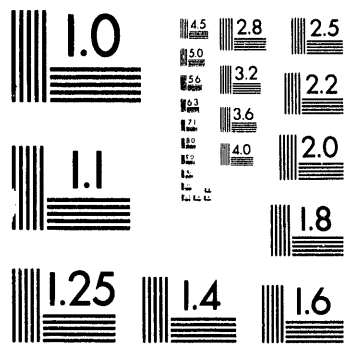
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ORNL/ER/Sub/87-99053/55

Energy Systems Environmental Restoration Program
ORNL Environmental Restoration Program

Waste Management Plan for the Remedial Investigation of Waste Area Grouping 10, Operable Unit 3, at Oak Ridge National Laboratory, Oak Ridge, Tennessee

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WASTE MANAGEMENT PLAN

FOR THE REMEDIAL INVESTIGATION OF

WASTE AREA GROUPING 10, OPERABLE UNIT 3, AT

OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

Bechtel Job 19118

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AOC	area of contamination
ALARA	as low as reasonably achievable
CAA	controlled access area
CFR	Code of Federal Regulations
CSL	Close Support Laboratory
DOE	Department of Energy
EPA	Environmental Protection Agency
ES&H	Environmental, Safety, and Health
GCO	Generator Certification Official
IDW	investigation-derived waste
NHF	New Hydrofracture Facility
OHF	Old Hydrofracture Facility
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
OU	operable unit
PEL	permissible exposure limit
PP	project procedure
PPE	personal protective equipment
RI/FS	remedial investigation/feasibility study
SLLW	solid low-level waste
TLV	threshold limit value
VLA	very low activity
WAG	waste area grouping
WGCS	Waste Generator Certification Supervisor
WMP	waste management plan

EXECUTIVE SUMMARY

This Waste Management Plan for the limited remedial investigation of Operable Unit (OU) 3 of Waste Area Grouping (WAG) 10 at Oak Ridge National Laboratory (ORNL) establishes the criteria, characterization and management methods, and operational techniques to be used for managing wastes that result from the investigation. The 23 wells (of a total of approximately 100 within OU3) covered under this plan are physically located within the WAG 5 area of contamination (AOC). OU3 consists of injection wells, observation wells, monitoring wells, and boreholes; no surficial land is associated with this portion of the remedial investigation. It is expected that some of the solid wastes generated will be handled, prepared for disposal, and disposed of within the WAG 5 AOC. Additional solid wastes that can not be disposed of within the WAG 5 AOC will be transferred to Martin Marietta Energy Systems, Inc. (Energy Systems) for dispositioning.

In accordance with regulatory guidance from the Environmental Protection Agency concerning investigation-derived waste (IDW), this plan provides for cost-effective waste management that is protective of personnel, the public, and the environment. For the ORNL Remedial Investigation/Feasibility Study (RI/FS) Project, IDW consists of soil, rock, and cuttings that are returned to the boring or stored in the AOC if they do not exceed radiological contamination limits. The scope of this investigation includes no boring or soil sampling; therefore, no IDW will be generated. However, this investigation will generate other wastes including liquids, mechanical fittings, personal protective equipment, refuse material, and trash. Field screening (i.e., surveys with portable instruments) will be used to monitor all waste. This plan specifies that wastes will be managed so that

- additional pathways of contaminant release are not created and existing pathways are not enhanced;
- additional contaminated areas are not created;
- potential public exposures are not increased during the investigation or before remedial action is taken;
- potential worker exposures are not increased during the investigation and before remedial action is taken; and
- wastes generated during the WAG 10 remedial investigation will be managed within the WAG 5 AOC and will not complicate the selection and implementation of remedial action alternatives within WAG 10.

Solid IDW generated from WAG 10 activities will be placed in the WAG 5 waste consolidation area or containerized and handed over to Energy Systems for disposal. Other solids will be characterized, containerized, stored for analysis, and handled/disposed of as described in RI/FS Project Procedures 1401 and 1402. Liquids will be containerized and

given to Energy Systems for disposal at the Process Waste Treatment Plant or through the liquid low-level waste treatment system.

The management techniques and operational elements of this plan allow the maximum possible volume of IDW materials to be redeposited in the borings or remain within the WAG 5 AOC until final remedial action within WAG 5 is completed.

This plan also addresses noncontaminated, hazardous, and radioactive wastes that are not IDW. Management techniques for these materials conform to the technical and administrative requirements reflected in project waste management procedures and applicable Energy Systems/ORNL guidance and requirements.

The provisions of this plan will be implemented through project procedures and directives to ensure uniform and consistent waste management operations. Appendix A is the Waste Management Planning Checklist.

1. INTRODUCTION

1.1 PURPOSE

This Waste Management Plan (WMP) supplements the Remedial Investigation/Feasibility Study (RI/FS) Project WMP and defines the criteria and methods to be used for managing and characterizing waste generated during activities associated with the RI of 23 wells near the Old Hydrofracture Facility (OHF). These wells are within the Waste Area Grouping (WAG) 5 area of contamination (AOC) at Oak Ridge National Laboratory (ORNL). Field activities for the limited RI of Operable Unit (OU) 3 of WAG 10 will involve sampling and measurement of various environmental media (e.g., liquids and gases). Many of these activities will occur in areas known to be contaminated with radioactive materials or hazardous chemical substances, and it is anticipated that contaminated solid and liquid wastes and noncontaminated wastes will be generated as a result of these activities. On a project-wide basis, handling of these waste materials will be accomplished in accordance with the RI/FS Project WMP and the procedures referenced throughout the plan. The following sections summarize the waste characterization and handling requirements specific to the limited (23 wells) WAG 10 field investigation activities covered in this plan. Appendix A is the Waste Management Planning Checklist.

1.2 BACKGROUND

WAG 10 is defined as the subsurface component of the various hydrofracture facilities (i.e., wells and grout injection sheets) located in Melton Valley, south of the ORNL main plant area (Fig. 1). The hydrofracture process was a unique waste disposal method that resulted in the subterranean burial of over 12 million liters (3.2 million gallons) of low-level radioactive wastes containing (at the time of disposal) over 51.8 PBq (1.4×10^6 Ci) of radioactivity over a 25-year period (1959–1984). The technology involved injecting waste materials mixed with grout and additives under pumping pressures of 13.8 MPa (2000 psi) or greater into a low-permeability shale formation at depths of 210 to 300 m (689 to 984 ft). Hydrofracture injections were conducted at two experimental locations (HF-1 and HF-2) and two hydrofracture production facilities [OHF and the New Hydrofracture Facility (NHF)]. Operational injections at OHF continued until it was replaced by NHF, where operational injections were performed until 1984. It is important to note that the areas that will be investigated under the scope of this plan are all within the WAG 5 AOC.

WAG 10 has been divided into three OUs. OU1 consists of the solidified grout and contaminated rock layered between or surrounding the grout sheets. OU2 consists of contaminated groundwater, including free liquids resulting from hydrofracture injections and contaminated groundwater that may be migrating toward the surface. OU3 consists of the injection wells, observation wells, monitoring wells, and boreholes associated with WAG 10. The Department of Energy's (DOE) environmental restoration strategy for WAG 10 calls for resources to be focused initially on OU3.

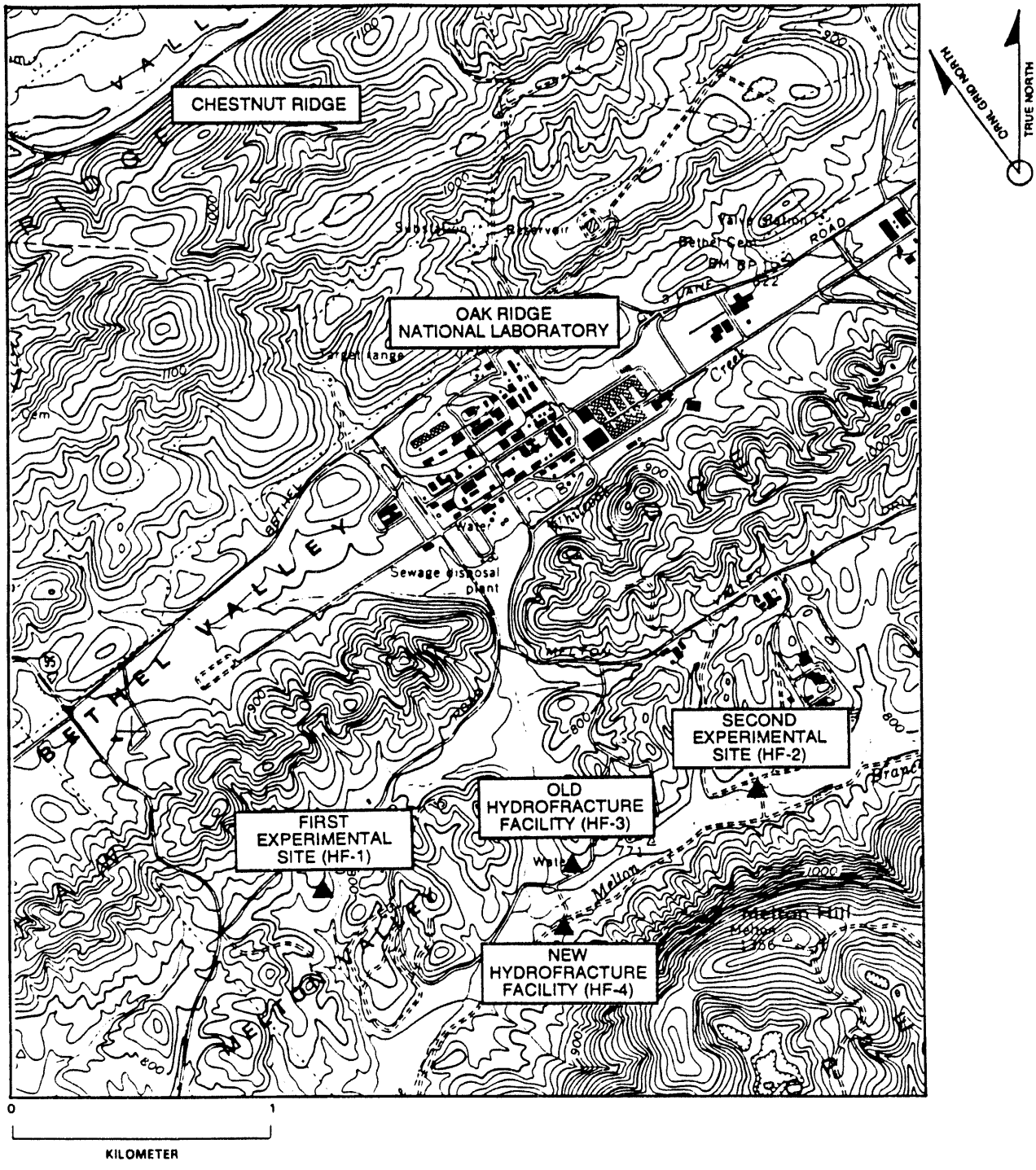

Fig. 1. Location of the hydrofracture sites.

The currently planned work activities for OU3 covered under this WMP will focus on 23 wells at OHF within the WAG 5 AOC. Future work on OU3 will focus on those areas offering the greatest potential for migration of contamination (OHF and NHF) and on confirming or disproving the migration of contaminants out of the injection formation. When conducted, OU2 and OU1 investigations will further characterize the nature and extent of contamination and the pathways of contaminant migration.

1.3 BASIS FOR THE PLAN

This WMP contains provisions for safely and effectively managing solids, well development and sampling water, decontamination fluids, and disposable personal protective equipment (PPE) consistent with the Environmental Protection Agency (EPA) guidance of May 1991 (EPA 1991). Consistent with EPA guidance, this plan is designed to protect the environment and the health and safety of workers and the public. It therefore specifies that investigation-derived waste (IDW) and other wastes be managed to ensure that

- costs associated with sample storage, analysis, transportation, and disposal are minimized;
- additional pathways of contaminant release are not created and existing pathways are not enhanced;
- additional contaminated areas are not created;
- potential public exposures are not increased during the investigation and during the period before remedial action;
- potential worker exposures are not increased during the investigation and during the period before remedial action; and
- wastes managed within the WAG 5 AOC do not complicate remedial action, alternative selection, or implementation.

The intent of this WMP is to provide guidance for characterizing, handling, and disposing of waste. Field screening (i.e., with portable survey equipment) and, if necessary, media sampling and analysis will be used to characterize waste in support of transferring waste to Energy Systems Waste Operations.

The provisions of this plan will be implemented through project procedures (PPs) and other Energy Systems and Bechtel directives to ensure consistent waste management operations.

1.4 REGULATORY OVERVIEW

This plan was developed in accordance with published regulatory standards applicable to the ORNL Environmental Restoration Program. It incorporates elements of the standards and procedures that exhibit best management practices and guidelines for managing radioactive, mixed, and Resource Conservation and Recovery Act-defined materials.

1.4.1 EPA

Management of Investigation-Derived Wastes During Site Investigations (EPA 1991) provides direction for managing IDW under the Comprehensive Environmental Response, Compensation, and Liability Act.

1.4.2 DOE Orders

DOE Order 5820.2A, *Radioactive Waste Management*, governs the handling and disposal of radioactive materials resulting from DOE activities (DOE 1988a). DOE Order 5480.11, *Radiation Protection for Occupational Workers*, establishes a regulatory limit of 5 rem/year for the combined internal and external exposure of occupational workers to ionizing radiation and radioactive materials (DOE 1988b). The order also calls for the establishment of as low as reasonably achievable (ALARA) goals and objectives for each facility and operation commensurate with its mission. DOE Order 5480.11 has been revised to require implementation of the DOE *Radiological Control Manual* (DOE 1992) by December 1992 (see Sect. 1.4.4). DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, establishes standards and requirements for DOE activities to protect the public and the environment against undue risk from radiation. It is the objective of this order that potential exposures to members of the public be maintained ALARA (DOE 1990).

1.4.3 Occupational Safety and Health Administration

The Occupational Safety and Health Administration (OSHA) has established standards for limiting occupational exposure to hazardous materials; 29 Code of Federal Regulations (CFR) 1910 includes a range of standards applicable to RI/FS activities and other ORNL operations. Subpart 120, which governs hazardous waste operations, and Subpart Z, which establishes the permissible exposure limits (PELs) for occupational exposure to listed hazardous chemical agents, apply to waste management operations involving IDW (OSHA 1991).

The requirements of 29 CFR 1910 are incorporated in the ORNL Industrial Hygiene Procedures and Policies (ORNL 1992) and the RI/FS Environmental, Safety, and Health (ES&H) project procedures. Because the PEL list is not comprehensive, the procedures permit the use of the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) as standards (ACGIH 1991). When they are more conservative than PELs, TLVs are used during field operations.

1.4.4 DOE Radiological Control Manual

By order of the Secretary of Energy in December 1991, selected elements of DOE Headquarters Environmental Health and Nuclear Energy organizations were directed to develop guidance for uniform health physics practices among all DOE operations sites; in June 1992, DOE published the *Radiological Control Manual.* All DOE Maintenance and Operations contractors were directed by the Secretary to prepare an implementation strategy by August 1992, issue site-specific radiological control manuals by December 1992, and complete all required standardized DOE Core Radiological Controls training and qualification upgrades by June 1994 (DOE 1992).

Chapter 4 of the manual addresses radiological controls for waste management practices. This WAG 10 WMP was developed using elements of the manual and includes excerpts where appropriate.

1.5 DEFINITION OF WAG 10 AOC

Under the provisions of the EPA IDW guidance (EPA 1991), wastes generated within a specific AOC may be managed within that area until final remedial action. For the purpose of this plan, the WAG 10 AOC is roughly defined as WAG 5 and portions of WAG 2 that may be receiving WAG 5 wastes and includes locations outside the WAG 5 boundary where field work and storage of radioactive waste are expected (see Fig. 2). (Large quantities of IDW are not expected to be generated during activities covered in this plan.)

1.6 WASTE CONSOLIDATION AREA

A waste consolidation area will be located within the WAG 5 AOC for managing and storing IDW generated from WAG 10 activities. These wastes will remain within the waste consolidation area until, and their disposition will be consistent with, the final remedial action of WAG 5.

1.7 WASTE STAGING AREA

A waste staging area will be established within WAG 5 to permit the segregation and efficient consolidation of IDW and non-IDW generated during WAG 10 activities. While the consolidation area is being prepared, the staging area will be used for temporary retention of IDW intended for disposition within the consolidation area in a controlled and protective manner. Non-IDW will be maintained within the staging area until transferred to Energy Systems for disposal.

The types and sources of wastes expected to transit the waste staging area are described in Sect. 2, "Waste Characterization."

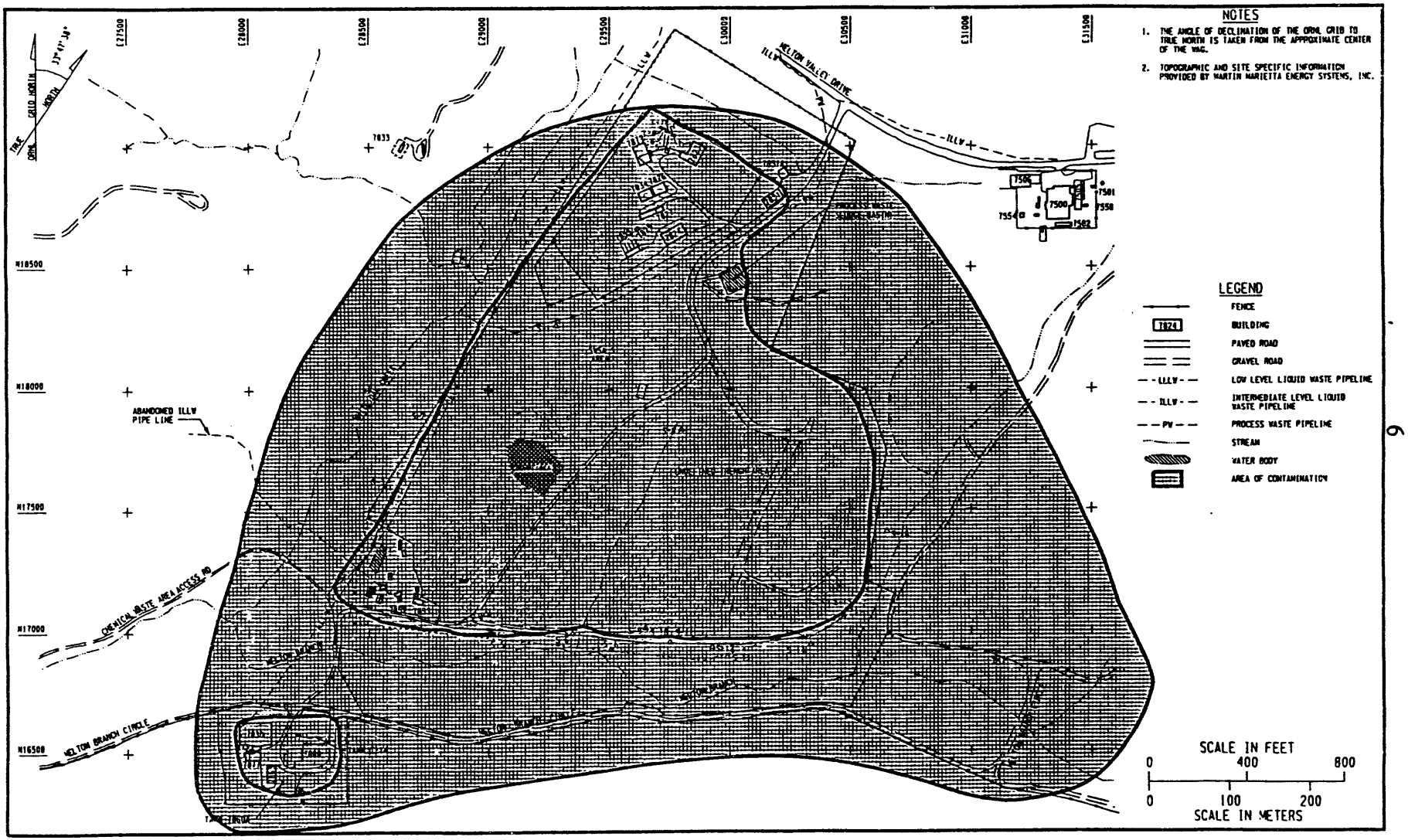

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Fig. 2. Approximate area of contamination used for WAG 10.

2. WASTE CHARACTERIZATION

Waste characterization involves identification of sources, forms, and contents. Work elements to be performed during the limited RI of 23 wells in OU3 are

- civil survey to establish local spatial control,
- nonintrusive surface geophysical surveys,
- sampling of existing wells and boreholes,
- modification and installation of pressure-measuring devices on wellheads, and
- decontamination activities.

2.1 WASTE-GENERATING ACTIVITIES

2.1.1 Civil Survey

Because of the nonintrusive nature of these work elements, only minor quantities of waste materials are anticipated. These materials will be in the form of disposable solids (e.g., PPE, plastic wraps, and tape) and liquids (e.g., decontamination fluids).

2.1.2 Sampling of Existing Wells and Boreholes; Modification of Selected Wellheads

Due to the intrusive nature of these work elements, appreciable quantities of waste materials are anticipated. Sampling activities will necessitate the use of downhole measurement equipment (e.g., thief-type sampler and cable) and analytical sample containers. Sampling activities may result in sample container and collection equipment waste materials. Wellhead modification activities (e.g., installation of pressure gauges and liquid sampling ports) may generate waste materials in the form of contaminated fittings resulting from these retrofit operations. Both sampling and modification will result in disposable solid (e.g., PPE and plastic wraps) and liquid (e.g., decontamination fluids) waste materials.

2.1.3 Borehole Geophysics

Geophysical surveys (e.g., density, gauge, well diameter) utilizing downhole sondes will be conducted on 23 wells near OHF. It is expected that both solid (e.g., PPE, wipes, and plastic wraps) and liquid (e.g., decontamination fluids) waste will be generated.

2.1.4 Decontamination Activities

Equipment, tools, and materials used are likely to become contaminated because of the high probability of encountering contaminated materials during WAG 10 field investigations. All reasonable efforts will be taken to reduce or eliminate the potential for such contamination, including minimizing the number of tools and pieces of equipment used,

choosing tools and equipment with surfaces that can easily be decontaminated, and using coverings (e.g., plastic wraps and strip-coat paints) that protect against surface contamination. It will not be possible, however, to prevent contamination of some items such as downhole tools because of the way they are used; these items will be decontaminated to the extent possible using portable equipment and materials in the field (see PP 1250, "Equipment Decontamination and Release for Unrestricted Use"). This decontaminated waste will be accumulated within the WAG 5 waste staging and accumulation area. Equipment needing additional cleaning will be decontaminated at a mobile decontamination trailer in a controlled access area (CAA) within the WAG 5 AOC. These decontamination efforts will result in a variety of wastes, which will be packaged and categorized according to field instrument readings until Close Support Laboratory (CSL) analysis results are obtained.

2.1.5 Miscellaneous

Various types of waste will also be generated from other sources such as discarded PPE (e.g., disposable gloves, hoods, shoe covers, coveralls, and respirator cartridges), CSL solid and liquid wastes, and analytical sample residues.

2.2 WASTE DETERMINATION CRITERIA

Wastes will be classified by the Waste Generator Certification Supervisor (WGCS) with assistance as necessary from the ES&H Manager, the Project Health Physicist, and/or the Project Industrial Hygienist. If necessary, the ORNL RI/FS Field Coordination Manager, who will serve as the Generator Certification Official (GCO), will be contacted to determine the disposition of waste solids. Criteria are developed in accordance with the guidance in Articles 131 and 132 of the *Radiological Control Manual* (DOE 1992).

Criteria for appropriate screening and classification of wastes for cost-effective disposition or isolation will be consistent with EPA guidance for IDW (EPA 1991) and with currently available and applicable regulatory or administrative guidelines. Radiological dose equivalent measurements, except for alpha measurements, are conducted at a distance of 30 cm from the radiation source or from any surface through which the radiation penetrates. Alpha measurements are conducted near the surface of the material.

PPE and other incidental IDW generated through routine activities will be characterized using process knowledge and measurements made with calibrated portable radiation survey instruments at the direction of Energy Systems. Direct measurement readings will be recorded for all PPE and solid IDW. Very-low-activity (VLA) waste will be segregated from solid low-level waste (SLLW). Activities above the VLA waste limits for acceptance for disposal in WAG 6 (ORNL 1993) will require either analyses of the contaminant of the IDW or cross-reference to a sample known to be associated with the contamination. Soils will be

left within the AOC. For those items determined through field screening to be contaminated, radioactivity measurements from portable radiation survey instruments will be converted to activity units (curies).

The following equation will be used to estimate the activity of specific radionuclides in segregating wastes at WAG 10.

$$\{[(count/sensititvity)/constant)/area]\}*percent = activity$$

where

count = rate of counts recorded by detector (cpm)
sensitivity = sensitivity of detector to particular radionuclide (cpm/dpm)
constant = ratio of disintegrations to activity (dpm/μCi)
area = surface area of detector probe (cm^2)
percent = estimated percent of total activity attributed to a particular radionuclide
activity = radioactivity attributed to a particular radionuclide per unit area ($\mu Ci/cm^2$)

An estimate of activity by radionuclide (50% strontium, 25% cesium, and 25% plutonium) will be used to determine the radionuclides of concern and estimate the percent concentration by activity of potential waste contaminants. This estimate was developed as a conservative approach to segregating waste in a poorly categorized area. An assumption is made that this is a representative sample of the composition of the waste injected at WAG 10.

It is recognized this method of characterization is an estimate and is highly dependent on the assumptions made of the radionuclide composition of the contaminant source, the sensitivity and limitations of the portable survey instruments, and the masking potential of the IDW itself, especially with respect to alpha emissions.

As an example of the calculation, an item causes the 15-cm^2 pancake probe of a Geiger-Mueller survey meter to read 1000 cpm. To estimate the activity of strontium-90, assumptions are made that strontium-90 comprises 50% of the activity and the sensitivity of the probe to strontium-90 is 0.2 cpm/dpm. The following result is achieved:

$$\{[(1000\ cpm/(0.2\frac{cpm}{dpm})/(2.2\ x\ 10^6\frac{dpm}{\mu Ci})]/15\ cm^2\}*0.50\ Bq/Bq\ =\ 7.6\ x\ 10^{-5}\frac{\mu Ci}{cm^2}$$

For the example, the assumption would then be that the strontium-90 content of the contaminant causing the count rate of 1000 is 7.6×10^{-5} μCi/cm^2 or, to state it another way, count rate $\times$ 7.6×10^{-8} μCi/cm^2 estimates the activity due to strontium-90.

In addition to surveying waste in the field with alpha scintillation and beta/gamma probes for radiological contamination, data from CSL screening analyses such as gross alpha, gross beta, gamma spectroscopy, tritium, carbon-14, volatile organics analysis by gas chromatography-photoionization detection, ion chromatography, suspended and dissolved solids, and pH will also be used as needed. If alpha and beta readings are near action levels, isotopic characterization will be performed. Laboratory testing will not be performed if knowledge of waste content is sufficient and documentation is adequate.

2.3 WASTE FORMS AND DISPOSITION

2.3.1 Solid Wastes

Solid compactible waste includes materials such as paper, plastic, thin-gauge metal, and tape. Solid compactible waste that will be generated during the OU3 RI includes PPE, plastic wraps, strip-coat paints, CSL wastes (e.g., wipes and planchettes), plastic sample containers, and tape. No soil sampling and analysis is planned for the investigation. However, if the project scope is revised to include this activity, a list of analytical parameters for waste soil will be developed.

Solid noncompactible waste that will be generated includes contaminated tools and pieces of equipment for which the cost of decontamination would exceed the replacement value of the item (e.g., contaminated glass or metal sample containers and contaminated fittings resulting from any wellhead modifications). It is expected that solid IDW will be containerized and turned over to Energy Systems for disposal rather than placed back on the ground due to its form (e.g., plastic wrap, smear paper, and PPE) and projected minimal volume. No soil sampling or borings are planned for this investigation. However, if the project scope is changed to include these activities, excess soils will be returned to the boring if possible, in accordance with the IDW concept.

2.3.2 Liquid Wastes

Liquids generated during WAG 10 field activities will be containerized, sampled, and analyzed for the parameters listed in Table 1. Analytical results will be submitted to Energy Systems.

2.3.3 Sanitary and Infectious Wastes

No facility or process planned for use during the WAG 10 RI has been determined to generate sanitary or infectious wastes.

Table 1. Monitored contaminants for discharge to the Process Waste Treatment Plant

Radionuclides	Metals	Others
Gross alpha	Ag	Chlorine (Cl_2)
Gross beta	As	Cyanide (CN)
^{90}Sr	B	Nitrate (NO_3)
^{137}Cs	Ba	Oil and grease
^{60}Co	Be	pH
^{152}Eu	Cd	Phosphate (PO_4)
^{154}Eu	Cr	Sulfate (SO_4)
^{155}Eu	Cu	Total organic carbon
^{106}Ru	Fe	Total suspended solids
$^{95}ZrNb$	Hg	Total toxic organics
	Ni	
	Pb	
	Sb	
	Se	
	Zn	

Source: ORNL, *Oak Ridge National Laboratory Liquid Waste Treatment Systems Waste Acceptanc Criteria*, WM-WMCO-201, Oak Ridge, Tennessee.

2.4 WASTE MINIMIZATION METHODS AND PLANNING

Because waste materials (e.g., PPE, damaged machine parts, soil, water, and sediments) generated during an RI have the potential to be contaminated, they will be treated as contaminated waste until survey or monitoring results establish that they can be released from the site. This section discusses the field methods and planning necessary for minimizing wastes.

2.4.1 Material Selection

Materials selected for use in WAG 10 will be able to withstand continuous field use and be easily decontaminated. Because of its ability to be effectively cleaned, stainless steel will be used for equipment that will come in direct contact with potentially contaminated environmental media.

Drums or B-25 metal boxes used to contain wastes as they are generated will be routinely maintained to ensure their integrity and appearance. Plastic liners will be used to minimize internal corrosion, and the exterior of the waste containers will be repainted as necessary to minimize external corrosion. Ground coverings (such as synthetic geotextiles or plastic material) may be used for temporary accumulation of potentially contaminated materials so that release surveys can be conducted to determine whether the material will be disposed of as contaminated or noncontaminated waste. The coverings and containers will be near the field activity, inside the CAA where the material will be segregated.

2.4.2 PPE Selection

Field personnel wear PPE to prevent potentially radioactive and hazardous materials from contacting the skin and entering the body. The basic set of PPE (Level 1) required in the field includes washable cotton coveralls and disposable gloves. Activities that could expose project personnel to higher levels of contamination will require additional sets of protective clothing. Protective equipment will be chosen to minimize the amount of waste material generated and to enable recycling of as much PPE as possible.

2.4.3 Contamination Control

Areas that may contain hazardous contaminants at elevated levels will be controlled to minimize the potential for spread of contamination. Ropes, barricades, and signs will control access to these areas; individuals will be monitored before they leave CAAs, and equipment will be scanned. Materials will be tentatively segregated at the point of generation as clean or contaminated, and field decontamination will reduce the amount of waste to be disposed of.

2.4.4 Material Minimization

Equipment and personnel entry into CAAs will be restricted to reduce waste. Unnecessary packaging will be removed before materials enter potentially contaminated areas, and the size of field crews will be maintained at levels that allow the activity to be performed safely. PPE may be monitored at the job site to determine contamination levels for further segregation as contaminated or noncontaminated waste.

2.4.5 Decontamination

Materials that come in contact with potentially contaminated substances must be monitored and, if contaminated, must be decontaminated by nonaggressive (dry wiping) or aggressive (grit blasting) techniques. Wiping is preferred because it is efficient and minimizes waste generation; more aggressive cleaning creates additional solid and liquid waste and can weaken the structure of the equipment so that it becomes waste.

3. WASTE VOLUME GENERATION

The limited OU3 field activities are specified in Sect. 2.1 of this WMP. Because of the unique nature of the investigation and the fact that many of the wells have not been sampled to determine whether they are contaminated, accurate prediction of waste volumes resulting from these activities is difficult. Table 2 provides waste volume estimates based on the activities currently proposed in the revised WAG 10 Field Sampling Plan; experience gained from performing similar activities in WAGs 1 and 6 was used in estimating waste volumes for these activities. Waste volume calculations for WAG 10 are maintained as project records.

Because the investigation as planned includes no soil boring or sampling, no soil or rock waste that could be maintained within the AOC as IDW is anticipated. The solid and liquid wastes listed in Table 2 will be transferred to Energy Systems for disposal.

Table 2. Estimated volumes of wastes generated during OU3 investigation

	Waste volume[a] (ft^3)			
Type of waste	Radioactive	Hazardous	Mixed	Noncontaminated
Solid				
Compactible[b]	63.48	1.38	0.69	3.45
Noncompactible[c]	21.16	0.46	0.23	1.15
Liquid				
Decontamination water[d]	118.82	2.58	1.29	6.46
CSL liquids	20.30	0.44	0.22	1.10

[a]It is assumed that field-generated waste is broken down into the following percentages: 92% radioactive, 2% hazardous, 1% mixed, and 5% noncontaminated.

[b]Based on 23 wells to be sampled, which will generate 3 ft^3/well of waste material.

[c]Based on 23 wellhead modifications, which will generate 1 ft^3/wellhead of waste material.

[d]Based on 23 wells utilizing 2 gal/well sampled and 40 gal/well for decontamination of logging truck and related sampling equipment.

4. WASTE HANDLING AND DISPOSITION METHODOLOGY

All types of materials will be checked for radioactivity and organic vapors. A containment system (e.g., drum or plastic covering) that restricts the release of the wastes to the environment will be provided for all waste materials throughout the WAG 10 field investigation activities. This section presents methods for implementing these requirements and incorporates the guidance given by ORNL for managing wastes. Options for handling and disposition are based on waste forms and classifications. The 1400 series of RI/FS PPs provide methods for handling and disposing of wastes for this project.

4.1 SOLIDS

As stated in Sect. 2.3.1, wastes will be segregated on the basis of field instrument surveys (i.e., portable radiation and organic vapor survey instruments). It is expected that most of the solids will be maintained in the waste staging area in a manner consistent with the protection of human health and the environment and ultimately transferred to Energy Systems for disposal.

Compactible solids (e.g., contaminated PPE, wipes, and small containers) and noncompactible solids (e.g., pipe, lumber, or metal) from wellhead modification that cannot be decontaminated and that do not meet the criteria for release for unrestricted use will be containerized at the point of generation. These wastes will be segregated into solid low-level waste (SLLW) and very-low-activity waste, based on the criteria identified in PP 1401, "Waste Characterization," and on the dominant radionuclide and the efficiency of the instrumentation. The waste will be placed within appropriately marked, tightly sealed containers and temporarily retained within the AOC until they are transferred to Energy Systems in accordance with to PP 1402, "Waste Handling."

4.2 LIQUIDS

Waste liquids will be containerized in the field in containers compatible with the anticipated characteristics of the liquids collected. Liquids will subsequently be transferred to bulk storage containers in the waste staging area. All liquids will be sampled and analyzed for the parameters given in Table 1 before being transferred to Energy Systems for disposal.

5. TRAINING REQUIREMENTS

Training for individuals handling waste will be conducted and documented in accordance with PP 1404, "Waste Management Training."

5.1 WASTE GENERATOR CERTIFICATION SUPERVISOR

The project WGCS will complete the following Energy Systems-required training:

- hazardous waste generator certification training,
- SLLW generator training, and
- ORNL transuranic waste generator certification training.

The WGCS will also complete the training specified in PP 1404 and project-based training as specified by the ES&H Manager on the individual's training work sheet. The WGCS will ensure that waste generating activities are performed by individuals who have received the required Energy Systems training, including SLLW training, and are qualified to sign off on the appropriate waste management forms.

5.2 WASTE TECHNICIANS

Waste technicians will complete the training specified in PP 1404 and project-based training as specified by the ES&H Manager on their training work sheets.

5.3 GENERAL FIELD PERSONNEL

General field personnel will participate in a briefing on the operational aspects of this plan; this briefing will be documented with a training attendance roster. This WMP will be made available as a reference for field personnel at the Field Operations Facility.

6. RECORDS

6.1 WASTE MANAGEMENT LOGBOOK

The WGCS will maintain a logbook in accordance with PP 1631, "Logbook Protocols"; the logbook will contain the following information concerning all waste generated or handled:

- location and identification of borehole, well, monitoring station, or other facility where the waste was generated;
- date of generation;
- volume generated and immediate disposition (including container number if applicable);
- summary of field instrument screening data and reference to ES&H survey number;
- summary of CSL screening results and reference to CSL data identifier, if appropriate;
- classification of waste; and
- disposition of waste.

6.2 SECONDARY AND SUPPORTING RECORDS

Secondary and supporting records provide details concerning the entries in the waste management logbook, including

- individual logbook contents,
- CSL screening results report sheets,
- ES&H survey forms,
- waste management area inspection forms,
- copies of applicable Energy Systems/ORNL waste management forms, and
- convenience forms designed and maintained by field operations personnel (as deemed necessary by the WGCS).

Secondary and supporting records must be referenced in the waste management logbook.

6.3 DISPOSITION OF RECORDS

Original Energy Systems/ORNL Waste Management forms are submitted to the ORNL RI/FS Field Coordination Manager for his signature as GCO after the WGCS has ensured that the "generator" sections of the forms have been properly completed. The GCO then submits these forms to the appropriate Energy Systems disposal entity.

The waste management logbook and all secondary and supporting records will be submitted to the Project Document Control Center for incorporation into the project record.

7. RESPONSIBILITIES

7.1 ORNL ENVIRONMENTAL RESTORATION PROGRAM

The ORNL Environmental Restoration Program will be responsible for providing project oversight, waste disposal, and a point of contact regarding handling and storage of project-generated wastes. The ORNL RI/FS Field Coordination Manager is the GCO and the interface between the project and the ORNL Laboratory Certification Officer and Waste Management Organization.

7.2 WAG 10 PROJECT MANAGEMENT

The WAG 10 Task Manager will be responsible for coordinating staff and field activities necessary to implement this plan. In conjunction with program management and Energy Systems/ORNL/Environmental Restoration Division management, the WAG 10 Task Manager will be responsible for providing the resources necessary for effective management of waste during WAG 10 field activities.

7.3 TECHNICAL SUPPORT

The Technical Support Lead will be responsible for all engineering, siting, permitting, waste management, and regulatory oversight activities necessary for implementing this plan. Technical support activities will be conducted in accordance with applicable ORNL/Energy Systems design standards, Bechtel Engineering Department procedures, RI/FS Project engineering procedures, and Bechtel design standards, as applicable.

7.4 FIELD SUPPORT

The Field Support Lead will be responsible for operational and construction aspects of this plan in accordance with applicable PPs. This responsibility includes coordination with the Technical Support Lead and with Energy Systems/ORNL departments responsible for siting the waste management area within WAG 5. The WGCS will ensure that all project waste generators have completed the required ORNL waste training before they generate waste.

7.5 ES&H DEPARTMENT

The ES&H Manager will be responsible for health and safety oversight and support for the engineering, siting, permitting, and operational activities necessary for implementing this

plan. The ES&H Department will supply trained ES&H specialists and instrumentation necessary for conducting field measurements of hazardous substances in support of the operational aspects of this plan.

7.6 QUALITY ASSURANCE/QUALITY CONTROL DEPARTMENT

The Quality Assurance Manager will be responsible for periodic surveillance and audit activities associated with this plan and related PPs to ensure compliance with these provisions.

BIBLIOGRAPHY AND REFERENCES

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APPENDIX A

WASTE MANAGEMENT PLANNING CHECKLIST

Waste Management Planning Checklist
ORNL Environmental Restoration Program

Date 6/30/93

1. Project Name: Remedial Investigation/Feasibility Study Expected Start/Completion Date: August 1993/March 1994

   Responsible Project/WAG Manager: Jim Kannard/Russ Lahoud

   Phone: 220-2219

   Address: Bechtel National, Inc., P.O. Box 350 (151 Lafayette Dr.), Oak Ridge, TN 37831

   Location of Project (WAG, building, street, etc.): WAG 10, OU3, Hydrofracture Facilities

   Organization/Subcontractor Performing Waste Generation Task: Bechtel Team

   Work Order Number for Waste Management/P&E Activities: ORNL/ER/SUB/87-99053/55

2. Responsible field ORNL Construction Engineer/Prime or Subcontractor:
   Bechtel National, Inc.

   Phone: 220-2000

   Address: P.O. Box 350 (151 Lafayette Dr.), Oak Ridge, TN 37831

   Responsible field and ES&H Supervisor: Ray Patterson, Field Supervisor, and Clay Davis, ES&H Supervisor

   Phone: 574-9778 (Ray Patterson), 220-2577 (Clay Davis)

   Address: P.O. Box 350 (151 Lafayette Dr.), Oak Ridge, TN 37831

Please attach a drawing or sketch of the proposed location(s) of the waste-generating activities to this document (unless sketch is in project waste management plan).

See sketch in project waste management plan.

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3. Project Description (site history and scope of project):

See introduction of project waste management plan.

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4. Completion and Signatures of Waste Management Forms:

Individuals who have not taken the proper training authorizing them to sign Waste Disposal forms UCN-2822 and UCN-16114 should contact Kory Gabrielsen at 576-4374, for Specific Training Requirements.

A. Request for Storage or Disposal of Radioactive Waste or Special Materials (Appendix C, attachment 1):

Form UCN-2822

Charles Clark	Ed Kelley, Field Safety and Health Supervisor (FHSS)
Requestor's Name (GCO, MMES Employee)	Health Physics Technician's Name

B. Log in Data Sheet (Appendix C, attachment 2):

Form UCN-16114

Tammy Bunch, Waste Generation Certification Supervisor (WGCS)
Column 15: Supervisor or designee
of waste packaging/containerization
activities (generator)

Charles Clark
Notes 2, 3: GCO

C. Request for Disposal of Hazardous Waste Material (Appendix C, attachment 3):

Forms UCN-13698 and UCN-13698A

Bechtel Team
Subcontractor/Prime Contractor
Waste Generator Name

Ed Kelly, FHSS
Health Physics Technician's Name

Environmental Restoration
MMES Waste Generator Name

D. Request for Disposal of Asbestos or Material Containing Asbestos (Appendix C, attachment 4):

Form UCN-13386

NA
Requestor's Name

E. Request for Disposal of Sanitary/Industrial Waste and Spoil Material

Form UCN-2109/Trip Ticket (Obtain form and trip ticket from ORNL Hazardous Waste Operation Group).

Tammy Bunch, WGCS
Authorized Name

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5. Person or organization responsible for completing the ORNL ER Weekly Waste Generation Report (Appendix C, attachment 5):

Tammy Bunch, WGCS
Name

6. Organization or person responsible for providing, MMES, prime or subcontractor with characterization data for waste transfer or dispositioning:

   Bechtel Field Operations Facility (FOF). Tammy Bunch, WGCS

7. Organization or person responsible for obtaining samples from waste containers and transporting those samples to the analytical laboratory for characterization purposes:

   Bechtel Field Operations Facility (FOF). Tammy Bunch, WGCS

8. Describe sampling plan for taking samples (from waste containers or the area of contamination) that are to be sent to the lab for characterization information which will be used in completing the waste disposal forms.

   For aqueous waste a grab sample will be collected from the bulk storage tank. No solid waste samples anticipated.

9. Organization or person responsible for performing analysis on waste samples for characterization purposes:

   Bechtel Close Support Laboratory (CSL), onsite and subcontracted offsite commercial lab.

10. What analysis will be requested to characterize the waste? (Be Specific)

    Process waste treatment facility acceptance criteria listed in Table 1 of the Waste Management Plan.

11. List the process knowledge available to characterize the waste: (Be Specific)

    Wells to be sampled are associated with Hydrofracture Facilities.

12. Is the available process knowledge enough to properly characterize the waste without having to perform analysis on the waste? Y/N/NA (Please Circle)

13.

Waste Stream/Source[a]	Type[b]	Category[c]	Volume (cubic feet)[d]	Suspected Contaminates
(1). Types, sources, and estimated volumes of waste listed in Table 2 of waste management plan.				^{90}Sr & ^{137}Cs
(2).				
(3).				
(4).				
(5).				
(6).				

[a]Coring, drilling, deconning, surface/ground water sampling, protective equipment, well puring, etc.
[b]Liquid, metal, plastic, sediment, sludge, soil, etc.
[c]Classified, clean, construction, hazardous, mercury, mixed, nonhazardous, radiological, TRU, TSCA, etc.
[d]ER Methodology for generating waste volume estimates is to be used in estimating waste volumes. Unless if you have an approved alternate methodology for estimating waste volume.

What Methodology was used to estimate your waste volumes? (Be Specific)

Previous experience with similar work performed in WAGs 1, 6, and 5.

14. Will a spill control kit be on-site during waste generation activities? Y/N/NA (Please Circle)

What will the spill control kit consist of? (Be Specific)

Spare containers (e.g., 55 gallon drums), labels, bulk absorbent (e.g., soda ash, clay) or absorbent pillows, shovel or scoop, sponge mop, heavy duty plastic bags, and extra level 3 PPE (for 2 people).

Is a first responder emergency action plan in place, in case of spill or a line puncture? This means in addition to contacting Laboratory Protection (911). Please be specific.

15. What organization or person will be assigned the responsibility of properly containerizing the waste, labeling the waste containers, and labeling and bagging contaminated material?

Tammy Bunch, WGCS for Bechtel Team

16. Which of the following areas will be required to temporarily store the project waste until the waste can be transferred to ORNL Waste Management Operations?

A. Radiological Waste Storage Area: Y/N/NA (Please Circle)

Location: WAG 5

Responsible organization or person that will manage area: Tammy Bunch, WGCS for Bechtel Team

B. 90-Day Storage Facility for hazardous or mixed waste: Y/N/NA (Please Circle)

Location: WAG 5

Responsible organization or person who will manage area: Tammy Bunch, WGCS for Bechtel Team

C. Satellite Accumulation Area: Y/N/NA (Please Circle)

Location: Field Operations Facility

Responsible organization or person that will manage area: Tammy Bunch, WGCS for Bechtel Team

D. What is in place to protect the structural integrity and weatherability of drums and B-25 boxes. (Be Specific) (Refer to instructions for assistants.) Inspection and maintenance guidance provided in PP 1402 and PP 1406.

E. If any of the above areas will not be used to manage the waste, please give specific details to how this waste will be managed.
Examples: stockpiling, solidification, incineration, synthetic or clay linings, in situ vitrification, leave waste in area of contamination, etc.

Have training requirements (e.g., Satellite Accumulation Area and 90-Day Accumulation Area) been fulfilled to manage the storage area? Y/N/NA (Please Circle)

17. Have you spoken to ORNL compliance personnel pertaining to your requirements for managing a temporary satellite, 90-day or radiological waste storage? Y/N/NA (Please Circle)

April Dickens — 576-3929
Person Contacted — Phone

List the specific requirements:

18A. Can the ORNL Hazardous Waste Group take charge of the hazardous or mixed waste generated? Y/N/NA (Please Circle)

If not now, when?

List any specific requirements:

Volume of Waste (cubic feet):

Lewis Wesley (contacted 6/30/93) — 574-7467
Person Contacted — Phone

18B. Can the Solid Radioactive Waste group accept the volume of radiological waste that will be generated? Y/N/NA (Please Circle)

If not now when?

List any specific requirements:

Volume of Waste (cubic feet):

Jack Adams (contacted 6/30/93) — 576-4759
Person Contacted — Phone

18C. Can the Liquid Gaseous Waste Group accept the liquid waste that will be generated?

Y/N/NA

If not now, when?

List any specific requirements:

Volume of Waste (cubic feet):

Chris Scott — 574-7057
Person Contacted — Phone

18D. Do you plan to generate any brine solution, sludge or sediment waste; if so, how will you manage this waste? Give specific details.

Not anticipated.

18E. Will any large volumes of uncontaminated spoils be generated? Y/N/NA
If yes, give specific details how you plan to manage those spoils.

18F. For waste that cannot be managed by any of the above ORNL Waste Operation Groups, what is your alternative for managing the waste? Give specific details. NA

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19. Will any TRU/or TRU Mixed Waste be generated? Y/N/NA

Not anticipated.

If yes, the Laboratory Certification Official is to be consulted, before any waste is generated.

List the specific requirements for managing TRU/and or TRU Mixed Waste.

None

Bob Hydzik	6/16/93
Person Contacted	Date

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20. What organization or person will be responsible for transporting the waste from the generation area to the temporary waste storage area to await final pickup by Martin Marietta Energy Systems (MMES)?

Tammy Bunch, WGCS for Bechtel Team

Describe the route that will be used to transport waste to the temporary waste storage area, treatment, facility, or disposal facility:

From FOF east onto White Oak Drive to south onto Melton Valley Drive to south into WAG 5. From WAG 10 north on unpaved access road to WAG 5.

21. Will ORNL Waste Management Operations be responsible for transporting waste from site of waste generation or the waste storage area to a MMES storage, treatment or disposal facility? ORNL Waste Operation does not normally pick up waste from offsite. Y/N/NA (Please Circle)

See items 18A, B, and C for MMES contacts

MMES Person Contacted Phone

Give specific details regarding who or what organization will be transporting the waste from the site of waste generation or waste storage area to a MMES storage, disposal, or treatment facility.

22. For waste that is generated offsite, who or what organization will transport that waste to ORNL Waste Operations? Give specific details as to how this waste will be transferred to ORNL Waste Operations?

NA

23. A. Will waste require transporting over public roads? Y/N/NA (Please Circle)
If yes, DOT regulation must be adhered to.

B. Will waste require transporting over DOE roads before 9 a.m. and after 4 p.m.? No
If yes, DOT regulation must be adhered to.

No

C. List the Department of Transportation issues that are of concern in transporting this waste: (Be Specific)

NA

D. Have you communicated those concerns of transporting the waste and associated resolutions to ORNL Transportation Operation Management Department and received their concurrence of how the waste may be transported? Y/N/NA (Please Circle)

Person Contacted Phone

E. List the resolutions to those concerns:

---

24. Identify your waste minimization techniques in that will be implemented during this task. Provide specific details.

- ■ Segregation
- ■ Decontamination
- □ Compaction
- □ Solvent Substitution
- ■ Sludge Dewatering
- ■ Selection of PPE
- □ Waste Handling (Spill Control)
- □ Material Recycle (Solvents, Wash Waters)
- □ Material Reuse (Solvents, Wash Waters)
- □ Cutting Fluids Recovery
- ■ Selection of Equipment
- □ Other

Description of Special Techniques:

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25. Attach any additional information that will give further clarification of your waste management plan.

Approvals

Signature Project Manager	ORNL Waste Management Operation Organization
Date	ORNL Waste Management Plan Document Number
Generator Certification Official	Date
Date	ORNL Environmental Restoration Program
	Date

Environmental Compliance and Documentation

Date

Laboratory Certification Official

DISTRIBUTION

1. H. L. Boston
2. R. T. Carvin
3. C. Clark, Jr.
4. C. D. Goins
5. L. W. Little
6–8. D. M. Matteo
9–10. P. T. Owen
11. T. F. Scanlan
12. P. A. Schrandt
13. A. S. Will
14. P. S. Wood
15. Central Research Library
16–18. Central ER Document Management Center
19–21. ORNL ER Document Management Center—RC
22. Laboratory Records Dept.
23. ORNL Patent Section
24. Office of Assistant Manager for Energy Research and Development, DOE Oak Ridge Operations Office, P.O. Box 2001, Oak Ridge, TN 37831-8600
25. J. R. Kannard, Program Manager, Bechtel National, Inc., P.O. Box 350, Oak Ridge Corporate Center, 151 LaFayette Drive, Oak Ridge, TN 37830
26. D. W. Swindle, Radian Corporation, 120 South Jefferson Circle, Oak Ridge, TN 37830
27–28. Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831

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