEMP. Data for streams which do not require a FEMP are not included since pertinent information was included in the FEMP determination. Because this is a pre-operational FEMP, historical data is not yet available. However, as the facility becomes operational, the collected data will be incorporated in this section for both normal and upset conditions.

This page intentionally left blank.

9.0 SAMPLE ANALYSIS

9.1 ANALYTICAL LABORATORY AND PROCEDURES

Along with all of the samples which will be taken from the glove boxes, the record sampler filter paper and the CAM sample filters will all be sent to an analytical laboratory. The WRAP 1 Health Physics performs the sample exchanges in the air sampling and monitoring devices.

9.1.1 Record Sample Exchange

Record sample filters are exchanged per WHC-IP-0718, *Health Physics Procedures*, Section 3.3.2, Rev. 1, "Gaseous Effluent Monitoring System Inspection and Sample Exchange," (WHC 1995a) and Section 3.3.3, Rev. 0, "Automated Bar Coding of Air Samples at Hanford," (ABCASH) (WHC 1992b).

9.1.2 CAM Filter Exchange

CAM filters are exchanged per WHC-IP-0718, Section 3.3.2, Rev. 1, "Gaseous Effluent Monitoring System Inspection and Sample Exchange," (WHC 1995a).

9.1.3 Sample Data Examination and Delivery

Sample Data examination and delivery to the Analytical Lab are conducted per WHC-IP-0718, Section 3.3.2, "Gaseous Effluent Monitoring System Inspection and Sample Exchange," (WHC 1995a).

9.1.4 Laboratory Sample Analysis Instructions

The Effluent Monitoring group assigns an Effluent Data Processing codes to each discharge point monitoring and sampling equipment units. The EDP codes for all applicable WRAP 1 stack equipment are listed in Table 9-1.

Table 9-1 WRAP 1 Effluent Data Processing Codes

EDP CODE	STACK/FACILITY
W123	WRAP 1 Record Sampler
W124	WRAP 1 Alpha CAM
W125	WRAP 1 Beta CAM

The minimum detectable activities for specific radionuclides are listed in Table 9-2. Note that Pu-239, Pu-240, Am-241, and Sr-90 are analyzed quarterly rather than annually.

Table 9-2 Minimum Quantifiable Concentrations for Specific Radionuclides as Measured in Bi-Weekly Air Samples

Radionuclide	Minimum Quantifiable Concentration (uCi/mL)
^{239,240} Pu	2.0×10^{-15}
²³⁸ Pu	2.0×10^{-15}
²⁴¹ Am	1.9×10^{-15}
^{89,90} Sr	1.9×10^{-14}
¹⁰⁶ Ru\Rh	3.4×10^{-13}

9.1.5 Laboratory Analysis

When the sample reaches the laboratory, the Record sample is held in the lab for seven days to allow the short lived natural occurring isotopes to decay. The sample is then counted for alpha and beta readings. These readings are reported to Effluent Monitoring (EM) and lab Health and Safety group. These samples are put in storage for further sampling. Quarterly, these samples are gathered and dissolved for radio-isotopic analysis. The results of these analyses are submitted to EM and reported annually.

The CAM samples are not treated as record samples unless it is specifically requested. CAM filters from the stacks are managed by the Radiological Control group.

9.1.6 Laboratory Procedures

The analytical lab procedures are identified in section 5.0 and 5-1 of WHC-EP-0528-1, *Quality Assurance Project Plan for Radioactive Airborne Emissions Data Compilation and Reporting* (WHC 1994c). Additional laboratory procedural requirements are presented in WHC-EP-0536-2, *Quality Assurance Program Plan for Radionuclide Airborne Emissions Monitoring* (WHC 1995c).

9.2 SAMPLE AND DATA AND TRACKING

Sample exchange procedures are specified in WHC-IP-0718, Section 3.3.2, "Gaseous Effluent Monitoring System Inspection and Sample Exchange," (WHC 1995a). Tracking of samples and sample data is governed by *Automated Bar Coding of Air Samples at Hanford*, (WHC 1992b).

9.3 U.S. DEPARTMENT OF ENERGY ANALYTICAL AND LABORATORY GUIDELINES

The analytical and laboratory procedures for the FEMP activities are identified in Section 8.0 of the QAPP, *Quality Assurance Project Plan for Facility Effluent Monitoring Plans* (WHC 1994a). General requirements for laboratory procedures, data analyses, and statistical treatment are addressed in the QAPP. Detailed descriptions of these requirements are given in each FEMP.

The following elements identified in Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, DOE/EH-0173T (DOE 1991b) are addressed in *Quality Assurance Program Plan for Laboratory Analysis and Process Testing*, WHC-SD-CP-QAPP-003 (WHC 1994d), and *Quality Assurance Project Plan for Chemical Analysis of Highly Radioactive Mixed Waste Samples in Support of Environmental Activities on the Hanford Site*, WHC-SD-CP-QAPP-002 (WHC 1994b).

- Procedures preventing cross contamination
- Documentation of Methods
- Gamma emitting radionuclides
- Calibration
- Handling of Samples
- Analysis method and capabilities
- Gross alpha, beta, and gamma measurements
- Direct gamma-ray spectrometry
- Beta counters
- Alpha-energy analysis
- Radiochemical separation procedures
- Reporting of Results
- Counter Calibration
- Inter calibration of equipment and procedures
- Counter background
- Quality assurance

Table 9-3 Data Analyses and Statistical Treatment

Element	Documentation
Summary of data and statistical treatment requirements	WHC-SD-CP-QAPP-003, Rev. 1 (WHC 1994d)
Variability of effluent and environmental data	WHC-EP-0527-3, <i>Environmental Releases for Calendar Year 1993</i> (WHC 1994e)
Summarization of data and testing for outliers	Statistical identification of control standards are performed by the Laboratory Measurement Control System database program during the annual review of data for setting control limits. Outliers are evaluated.
Treatment of significant figures	WHC-SD-CP-QAPP-003, Rev. 1 (WHC 1994d)
Parent-decay product relationships	Parent-decay product relationships are not accounted for in laboratory operating procedures.
Comparisons to regulatory or administrative control standards and control data	The WSCF laboratory participates in the EPA Intra Comparison Program
Quality Assurance	WHC-SD-CP-QAPP-003, Rev. 1 (WHC 1994d)

10.0 NOTIFICATIONS AND REPORTING REQUIREMENTS

Notification and reporting requirements are imposed by federal and state law as well as by DOE Orders and permits. Because DOE and EPA documents are periodically updated, the current requirements should be obtained from the latest CFR and DOE Order. This section is to serve as a guideline for general notification and reporting requirements and as a reference to the sources where specific information may be found for federal, state, and DOE requirements. Refer to WHC-CM-5-34, *Solid Waste Disposal Operations Administrations* for more detailed reporting requirements.

10.1 ENVIRONMENTAL OCCURRENCE

10.1.1 Occurrence Identification and Immediate Response

Each employee shall identify events and conditions and shall promptly notify management of such occurrences.

- a. Call 911 if immediate help such as fire, ambulance, or patrol is required.
- b. Call 373-3800 (the Patrol Operations Center) if assistance other than fire, ambulance, or patrol is required.
- c. After requesting necessary outside assistance, the employee must notify his or her supervisor, who will notify the facility manager, the building emergency director, and, depending on the magnitude of the occurrence, the Occurrence Notification Center (376-2900).

Operations personnel shall take appropriate immediate action to stabilize or return the facility/operation to a safe condition. Actions taken in response to nonroutine releases, as evidenced by high sample results from liquid and gaseous effluent sampling, are documented in section two of WHC-CM-7-5, *Environmental Compliance*.

The oversight organizations shall notify their DOE Field Office, Richland, counterparts of the event after receiving notifications from, and discussing the event with, the facility manager.

10.1.2 Occurrence Categorization

Occurrences (environmental) shall be categorized as soon as practical using the specific criteria provided by EM for radioactive and hazardous materials release. These categorizations should be made within 2 hours of identification. Occurrences shall be categorized by their seriousness; if categorization is not clear, the occurrence shall be categorized initially at

the higher level being considered. The occurrence categorization shall then be either evaluated, maintained, or lowered as information becomes available.

10.2 PERIODIC ROUTINE EFFLUENT MONITORING REPORTS

Annual effluent monitoring data is compiled and reported in several annual reports. Site-wide data, which includes all DOE-RL contractors, is reported in the EIS/ODIS reported to the INEL Site for DOE-HQ, the Hanford Site Environmental Report is reported to DOE, the Radionuclide Air Emissions Report for the Hanford Site is reported to EPA Region 10 and the Washington Department of Health. The Westinghouse Hanford Company also reports annual effluent releases from WHC facilities to DOE-RL in the Environmental Releases Report.

11.0 INTERFACE WITH THE OPERATIONAL ENVIRONMENTAL SURVEILLANCE PROGRAM

11.1 DESCRIPTION

The Sitewide Environmental Monitoring Plan (EMP), as described in *Management Plan for the Facility Effluent Monitoring Plan Activities*, WHC-EP-0491 (WHC 1991), consists of two distinct but related components: environmental surveillance conducted by Pacific Northwest Laboratory, and effluent monitoring conducted by Westinghouse Hanford Company. The responsibilities for these two portions of the EMP are delineated in a Memorandum of Understanding (MOU 1989). Environmental surveillance, conducted by Pacific Northwest Laboratory, consists of surveillance of all environmental parameters to demonstrate compliance with regulations. Effluent monitoring includes both in-line and facility effluent monitoring as well as near-field (near-facility) operational environmental monitoring. Projected EDEs, reported in this FEMP, are the products of in-line effluent monitoring. Near-field monitoring is required by WHC-CM-7-5, *Environmental Compliance Manual*, Section 5.4, "Environmental Monitoring," and procedures are described in WHC-CM-7-4, *Operational Environmental Monitoring*.

11.2 PURPOSE

The purpose of the Operational Environmental Monitoring Program (OEMP) is to provide facility-specific environmental monitoring to protect the environment adjacent to facilities under the responsibility of WHC and ensure compliance with local, state, and federal environmental regulations. The objectives of the OEMP are to evaluate the following:

- Compliance with DOE, EPA, Washington State Department of Ecology, Washington State Department of Health, and internal WHC environmental radiation protection requirements and guides
- Performance of radioactive waste confinement systems
- Trends of radioactive materials in the environment at and adjacent to nuclear facilities and waste disposal sites.

Specifically, the OEMP is developed to:

- Monitor all inactive, existing, and new low-level waste disposal sites to assess both radiological and nonradiological hazards (DOE Order 5820.2A (DOE 1988b)).
- Determine the effectiveness of effluent treatment and controls in reducing effluents and emissions (DOE/EH-0173T, Page 1-1, Par. 1 [DOE 1991b]) (DOE/EV/1830-T5 [DOE 1991a])

- Detect and quantify unplanned releases (DOE/EH-0173T, Page 1-1, Par. 2 [DOE 1991b]) (40 CFR 302) (WAC 173-303-145) (DOE 5000.3B [DOE 1993a]) (DOE 5484.1 [DOE 1981])
- Monitor fugitive emissions and diffuse sources from contaminated areas for compliance with NESHAP (40 CFR 61), (DOE/EH-0173T, Pg. 3-4, 3.3.2 [DOE 1991b]), Toxic Air Emissions Inventory (40 CFR 265, Subparts AA and B13), State Operating Permit Program (40 CFR 70), and Source Registration (WAC 246-247).
- Monitor all surplus facilities prior to decontaminating or decommissioning (DOE Order 5820.2A [DOE 1988b]).
- Monitor new and existing sites, processes, and facilities for potential impacts and releases (DOE Order 5484.1 [DOE 1981] and DOE/EH-0173T [DOE 1991b]).
- Monitor and assess radioactive contamination and potential exposure to employees and the public (DOE Orders 5400.1 [DOE 1988a] and 5400.5 [DOE 1990]).

The purpose and justification for the OEMP is contained in WHC-CM-7-4, *Operational Environmental Monitoring*, and WHC-CM-7-5, *Environmental Compliance*. The primary justification for the OEMP includes the following:

- The OEMP provides a level of assurance to Westinghouse Hanford Company that the effluent and contamination controls for the various facilities and waste sites are effective.
- The OEMP monitors a diversity of operations, activities, and programs managed by several different WHC organizations. Accordingly, the program direction and integration function performed by environmental engineering studies are needed to assure program consistency, technical quality, and cost effectiveness.
- A secondary aspect of the OEMP is additional assurance beyond that provided by the Occupational Health and Safety Program that it is safe to work onsite and that visitors can safely tour the site.

11.3 BASIS

Near-field environmental surveillance is conducted to: (1) monitor employee protection; (2) monitor environmental protection; and (3) ensure compliance with local, state, and federal regulations. Compliance with parts of the following DOE orders, 40 CFRs, and WACs is addressed through this activity.

- DOE Order 5000.3B (DOE 1993a), *Occurrence Reporting and Processing of Operational Information*
- DOE Order 5484.1 (DOE 1981), *Protection, Safety, and Health Protection Information Reporting System*
- DOE Order 5820.2A (DOE 1988), *Radioactive Waste Management*
- DOE/EH-0173T (DOE 1991b), *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*
- DOE/EV/1830-T5 (DOE 1991a), *A Guide to Reducing Radiation Exposure to As Low As Reasonably Achievable (ALARA)*
- 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants"
- 40 CFR 70, "State Operating Permit Programs"
- 40 CFR 265, Subpart AA and B13, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"
- 40 CFR 302, "Designation, Reportable Quantities, and Notification"
- WAC 173-303-145, "Dangerous Waste Regulations (Spills and Discharges)"
- WAC 246-247, "Radiation Protection--Air Emissions."

11.4 MEDIA SAMPLED AND ANALYSES PERFORMED

Procedure protocols for sampling, analysis, data handling, and reporting are specified in WHC-CM-7-4. Media include ambient air, surface water, groundwater, external radiation dose, soil, sediment, vegetation, and animals at or near active and inactive facilities and/or waste sites. Parameters monitored include the following, as needed: pH, water temperature, radionuclides, radiation exposure, and hazardous constituents. Animals that are not contaminated, as determined by a field instrument survey, are released to a non-hazardous environment.

11.5 LOCATIONS

Samples are collected from known or suspected effluent pathways (e.g., downwind of potential releases, liquid streams, or proximal to release points). To avoid duplication, WHC relies on existing sample locations where Pacific Northwest Laboratory has previously established sample sites

(e.g., air samplers in the 300 Area). There are 38 air samplers (4 in the 100 Area and 34 in the 200/600 Areas); 35 surface water sample sites (22 in the 100 Area and 13 in the 200/600 Areas); 110 groundwater monitoring wells (20 in the 100 Area, 89 in the 200/600 Areas, and 1 in the 300/400 Areas); 299 external radiation monitor points (182 survey points and 41 thermoluminescent dosimeter [TLD] sites in the 100 Area, 61 TLD sites in the 200/600 Areas, and 15 TLD sites in the 300/400 Areas); 157 soil sample sites (32 in the 100 Area, 110 in the 200/600 Areas, and 15 in the 300/400 Areas); and 95 vegetation sample sites (40 in the 100 Area, 40 in the 200/600 Areas, and 15 in the 300/400 Areas). Animal samples are collected at or near facilities and/or waste sites. Specific locations of sample sites are found in WHC-CM-7-4.

Surveys to detect surface radiological contamination are conducted near and on liquid waste disposal sites (e.g., cribs, trenches, drains, retention basin perimeters, pond perimeters, and ditch banks), solid waste disposal sites (e.g., burial grounds and trenches), unplanned release sites, tank farm perimeters, stabilized waste disposal sites, roads, and firebreaks in the Operations Areas. There are 391 sites in the Operations Areas (100 in the 100 Area, 273 in the 200/600 Areas, and 18 in the 300/400 Areas) where radiological surveys are conducted.

11.6 PROGRAM REVIEW

The near-field (operational environmental) monitoring program will be reviewed at least annually to determine that the appropriate effluents are being monitored and that the monitor locations are in position to best determine potential releases.

11.7 SAMPLER DESIGN

Sampler design (e.g., air monitors) will be reviewed at least biannually to determine equipment efficiency and compliance with current EPA and industry (e.g., ANSI and American Society for Testing and Materials) standards.

11.8 COMMUNICATION

The Operations and Engineering Contractor (WHC) and the Research and Development Contractor (PNL) will compare and communicate to each other the results of their respective monitoring programs at least quarterly and as soon as possible under upset conditions. This will be coordinated through EM.

11.9 REPORTS

Results of the near-field environmental monitoring program are published in WHC-EP-0527-4, *Environmental Releases for Calendar Year 1994* (WHC 1995b),

WHC-EP-0573-3, *Environmental Surveillance Annual Report Calendar Year 1994* (WHC 1995d), and DOE/RL-95-49, *Radionuclide Air Emissions Report for the Hanford Site. Calendar Year 1994* (DOE 1995). The radionuclide values in these reports are expressed in curies, or portions thereof, for each radionuclide per unit weight of sample (e.g., pCi per gram) or in field instrument values (e.g., counts per minute). Values are reported in this manner, rather than EDE, which is calculated as the summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor.

This page intentionally left blank.

12.0 QUALITY ASSURANCE

12.1 PURPOSE

WHC-EP-0446, *Quality Assurance Project Plan for Facility Effluent Monitoring Plan Activities*, (WHC 1994a), WHC-EP-0536-2, *Quality Assurance Program Plan for Radionuclide Airborne Emissions Monitoring*, and WHC-EP-0528-1, *Quality Assurance Project Plan for Radioactive Airborne Emissions Data Compilation and Reporting*, describe the quality assurance requirements associated with implementing FEMPs. The plan identifies the FEMP activities and assigns the appropriate quality assurance requirements defined by the WHC *Quality Assurance Manual* (WHC-CM-4-2). This quality assurance (QA) Plan shall be consistent with the requirements in DOE Order 5700.6C, *Quality Assurance* (DOE 1991c). In addition, QA requirements in 40 CFR 60, Appendix A, "Reference Methodologies" shall be considered when performing monitoring calculations and establishing monitoring systems.

12.2 OBJECTIVE

The objective of this plan is to provide a documented QA plan describing QA requirements for all facilities implementing the FEMPs.

12.3 REQUIREMENTS

A Quality Assurance Project Plan (QAPjP, WHC 1994c) has been developed to implement the overall QA program requirements defined by WHC-CM-4-2. The QAPjP applies specifically to the field activities, laboratory analyses, and continuous monitoring performed for all FEMPs conducted by WHC. Plans and procedures referenced in the QAPjP are available for regulatory review upon request by the direction of the WHC effluent emission monitoring manager. A QAPjP (WHC-EP-0528-1) (WHC 1994c) for radioactive airborne emission monitoring (WHC-CM-7-5), was prepared to address the QA elements of 40 CFR 61 and was submitted to the EPA.

This page intentionally left blank.

13.0 INTERNAL AND EXTERNAL PLAN REVIEW

The *General Environmental Protection Program*, DOE Order 5400.1, Chapter IV.4 (DOE 1988a), requires that the FEMP be reviewed annually and updated every three years. The FEMP should be reviewed and updated as necessary after each major change or modification in the facility processes, facility structure, ventilation and liquid collection systems, monitoring equipment, waste treatment, or a significant change to the safety analysis reports. In addition, EPA regulations require that records on the results of radioactive airborne emissions monitoring be maintained onsite for five years. Operations management shall maintain records of measurements of stack particulates or other nonradioactive hazardous pollutant emissions for three years. Under the guidance of the Operations Supervisor and Environmental Compliance, facility operators will have to determine on a semiannual basis that no changes in operations, that would require additional measurements, have occurred.

Westinghouse Hanford Company EM prepares an annual effluent discharges report for each area on the Hanford Site to cover both airborne and liquid release pathways. Although the report is based on the calendar year, the emission limits apply to any period of 12 consecutive months. In addition, a report on the air emissions and compliance to the *Federal Clean Air Act of 1977* is prepared by EM and submitted to EPA as well as DOE.

Facility management is to obtain the EM function's approval for all changes to the FEMPs, including those generated in the annual review and update. In addition, the FEMP shall be reviewed by others if determined by EM.

This page intentionally left blank.

14.0 COMPLIANCE ASSESSMENT

This section provides a detailed comparison of the effluent monitoring system described in Section 7.0 with the applicable regulations presented in Section 3.0. Based on the information presented previously, the WRAP 1 gaseous effluent stream is not out of compliance with the requirement to provide monitoring. Furthermore, all radioactive and nonradioactive hazardous materials that are potentially released through this steam will be monitored as required. This section also verifies compliance and applicability of federal, state, and local effluent regulations and DOE orders for the WRAP 1 facility monitoring.

14.1 296-W-004 MAIN STACK

The estimated potential hazardous material quantities do not exceed their respective CERCLA RQ values on a 24 hour basis. Therefore, no federal, state, and local effluent regulations as well as DOE Orders will require any special regulated material monitoring requirements for the WRAP 1 facility. However, the potential EDE for radioactive constituents does exceed the limit listed in 40 CFR 61, Subpart H, NESHAPs. Therefore, full compliance is required.

14.1.1 Comparison of Instrument Specifications With Required Standards

All of the monitoring and sampling equipment is designed in accordance and compliance with all applicable federal, state, and local laws and standards.

14.1.2 Comparison of Instrument Specifications With Monitoring Criteria

All of the monitoring instrument specifications are designed to comply fully with the monitoring criteria outlined in federal, state, and local laws and regulations found in section 3.0.

14.1.3 Comparison of Instrument Specifications With Effluent Characteristics

The gaseous effluent discharge ranges developed in Section 5.0 fall well within the ranges of the monitoring and sampling instrumentation specifications.

This page intentionally left blank.

15.0 SUMMARY AND CONCLUSIONS

This FEMP assesses the magnitude of routine and potential liquid and airborne effluent releases from the Waste Receiving and Processing Module 1 Facility to determine the compliance of effluent monitoring systems and sampling programs with applicable federal, state, and local regulations. Based on the data reviewed, the gaseous effluents from the main discharge stack were determined to require a monitoring plan according to applicable regulations identified in Section 3.0. The compliance of the monitoring and sampling system for the category A effluent stream is documented in this plan. The two miscellaneous discharge streams were determined not to require a monitoring plan due to the extremely limited quantities of regulated constituents which could potentially enter the stream. This is also documented in the monitoring plan and the facility effluent monitoring plan determination.

This page intentionally left blank.

16.0 REFERENCES

- 29 CFR 1910, 1994, "Occupational Health and Safety Standards," *Code of Federal Regulations*, as amended.
- 40 CFR 60, 1990, "Standards of Performance for New Stationary Sources," *Code of Federal Regulations*, as amended.
- 40 CFR 61, 1989, "National Emission Standards for Hazardous Air Pollutants (NESHAP)," *Code of Federal Regulations*, as amended.
- 40 CFR 70, 1992, "State Operating Permit Program," *Code of Federal Regulations*, as amended.
- 40 CFR 261, 1989, "Identification and Listing of Hazardous Waste, *Code of Federal Regulations*, as amended.
- 40 CFR 262, 1988, "Standards Applicable to Generators of Hazardous Waste," *Code of Federal Regulations*, as amended.
- 40 CFR 264, 1989, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.
- 40 CFR 265, 1989, "Interim Status for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations*, as amended.
- 40 CFR 302, 1991, "EPA Designation, Reportable Quantities, and Notification Requirements for Hazardous Substances Under CERCLA," *Code of Federal Regulations*, as amended.
- 40 CFR 355, 1987, "Superfund Amendments and Reauthorization Act of 1986 (SARA): Emergency Planning and Notification, *Code of Federal Regulations*, as amended.
- 40 CFR 401-471, 1990, "Effluent Guidelines Standards," *Code of Federal Regulations*, as amended.
- ANSI, 1969, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*, ANSI N13.1, American National Standards Institute, New York, New York.
- ANSI, 1974, *Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents*, ANSI N42.18-1974, American National Standards Institute, New York, New York.

- Benton-Franklin/Walla Walla Counties Air Pollution Control Authority, General Regulation 80-7/Proposed Regulation, Kennewick, Washington.
- DOE, 1981, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements*, DOE Order 5484.1, U.S. Department of Energy, Washington, D.C.
- DOE, 1983, *A Guide for Effluent Radiological Measurements at DOE Installations* as amended, DOE/EH-0096, U.S. Department of Energy, Richland Operations Office, Richland, WA.
- DOE, 1988, *Radioactive Waste Management*, DOE Order 5820.2A, U.S. Department of Energy, Washington, D.C.
- DOE, 1991a, *A Guide to Reducing Radiation Exposure to As Low As Reasonably Achievable (ALARA)*, DOE/EV/1830-T5, U.S. Department of Energy, Washington, D.C.
- DOE, 1991b, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*, DOE/EH-0173T, U.S. Department of Energy, Washington, D.C.
- DOE, 1993a, *Occurrence Reporting and Processing of Operations Information*, DOE Order 5000.3b, U.S. Department of Energy, Washington, D.C.
- DOE, 1993b, *Application for Approval to Construct the Waste Receiving and Processing Facility*, as amended, DOE/RL-93-16, U.S. Department of Energy, Richland Operations Office, Richland, WA.
- DOE, 1993c, *Radioactive Air Emissions Notice of Construction for the Waste Receiving and Processing Facility*, as amended, DOE/RL-93-15, U.S. Department of Energy, Richland Operations Office, Richland, WA.
- DOE, 1993d, *Nonradioactive Air Emissions Notice of Construction for the Waste Receiving and Processing Facility*, as amended, DOE/RL-93-18, U.S. Department of Energy, Richland Operations Office, Richland, WA.
- DOE, 1994, *Plan and Schedule for Disposition and Regulatory Compliance for Miscellaneous Streams*, as amended, DOE/RL-93-18, U.S. Department of Energy, Richland Operations Office, Richland, WA.
- DOE, 1995a, *Inventory of Miscellaneous Streams*, as amended, DOE/RL-95-82, U.S. Department of Energy, Richland Operations Office, Richland, WA.
- DOE, 1995b, *Radionuclide Air Emissions Report for the Hanford Site. Calendar Year 1995s*, as amended, DOE/RL-95-49, U.S. Department of Energy, Richland Operations Office, Richland, WA.

EPA, 1981, *Authorization to Discharge Under the National Pollutants Discharge Elimination System*, NPDES, Permit WA-000374-3, U.S. Environmental Protection Agency, Washington, D.C.

Federal Clean Air Act of 1977, 42 USC 7401 et seq.

Federal Water Pollution Control Act of 1972, 33 USC 1251 et seq.

Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq.

Safe Drinking Water Act of 1974, 42 USC 300f et seq.

Superfund Amendment and Reauthorization Act of 1986, 42 USC 11001 et seq.

WAC 173-200, 1990, "Water Quality Standards for Ground Waters of the State of Washington, *Washington Administration Code*, as amended.

WAC 173-216, 1994, "State Waste Discharge Permit Program," *Washington Administrative Code*, as amended.

WAC 173-220, 1988, "National Pollutant Discharge Elimination System Permit Program," *Washington Administrative Code*, as amended.

WAC 173-303, 1991, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

WAC 173-400, 1991, "General Regulations for Air Pollution Sources," *Washington Administrative Code*, as amended.

WAC 173-401, 1994, "Air Operating Permit Program," *Washington Administrative Code*, as amended.

WAC 173-460, 1991, "Controls for New Sources of Toxic air Pollutants," *Washington Administrative Code*, as amended.

WAC 173-480, 1991, "Washington State Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, as amended.

WAC 173-480, 1990, "Ambient Air Quality Standards and Emission Limits for Radionuclides," *Washington Administrative Code*, as amended.

WAC 246-247, 1994, "Radiation Protection--Air Emissions," *Washington Administrative Code*, as amended.

Washington Clean Air Act of 1967, RCW 70.94, as amended.

WHC, 1990, *Hazardous and Radiological Waste Control Manual*, WHC-NR-M-12, current revision, Westinghouse Hanford Company, Richland, Washington.

- WHC, 1991, *Management Plan for Facility Effluent monitoring Plan Activities*, WHC-EP-0491, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1992a, *A Guide for Preparing Hanford Site Facility Effluent Monitoring Plans* WHC-EP-0438-1, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1992b, *Automated Bar Coding of Air Samples at Hanford*, WHC-SA-1554-FP, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994a, *Quality Assurance Project Plan for Facility Effluent Monitoring Plan Activities*, WHC-EP-0446-02, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994b, *Quality Assurance Project Plan for Chemical Analysis of Highly Radioactive Mixed Waste Samples in Support of Environmental Activities on the Hanford Site*, WHC-SD-CP-QAPP-002, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994c, *Quality Assurance Project Plan for Radioactive Airborne Emissions Data Compilation and Reporting*, WHC-EP-0528-1, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1994d, *Quality Assurance Program Plan for Laboratory Analyses and Process Testing*, WHC-SD-CP-QAPP-003, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995a, *Health Physics Procedures Manual*, WHC-IP-0718, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995b, *Environmental Releases for Calendar Year 1994*, WHC-EP-0527-4, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995c, *Quality Assurance Program Plan for Radionuclide Airborne Emissions Monitoring*, WHC-EP-0536-2, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1995d, *Operational Environmental Monitoring Annual Report, CY 1994*, WHC-EP-0573-3, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-1-5, *Standard Operating Practices*, current revision, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-2, *Quality Assurance Manual*, current revision, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-4-43, *Emergency Management Procedures*, current revision, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-5-34, *Solid Waste Disposal Operations Administrations*, current revision, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-7-4, *Operational Environmental Monitoring*, current revision, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-7-5, *Environmental Compliance Manual*, current revision, Westinghouse Hanford Company, Richland, Washington.

This page intentionally left blank.

DISTRIBUTION

Number of Copies

5 U.S. Department of Energy, Richland Operations

R. M. Gordon	S7-55
R. F. Guercia	S5-55
H. M. Rodriguez	A5-15
D. C. Ward	A5-55
Public Reading Room	H2-53

5 Pacific Northwest Laboratory

W. J. Bjorklund	P7-68
G. R. Hoenes	P7-78
G. A. Simiele	P7-79
R. K. Woodruff	K6-13
Hanford Technical Library	P8-55

27 Westinghouse Hanford Company

J. M. Barnett	S3-95
R. J. Bottenus	T3-01
R. J. Boom	S3-95
W. E. Davis	H6-20
L. P. Diediker	T1-30
W. T. Dixon	H6-21
T. P. Frazier (5)	T1-30
D. W. Fritz	H6-22
E. M. Greager	H6-30
P. L. Hapke	T4-05
C. J. Lewis (5)	T3-01
B. A. Mayancsik	T3-01
T. K. Orgill	T3-01
D. W. Ranade	B2-16
L. W. Vance	H4-16
SWDPC-1	T3-05
Central Files	A3-88
OSTI (2)	A3-36