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Y/ER-289

**ENVIRONMENTAL
RESTORATION
PROGRAM**

**Waste Management Plan for Phase II
of the Bear Creek Valley
Treatability Study
Oak Ridge Y-12 Plant,
Oak Ridge, Tennessee**

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FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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contributed to the preparation of this document and should not be considered an eligible contractor for its review.

**Waste Management Plan for Phase II
of the Bear Creek Valley
Treatability Study
Oak Ridge Y-12 Plant,
Oak Ridge, Tennessee**

Date Issued—May 1997

Prepared by
Science Applications International Corporation
Oak Ridge, Tennessee
under subcontract 78B-99069C

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Office of Environmental Management
under budget and reporting code EW 20

Environmental Management Activities at the
OAK RIDGE Y-12 PLANT
Oak Ridge, Tennessee 37831
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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PREFACE

The Bear Creek Valley Treatability Study Waste Management Plan was prepared under the Environmental Restoration Program to support the investigation of the practicality of the use of passive, in situ treatment systems to remove contaminants from the Bear Creek Valley Characterization area. This work was performed under Work Breakdown Structure (WBS) 1.1.02.41.10.34.20. This report will be used to direct investigations during Phase 2.

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APPENDIX A

EMEF PROGRAM WASTE MANAGEMENT PLAN CHECKLIST

ABBREVIATIONS

DOE	U.S. Department of Energy
EMEF	Environmental Management and Enrichment Facilities
HASP	Health and Safety Plan
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
WMP	Waste Management Plan

1. INTRODUCTION

This Waste Management Plant (WMP) for the Bear Creek Valley Treatability Study addresses waste management requirements for the Oak Ridge Y-12 Plant. The study is intended to produce treatment performance data required to design a treatment system for contaminated groundwater. The treatability study will consist of an evaluation of various treatment media including: continuous column tests, with up to six columns being employed to evaluate the performance of different media in the treatment of groundwater; an evaluation of the denitrifying capacity and metal uptake capacity of a wetland system; and the long-term denitrifying capacity and metal uptake capacity of algal mats.

The Sampling and Analysis Plan (SAP) covers the project description, technical objectives, procedures, and planned work activities in greater detail. The Health and Safety Plan (HASP) addresses the health and safety concerns and requirements for the proposed sampling activities.

This WMP identifies the types and estimates the volumes of various wastes that may be generated during the proposed treatability studies. The approach to managing waste outlined in this WMP emphasizes:

- management of the waste generated in a manner that is protective of human health and the environment;
- minimization of waste generation, thereby reducing unnecessary costs and usage of limited permitted storage and disposal capacities; and
- compliance with federal, state, and site requirements.

Prior sampling at the site has detected organic, radioactive, and metals contamination in groundwater and surface water. Proposed field operations are not expected to result in worker exposures greater than applicable exposure or action limits.

2. WASTE MANAGEMENT PLAN CHECKLIST

The strategies and methodologies to be used in the management of wastes generated during the Bear Creek Valley Treatability Study are documented in the Environmental Management and Enrichment Facilities (EMEF) Program Waste Management Plan checklist for the Y-12 Plant, given in Appendix A. The WM checklist will be used in conjunction with site-specific waste management/waste certification plans and procedures to describe the strategy for minimizing, handling, packaging, treating, transporting, characterizing, sorting, or disposing of waste produced as a part of project activities. The WMP checklist provides guidance and recommendations to be used for ensuring the protection of the worker, the environment, and the public.

The checklist will be used in conjunction with Procedure EMEF/EM-P2109, Environmental Restoration and Waste Management Organization Waste Certification Procedure and the site-specific waste management procedures identified in the checklist. Furthermore, project waste management/waste certification activities will conform to the requirements of "Oak Ridge

Reservation Waste Certification Requirements Procedure," EP-710 and "Waste Acceptance Criteria for the Oak Ridge Reservation," ES-WM-10.

The following sections explain entries provided in the checklist concerning waste management issues. The information is presented as it corresponds to the EMEF WMP Checklist.

2.1 KEY PROJECT PERSONNEL

Individuals involved in the management of waste generated by this project include the project manager, EMEF Generator Interface, Facility Manager, Waste Generator, Waste Packager, Site Safety and Health Officer, and the EMEF Waste Management Coordinator. The names, addresses and telephone numbers of these individuals are identified in Sect. 1.0 of the checklist. The waste management responsibilities for these roles are described in the EO-710, ES-WM-10, and procedures identified in the WMP checklist.

2.2 PROJECT DESCRIPTION

A brief description of the scope of the EMEF project generating the waste is provided in Sect 2.0 of the WMP checklist. A brief history of the Y-12 Plant is also presented. Additionally, reports applicable to this project and waste management activities associated with this project are identified in this section.

2.3 WASTE GENERATION ACTIVITIES

Activities associated with the conduct of this study will result in the generation of solid and liquid wastes at the site. These activities are identified in Sect. 3.0 of the WMP checklist, and are briefly discussed below.

Continuous column tests. A series of four continuous flow column tests of various treatment media will be carried out sequentially. Each panel of columns will contain up to six columns. Groundwater will be continuously pumped from temporary wells GW-837 and GW-835 to provide test water. Effluent will be allowed to reinfiltrate the ground surface in the vicinity of the temporary wells. Hay bales and impermeable plastic layers will be utilized to ensure that no overland flow into Bear Creek takes place. Waste generated during these tests will include personal protective equipment (PPE) used during sample collection, disposable sampling equipment, and the columns themselves at the conclusion of each series of tests.

Wetlands capacity testing. Flow from spring SS-4 through the wetland cells will be reestablished, and water samples obtained periodically. The only wastes generated as a result of this activity will be PPE and disposable sampling equipment.

Algal mat testing. Groundwater from the temporary wells will also be continuously pumped to an algal mat reactor, with influent and effluent water being periodically monitored. Effluent water will be released to reinfiltrate the ground surface as with the column effluent. Wastes generated will include PPE and disposable sampling equipment.

The waste will be generated in the Bear Creek Valley watershed, as identified in Sect. 3.1 of the WMP checklist.

2.4 WASTE CHARACTERIZATION

2.4.1 Waste Types and Volumes

Proposed field operations will result in the generation of sanitary/industrial waste (PPE and disposable sampling equipment), and potential Resource Conservation and Recovery Act (RCRA) waste (columns and associated media). As discussed above, effluent water from the column tests and algal mat reactor will be released to reinfiltrate the ground surface.

Information on the method of characterization, estimated contaminant concentrations, and waste destination is also included in Sect. 4.1 of the checklist.

2.4.2 Waste Characterization Plan

Information on the waste characterization plans and supporting documentation is provided in Sect. 4.2 of the checklist. Organizations involved in waste characterization and waste acceptance activities have been designated and are identified in this section.

2.5 HANDLING AND STORAGE REQUIREMENTS

Section 5.0 of the checklist provides the necessary handling and storage requirements for the waste and the volumes that will be generated by the project. Applicable waste storage areas to be managed by the EMEF Program are identified. Special waste/waste container handling procedures are described, along with methods to be utilized to protect the integrity of the containers.

Section 5.3 of the checklist identifies applicable waste storage areas. The Satellite Accumulation Area will be established near the designated decontamination area.

This section of the WMP checklist also includes a brief description of project waste management practices that will be implemented to protect the environment and human health. This will be accomplished by keeping radiation and chemical exposure as low as reasonably achievable. To ensure these waste management practices are implemented, project personnel will be required to participate in the training that is identified by Sect. 5.0.

2.6 WASTE MINIMIZATION

Section 6.0 of the WMP checklist identifies techniques that minimize waste generation consistent with policies established by the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency. These techniques will include treatment, segregation, decontamination, low-flow purging and sampling, and training. Decontamination efforts will be conducted so as to prevent the spread of contamination and minimize the amount of waste generated. Uncontaminated waste will be segregated from potentially contaminated waste. Low flow purging of

groundwater wells will be performed to minimize the volume of purge water generated. Training will emphasize waste reduction philosophies, techniques, and improved methods.

2.7 TREATMENT, STORAGE, AND DISPOSAL OPTIONS

As documented by Sect. 7.1 of the WMP checklist, waste generated from field activities (identified in Sect. 4.0 of the WMP checklist) will be transferred to the Waste Management Organization for disposition. Prior to transfer of waste to the Waste Management Organization, the appropriate waste management forms will be completed and signed. Section 7.3 of the WMP checklist identifies the waste management forms that apply to the subject wastes. The waste certifier and the waste coordinator are responsible for completing and signing these forms.

2.8 TRANSPORTATION

The Waste Management Organization will be responsible for transporting waste to the treatment, storage, or disposal areas. Expected routes of transportation are identified in Sect. 8.0 of the WMP checklist. Waste generated will be transported in accordance with all applicable federal and state regulations, DOE Orders, and Lockheed Martin Energy Systems, Inc. policies and procedures.

2.9 SAFETY AND HEALTH PLAN

Section 9.0 identifies the HASP as the appropriate Environmental Safety and Health documentation associated with this project. The cited documentation includes requirements for the safe management and handling of waste containers, site communication, sanitation, emergency actions, spill containment and contamination control.

APPENDIX A
EMEF PROGRAM WASTE MANAGEMENT
PLAN CHECKLIST

May 1997

Original Issue Date:	
Revision Date:	
WMO # (if applicable):	

EMEF PROGRAM WASTE MANAGEMENT PLAN CHECKLIST

Bear Creek Valley
Treatability Study
PROJECT NAME

Y-12 PLANT
ER WM PLAN CHECKLIST #

ER Project Manager	Date
John Vanderlan <i>John Vanderlan</i>	6/9/97

ER Waste Management Manager	Date
Jeff Henderson <i>Jeffery C Henderson</i>	6-6-97

ER Waste Management Certification Official	Date
Jeff Henderson <i>Jeffery C Henderson</i>	6-6-97

Waste Management Organization	Date
Mary Wiginton <i>Mary Wiginton</i>	6-6-97

The ER WM Plan checklist number will be assigned by the Oak Ridge National Laboratory Environment Restoration Document Management Center Manager

ER PROJECT WASTE MANAGEMENT PLAN CHECKLIST

Project Name:	Bear Creek Valley Treatability Study	Est. End Date:	January 1998
Location:	Bear Creek Valley	ER WM Plan Checklist #:	
Est. Start Date:	May 1997	Charge # for WM:	

1.0 KEY PROJECT PERSONNEL

ER Project Manager:	John Vanderlan	ER Waste Certifier:	Jeff Henderson
Address:	Bldg. 9734, MS-8130	Address:	Bldg. K-1037, MS-736
Phone:	576-2745	Phone:	241-2410

Facility Manager:	N/A	Waste Generator:	Jeff Henderson
Address:		Address:	Bldg. K-1037, MS-736
Phone:		Phone:	241-2410

Packager:	SAIC/Dan Thompson	Site Safety & Health Officer:(if applicable):	SAIC/Mike Crenshaw
Address:	800 Oak Ridge Turnpike	Address:	800 Oak Ridge Turnpike
Phone:	481-4750	Phone:	481-4767

ER WM Coordinator:	Jeff Henderson	Construction Engineer (if applicable):	N/A
Address:	Bldg. K-1037, MS-36	Address:	
Phone:	241-2410	Phone:	

2.0 INTRODUCTION

2.1 Project Description:

The Bear Creek Valley Treatability Study is intended to produce treatment performance data required to design a treatment system for contaminated groundwater. The treatability study will consist of the continuous column tests, an evaluation of the denitrifying and metal uptake capacity of a mature natural wetland, and the denitrifying and metal uptake capacity of algal mats.

The Bear Creek Valley Treatability Study will take place at the Y-12 Plant, in Bear Creek Valley.

2.2 Brief Site History:

The Bear Creek watershed is located within Bear Creek Valley and contains most of the waste disposal units at the Y-12 Plant. The Y-12 Plant site occupies the upper basin of UEFPC. The UEFPC and its former tributaries are routed through storm drains that discharge to a concrete-lined channel along the southern plant boundary. Chestnut Ridge is included as a separate "watershed", although the ridge forms the headwaters for five separate north-south trending drainage basins, which ultimately discharge to the Clinch River.

Y-12 Plant operations salvage and disposal facilities are considered to be the primary sources of contamination in the surface water and groundwater. Operations included the recovery of mercury from plant materials. Salvage areas were used for storing scrap metal and liquid hazardous wastes and for the deheading and crushing of used drums. Disposal areas include construction spoil areas, liquid-waste percolation ponds, a sanitary landfill an oil landfarm, a hazardous-chemical disposal/storage area, and a solid waste burial area.

2.3 Reference Documents

Environmental Restoration Integrated Water Quality Program Plan, Oak Ridge, Tennessee, ES/ER/TM-205; Procedure ER/C-P2101, Preparation of Environmental Task/project-Specific Waste Management Plans; Procedure EMEF/EM-P2109, Environmental Restoration and Waste Management Organization Waste Certification.

3.0 WASTE GENERATION ACTIVITIES

	Coring	X	PPE		Geophysical Survey		Remedial Actions
	Drilling		Excavating		D&D Activities		UST Activity
X	Deconning		Renovations		Well Installation/Maint.		ISV
X	Water Sampling		Soil Sampling		Scoping Surveys	X	Other _____

Explain Other

Column tests: continuous column tests will result in the generation of effluent water and solid waste (the columns themselves). At the conclusion of each test, the columns and media will be evaluated for disposal alternatives. For volume estimates, it is assumed they will be disposed as RCRA wastes.

Algal mats: at the completion of the treatment period, the algal mats will be evaluated for disposal alternatives. For volume estimates, it is assumed they will be disposed as RCRA wastes.

3.1 Waste Generating Area(s)

Bear Creek Valley watershed

Location or Building Number(s)

Near groundwater wells GW-835 and GW-837.

4.0 WASTE CHARACTERIZATION

4.1 Wastes Types and Volume

Category ¹	Sanitary Waste/ industrial waste	RCRA			
Type ²	Solid	Solid			
Description of Waste stream/ source ³	PPE, plastic, paper	discarded columns, algal mats			
RAD - contact or remote handled	N/A	N/A			
Suspected contaminants (radiological and chemical) ⁴	N/A	metals			
Characterization of contaminant by sampling and analysis (Yes/No)	No	See footnote 8 below			
Characterization of contaminant determined by process knowledge ⁵ (Yes/No)	N/A	Yes			
Solids ⁶ (ft ³)	35 ³	35 ft ³			
Liquids (gallons)	N/A	N/A			
Volume that WMO may receive (solids and liquids)	35 ft ³	35 ft ³			
Volume that will be handled as Investigation Derived Waste (IDW) (solids and liquids)	N/A	N/A			
IDW Type ⁷	N/A	N/A			
Destination ⁷	WMO	WMO			

¹ RCRA, TSCA, LLLW, TRU, LLW/RCRA, LLW/TSCA, TRU/RCRA, TRU/TSCA, TRU/RCRA/TSCA, LLW/RCRA/TSCA, RCRA/TSCA, sanitary waste/industrial waste, liquid waste to be treated at K-25 Site, liquid waste to be treated at ORNL, liquid waste to be treated at Y-12 Plant.

² Liquid, sludge, solid, gas (compressed), etc.

³ Floor tiles, duct work, concrete, metal, plastic, soil, glass, cylinders, etc.

⁴ This not to include trace or naturally occurring chemicals or radionuclides found in nature.

⁵ Documents that defend process knowledge should be listed in Sect. 2.

⁶ See Methodology for Generating Waste Volumes Estimates (ORNL/ER-148). It is imperative that waste volumes be given the appropriate units. (i.e., solids in cubic feet, liquids in gallons, etc.)

⁷ Tumulus pads, waste treatment plant, SWSA 6, etc.

⁸ Characterization of contaminant by sampling and analysis will be conducted only if characterization can not be determined by process knowledge. Section 4.2 defines organizations responsible for sampling and analysis of waste, if necessary.

What Methodology was used to estimate waste volumes?

With reference to media evaluation, estimates were determined based upon frequency of monitoring, size of work crew, and size of column panels and algal mat reactor.

4.2 Waste Characterization Plan

All waste will be characterized in accordance with *Waste Acceptance Criteria for Oak Ridge, ES/WM-10*.

Has the organization or person responsible for obtaining samples been designated?

☒	Yes	☐	No	☐	NA
-------------------------------------	-----	--------------------------	----	--------------------------	----

List name WMO-Sampling Crew Date _____

Has the organization responsible for analyzing samples been identified?

☒	Yes	☐	No	☐	NA
-------------------------------------	-----	--------------------------	----	--------------------------	----

List name Analytical Services Organization Date _____

Can WMO take control of the hazardous or mixed waste generated?

☒	Yes	☐	No	☐	NA
-------------------------------------	-----	--------------------------	----	--------------------------	----

Person Contacted Mary Wiginton Date _____

Can WMO accept the volume of radiological waste to be generated?

☐	Yes	☐	No	☒	NA
--------------------------	-----	--------------------------	----	-------------------------------------	----

Person Contacted _____ Date _____

Can the WMO accept the liquid that will be generated?

☒	Yes	☐	No	☐	NA
-------------------------------------	-----	--------------------------	----	--------------------------	----

Person Contacted Tim Foust Date _____

Will TRU or mixed waste be generated?

☐	Yes	☒	No	☐	NA
--------------------------	-----	-------------------------------------	----	--------------------------	----

If any TRU or TRU Mixed Waste is to be generated contact the Waste Certification Official before project starts.

Person Contacted _____ Date _____

Will any of the waste generated be handled as IDW?

X	Yes		No		NA
---	-----	--	----	--	----

List any specific requirements as requested by any of the above organizations or compliance.

Waste Acceptance Criteria for Oak Ridge Reservation, ES/WM-10; Waste Certification Requirements for Energy Systems, EP-710; Environmental Restoration and Waste Management Organization Waste Certification, EMEF/EM-P2109; Procedure Y-70-903; Transfer of Waste to Y-12 ESWMO; Procedure Y-70-301, Waste Container Labeling

Who will be responsible for completing the weekly ER Waste Management Program Total Waste Generated Waste form?

Name: Jeff Henderson

Phone: 241-2410

5.0 HANDLING AND STORAGE REQUIREMENTS

5.1 List Special Handling Procedures For Waste or Waste Containers

Entech to provide discussion for waste generated during trenching, well installation and monitoring.

5.2 List What Will Be Used To Protect The Integrity Of Waste Containers From Environmental Elements. (Examples: Lid Tops, Plastic Covering, Epoxy, Storage Shelter)

Appropriate lid tops for the type of containers used to package waste. All containers will be kept closed unless waste is being added or removed.

5.3 Applicable Waste Storage Area(s)

X	Waste Staging Area	X	Satellite Accumulation Area		Waste Consolidation Area
	90-d Storage Facility		Area of Contamination		Other _____

Describe location of above areas (attach sketch)

The location of the waste staging area will be determined in cooperation with WMO and the ER Waste Management Manager prior to the start of the project. The Satellite Accumulation Area will be located near the decontamination area which will be designated by the ER Waste Management Manager.

5.4 Explain how waste will be managed to assure that personal safety and the environment will be protected.

Treatment systems have been designed to minimize exposure and contact with waste during normal operation. To further assure protection of personal safety, the project Health & Safety Plan will be adhered to.

Name of ER Waste Storage Area Supervisor: Jeff Henderson

Does supervisor and staff have the appropriate training required?

☒	Yes	☐	No	☐	NA
-------------------------------------	-----	--------------------------	----	--------------------------	----

List training requirements:

GET, Storm Water Pollution Prevention (module #16987)

Will a spill control kit be required on-site?

☒	Yes	☐	No	☐	NA
-------------------------------------	-----	--------------------------	----	--------------------------	----

List items:

Absorbent materials, plastic sheeting, tyvek gloves, absorbent pads or pillows.

6.0 WASTE MINIMIZATION**6.1 Waste Minimization Techniques To Be Implemented**

☒	Segregation	☐	IDW Concept
☒	Decontamination	☐	Material Recycle (Solvents, Decon Waters)
☐	Compaction	☐	Cutting Fluids Recovery
☐	Solvent Substitution	☐	Selection of Equipment
☐	Sludge Dewatering	☐	Solidification
☐	Selection of PPE	☒	Other

Explain specific techniques not listed above

7.0 TREATMENT, STORAGE, AND DISPOSAL OPTIONS**7.1 Potential Treatment, Storage or Disposal Options (If Applicable)**

Option	Waste Capacity	Responsible Organization
Disposal	PPE, sanitary waste: 35 ft ³	WMO
Disposal	columns, algal mat: 35 ft ³	WMO

7.2 Special Requirements of the Waste Acceptance Criteria To Meet

None

7.3 Applicable Waste Management Forms:*

	UCN-2822		UCN-1457	X	UCN-2109		TX-5352A
	UCN-16114	X	UCN-20-116		UCN-20117		Other
	UCN-16114A	X	UCN-19611	X	UCN-20118		

***List Persons(s) that will be responsible for completing and signing Waste Management form(s):**

Waste Certifier, Waste Coordinator

8.0 TRANSPORTATION**8.1 Transportation Requirements**

A. Who or what organization will transport waste to the WMO facility?

Waste Management Organization

B. List specific issues for transporting waste and their resolutions.

WMO will provide transportation to the waste staging area. All applicable federal and state regulations, DOE Orders, and LMER/LMES policies and procedures will be adhered to when transporting waste.
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9.0 SAFETY AND HEALTH PLAN

9.1 List name of appropriate Environmental Safety & Health documentation associated with this project.

Health and Safety Plan for the Bear Creek Valley Treatability Study

9.2 Name of the plan.

Sampling and Analysis Plan for the Bear Creek Valley Treatability Study

9.3 Date approved or **Expected date of approval** April 1997

10.0 Additional information to further define waste management activities may be provided in this section.

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