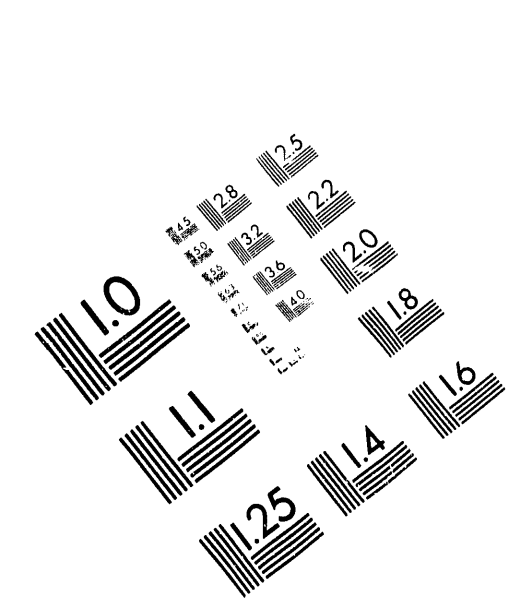

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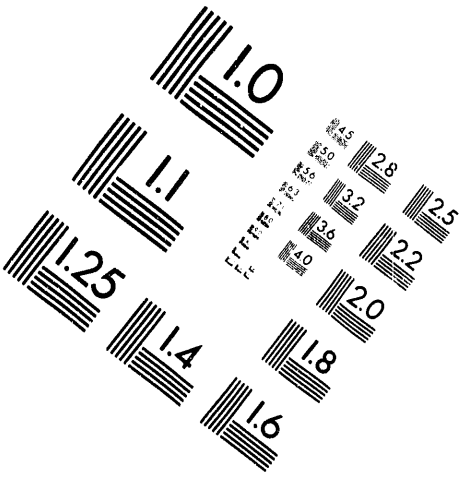

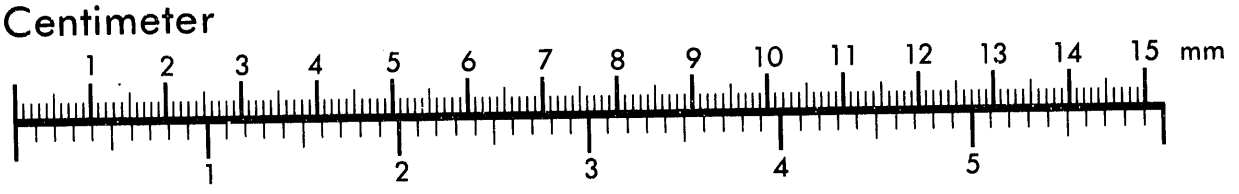

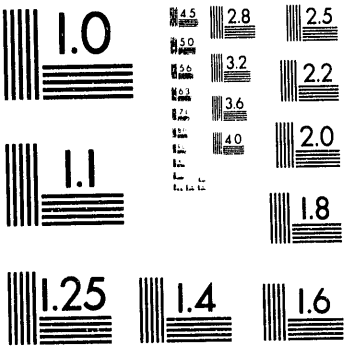

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Energy Systems Environmental Restoration Program
ORNL Environmental Restoration Program

Waste Management Plan for the Remedial Investigation/Feasibility Study of Waste Area Grouping 5 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

Date Issued—December 1992

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Oak Ridge, Tennessee 37831-6285
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
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under contract DE-AC05-84OR21400

WASTE MANAGEMENT PLAN

FOR THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY OF

WASTE AREA GROUPING 5 AT

OAK RIDGE NATIONAL LABORATORY, OAK RIDGE, TENNESSEE

Bechtel Job 19118

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1 Area of contamination in WAG 5 5

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ACRONYMS

AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ALARA	as low as reasonably achievable
CAA	controlled access area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSL	Close Support Laboratory
DOE	Department of Energy
EPA	Environmental Protection Agency
ES&H	Environmental, Safety, and Health
GC	gas chromatography
IDW	investigation-derived waste
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PP	project procedure
PPE	personal protective equipment
PWTP	process waste treatment plant
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
SWMU	solid waste management unit
TLV	threshold limit value
VOC	volatile organic compound
WAC	waste acceptance criteria
WAG	waste area grouping
WGCO	Waste Generation Certification Officer

EXECUTIVE SUMMARY

This Waste Management Plan for the remedial investigation of Waste Area Grouping (WAG) 5 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.

In accordance with the 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. 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 contamination 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 before remedial action is taken;
- potential worker exposures are not increased during the investigation and before remedial action is taken; and
- wastes managed within WAG 5 do not complicate the selection and implementation of remedial action alternatives.

Solid waste will either be placed back in the location where it originated within the WAG 5 area of contamination (AOC), placed in the WAG 5 waste consolidation area, or containerized and handed over the Martin Marietta Energy Systems, Inc. (Energy Systems). All liquids will be containerized and given to Energy Systems for disposal.

The management techniques and operational elements of this plan allow the maximum possible volume of IDW materials to remain within the AOC until final remedial action is completed.

This plan also addresses hazardous and radioactive wastes that are not IDW. Management techniques for these materials conform to the technical and administrative requirements of the Resource Conservation and Recovery Act as 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 as necessary to ensure uniform and consistent waste management operations.

1. INTRODUCTION

This plan defines the criteria and methods to be used for managing waste generated during activities associated with Waste Area Grouping (WAG) 5 at Oak Ridge National Laboratory (ORNL). WAG 5 is located in Melton Valley, south of the main ORNL plant area. It contains 17 solid waste management units (SWMUs) to be evaluated during the remedial investigation. The SWMUs include three burial areas, two hydrofracture facilities, two settling ponds, eight tanks, and two low-level liquid waste leak sites. These locations are all considered to be within the WAG 5 area of contamination (AOC).

The plan contains provisions for safely and effectively managing soils, rock cuttings, 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 contamination 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 plan is to provide guidance for waste handling and disposal using both field screening (i.e., with portable survey equipment) and, if necessary, media sampling and analysis in support of transferring waste to Energy Systems Waste Operations.

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

1.1 REGULATORY OVERVIEW

This plan was developed in accordance with published regulatory standards that are used as compliance documents at ORNL and other Department of Energy (DOE)-owned or DOE-controlled sites. 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 (RCRA)-defined materials.

1.1.1 EPA

EPA/540/G-91/009, *Management of Investigation-Derived Wastes During Site Investigations* (EPA 1991), provides direction for managing IDW under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This guidance is consistent with the applicable or relevant and appropriate requirements (ARARs) normally applied to remedial investigation/feasibility study (RI/FS) activities.

The key component of the guide is the guidance for managing IDW within the AOC until remedial action is taken. The guide, however, requires that management techniques protect human health and the environment and comply with (or obtain waivers of) ARARs. The EPA guide states that RI/FS and remedial design actions must comply with ARARs "to the extent practicable considering the exigencies of the situation" (EPA 1990). This document is applicable to field activities associated with the ORNL RI/FS Project. It is assumed that adherence to the provisions of this guidance document will satisfy the requirements of CERCLA, RCRA, the Hazardous Solid Waste Amendments of 1984, and the Emergency Planning and Community Right-to-Know Act as they apply to IDW generated by the ORNL RI/FS Project.

1.1.2 DOE Orders

DOE Order 5820.2A, *Radioactive Waste Management*, governs the handling and disposal of radioactive materials resulting from DOE activities. This order specifies four performance criteria that must be met in the management and disposal of low-level radioactive wastes: (1) Protect public health and safety in accordance with standards specified in applicable Environmental Health Orders and other DOE Orders; (2) ensure that exposures resulting from all credible pathways result in an effective dose equivalent that does not exceed 25 mrem/year to any member of the public and that releases to the atmosphere shall meet the requirements of 40 Code of Federal Regulations (CFR) 61 (EPA 1988); (3) ensure that the dose to an inadvertent intruder into the facility after loss of institutional controls (100 years) will not exceed 100 mrem/year for continuous exposure or 500 mrem/year for a single acute exposure; and (4) protect groundwater resources consistent with federal, state, and local requirements (DOE 1988a). This order is consistent with EPA guidance in specifying that actions taken with radioactive wastes must protect human health and the environment. As applied to the ORNL RI/FS, the objectives of the order as defined by the four criteria (with the possible exception of the 100-year loss of institutional control) are applicable to waste management options that retain radionuclide-bearing wastes within a WAG until final remediation.

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. The ALARA philosophy has been subsequently incorporated into ORNL Health Physics Procedure RP-3.1 (ORNL 1992a) in the form of an administrative limit of 2 rem/year. The RI/FS Project has an overall ALARA objective of 75% of the ORNL administrative limit for its workers [Bechtel Project Procedure (PP) 1280.3]. DOE Order 5480.11 has been revised to require implementation of the DOE *Radiological Control Manual* by December 1992 (see Sect. 1.1.4).

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. This order presents the derived concentration guides for radioactive material in air and water that will expose an individual to 100 mrem of annual effective dose equivalent under continuous exposure conditions. Chapter 4, entitled "Residual Radioactive Material," presents radiological protection requirements and guidelines for cleanup of residual radioactive material, management of the resulting wastes and residues, and release of property. It is the objective of this order that potential exposures to members of the public be maintained ALARA (DOE 1990).

1.1.3 Occupational Safety and Health Administration (29 CFR 1910)

The Occupational Safety and Health Administration (OSHA) has established standards for limiting occupational exposure to hazardous materials. 29 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 1992b) 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 threshold limit values (TLVs) as standards (ACGIH 1991). TLVs are used during field operations when they are more conservative than PELs.

1.1.4 DOE Radiological Control Manual (DOE N 5480.6)

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 operation 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 5 Waste Management Plan was developed using elements of the manual and includes excerpts where appropriate.

1.2 DEFINITION OF WAG 5 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 AOC is roughly defined as WAG 5 (see Fig. 1) and includes locations outside the WAG 5 boundary where field work and storage of radioactive waste are expected. RCRA land disposal restrictions do not apply to movement of wastes within the AOC, but may apply if the wastes are removed from the AOC. Department of Transportation and RCRA manifesting requirements will apply for movement of hazardous, radioactive, or mixed wastes between noncontiguous AOCs.

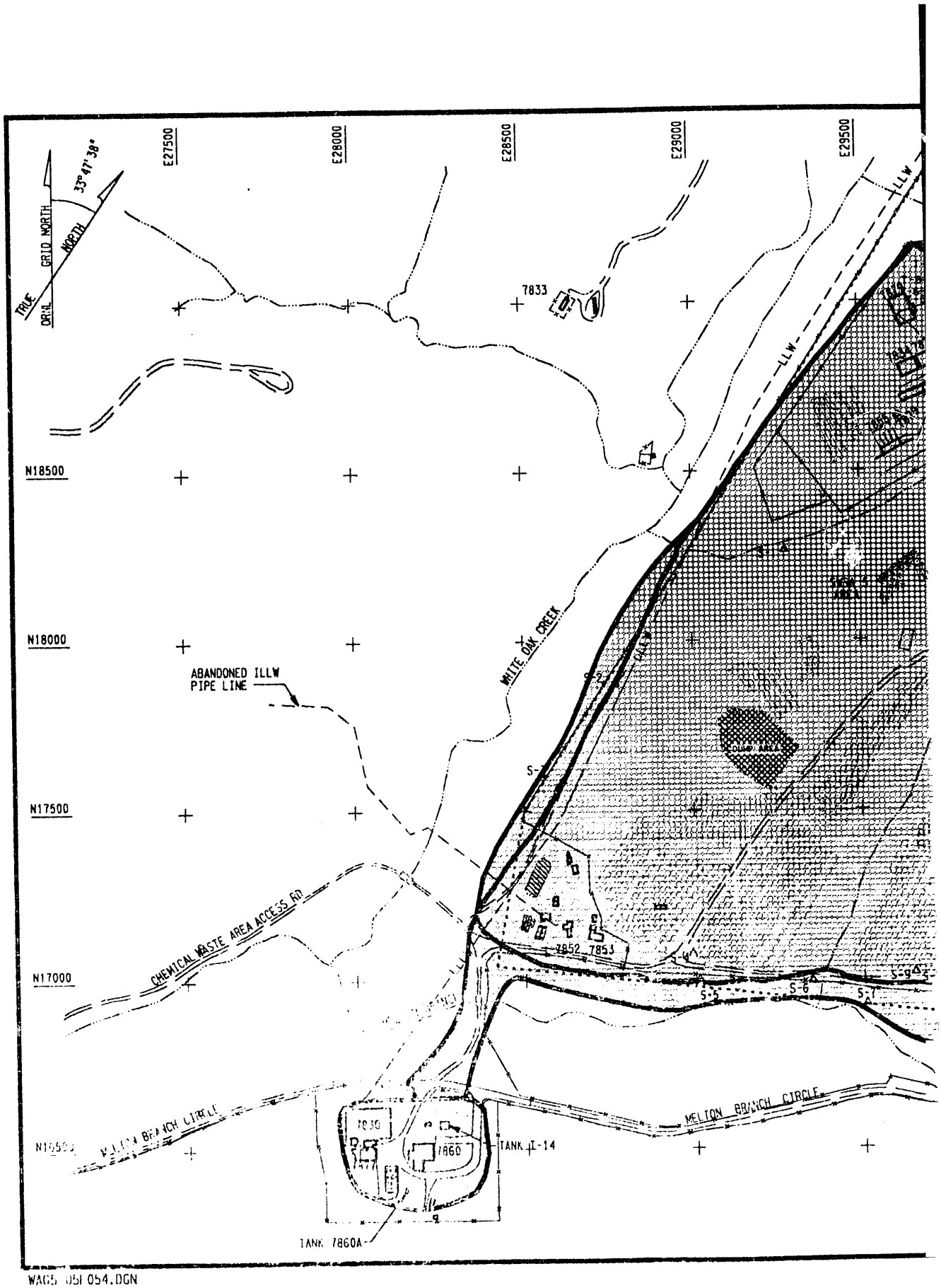
1.3 WAG 5 WASTE CONSOLIDATION AREA

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

1.4 WASTE STAGING AREA

A waste staging area will be established in WAG 5 to permit the segregation and efficient consolidation of IDW and non-IDW waste generated during WAG 5 activities. During the preparation of the consolidation area, the staging area will be used to temporarily retain IDW that is intended for disposition within the consolidation area in a controlled and protective manner.

The types and expected sources of wasters to transit the waste staging area are described in Sect. 2.0, "Waste Characteristics."



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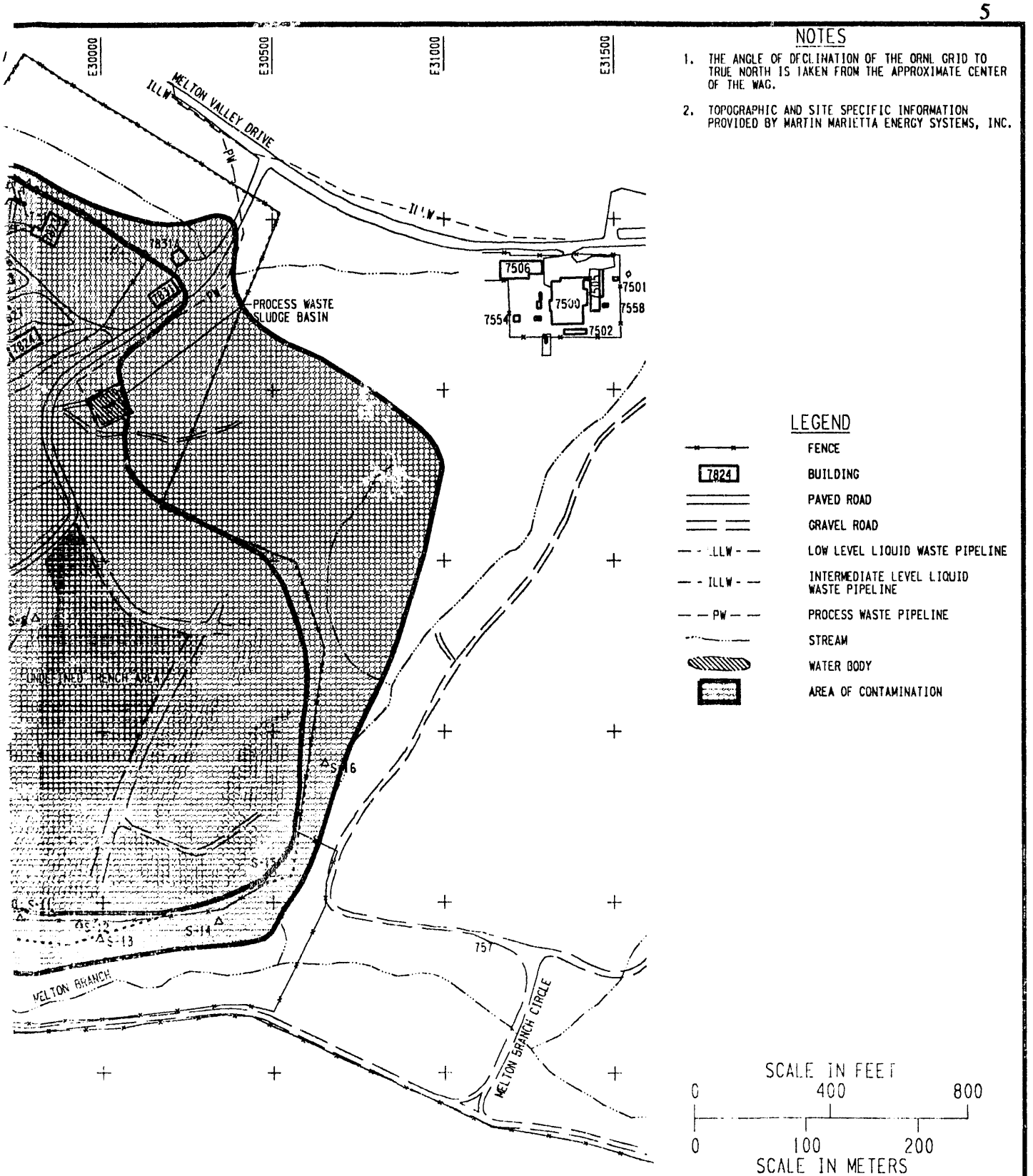

a of contamination in WAG 5.

2. WASTE CHARACTERISTICS

2.1 ACTIVITIES GENERATING IDW AND OTHER WASTES

Activities that will generate IDW wastes are described in detail in the Remedial Investigation Plan for WAG 5 (Bechtel 1988). Most of the wastes will be generated as the result of

- shallow soil sampling by split spoon and auger,
- core drilling of monitoring wells,
- developing and/or purging monitoring wells,
- excavation (e.g., from installation of surface water flumes),
- disposing of PPE,
- decontaminating small tools by hand techniques and decon trailer wastes,
- using anticontamination coverings, and
- sample residuals returned from the analytical laboratory following analysis.

The IDW waste volumes expected from these activities are listed in Sect. 3. These sources are further described in subsequent paragraphs.

WAG 5 RI/FS wastes that cannot be classed or managed as IDW will be managed under existing procedures by the Energy Systems/ORNL organizations responsible for radioactive and hazardous waste disposal. These wastes include

- Close Support Laboratory operations waste:
  - wash water for glassware,
  - sample residues,
  - gas chromatography (GC) Hall effect detector carrier solvent,
  - expended GC standards,
  - dilute acids,
  - dilute bases,
  - non-toluene-based liquid scintillation cocktails,
  - processed urine samples, and
  - disposable PPE;

- Field instrument maintenance and standardization wastes:
  - expended alkaline batteries,
  - expended nickel-cadmium batteries,
  - expended lead-acid gel batteries,
  - expended lithium batteries, and
  - empty standardization gas cylinders;

- Motor-driven equipment wastes:
  - gasoline residues and wipes,
  - diesel fuel residues and wipes,
  - lubricating oil residues and wipes,
  - glycol hydraulic fluid residues, and
  - petroleum/hydraulic fluid residues;

- Decontamination and cleaning facility operations wastes:
  - decontamination water,
  - waste isopropanol,
  - dilute acids,
  - soil residues,
  - expended aluminum oxide abrasives,
  - disposable PPE, and
  - contaminated wipes and rags.

Mechanisms and procedures are in place for managing these wastes.

2.2 WASTE SOURCES

2.2.1 Shallow Soil Sampling by Split Spoon and Auger

The normal practice for obtaining subsurface soil samples involves drilling a split-spoon sampler in front of an auger drill. The auger drilling aspect of this sampling technique raises to the surface soil cuttings that are unwanted by-products of the sampling process. Additionally, if the volume needed for a sample is less than the volume of material removed from the split-spoon sampler, the remnants become waste materials. For other purposes, auger drilling may also be used to reach the underlying bedrock; in this event, all of the soil brought to the top of the borehole becomes a waste material.

All auger cuttings will be collected in drill pans at the ground surface to provide for positive containment. The cuttings will be returned to the borehole using best management practices to protect workers and the environment. Any surplus cuttings will then be removed from the drill pans and placed in an approved container which will be transported to the consolidation area for dispositioning.

2.2.2 Core Drilling of Monitoring Wells

Core-barrel drilling, the technique commonly used to produce boreholes in bedrock, has the capacity to produce rock samples (cores) during the drilling process. This technique requires the use of a drilling fluid (usually water) to lubricate the drill bit and to remove drill cuttings from the borehole. The drilling fluid can be recycled through a mud pan to reduce the volume of waste generated by the process. If significant levels of contamination are encountered, however, the process can be converted to a "once-through" method of handling the drill fluids to preclude excessive contamination of return lines and pumps. In either case, the mud pan is constructed to allow solids to settle, thereby creating both sludge and liquid waste. Unwanted rock cores will also be a source of solid waste generated by this process.

Wet core drilling methods produce large quantities of rock flour that could contain greater than 95% water. The resulting sludge will be transported to the consolidation area for phase-separation. The solid phase must be kept from drying if radioactive or hazardous materials are present because of the high content of small, respirable-sized particles. The expected volume of these wastes is listed in Sect. 3.

2.2.3 Developing and/or Purging Monitoring Wells

Groundwater removed from existing wells and from new monitoring wells may contain from $<1\%$ to $>35\%$ solids, depending on well construction parameters and the intercepted strata. The liquid fraction of these wastes is expected to contain radionuclides characteristic of previous WAG 5 disposal practices, but no data are available on other potential hazardous contaminants. It is expected that solids will generally be larger than the respirable range of particulate size and settle rapidly in collection vessels. The expected volume of these wastes is listed in Sect. 3.

2.2.4 Installing Surface Water Flumes

The installation of surface water flow monitoring flumes and sampling stations will require excavation and grading within and adjacent to several drainageway flow channels, which is expected to produce a highly watered, contaminated soil and rock mixture. As appropriate, this material may be used in the adjacent area as fill material. Although particle sizes will generally be large, weathering and drying of these materials may result in contaminant releases into the stream channel if they are not effectively managed. Surplus fill material will be transported to the consolidation area for dispositioning. The expected volume of this waste is listed in Sect. 3.

2.2.5 Disposing of PPE

Invasive operations in WAG 5 will require, as a minimum, Level 2 PPE. Level 2 outer clothing consists of low air-permeability, spun, bonded polyolefin fabric (providing limited wet contaminant protection), neoprene overboots, and a two-part glove ensemble. The outer clothing and innermost gloves are disposable. Outer gloves may be decontaminated and reused if practicable. As experience in WAG 6 and WAG 1 indicates, the disposable PPE usually becomes contaminated with radioactive materials and must be classified as radioactive

waste. This waste will be transferred to Energy Systems Waste Operations for disposal. The expected volume of this waste is listed in Sect. 3.

2.2.6 Decontaminating Small Tools by Hand Techniques

Sampling and drilling tools are subjected to initial gross decontamination within the AOC before they are transported to the central decontamination and cleaning facility. Small volumes of deionized water and hand wipes are used to remove gross contamination in the field before tools are transported to the decontamination facility. The expected volume of this waste is listed in Sect. 3.

2.2.7 Using Anticontamination Coverings

Plastic sheeting and sleeving are used extensively in field operations to prevent contact of contaminated surfaces and soils with machinery and tools that are difficult to decontaminate. This waste will be transferred to Energy Systems Waste Operations for disposal. The expected volume of this waste is listed in Sect. 3.

2.2.8 Sample Residual from Analytical Laboratory

Sample residuals (e.g., soils, sediments, rock) that are not consumed by the analytical laboratory will be transferred to Energy Systems Waste Operations for disposal when they are no longer needed.

2.3 WASTE DETERMINATION CRITERIA

Criteria for appropriate screening and classification of wastes for cost-effective disposition or isolation will be consistent with the EPA guidance (EPA 1991) and with currently available, applicable regulatory or administrative guidelines. This section presents classification criteria for waste materials based on regulatory and administrative concepts.

Data such as CSL screening data for transportation or sample selection will also be used as needed. If process knowledge of waste content is sufficient for classification and is adequately documented and recorded as part of the waste management records, laboratory testing will not be utilized.

Wastes will be classified by the Waste Generation Certification Officer (WGCO) 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 will be contacted to determine the disposition of waste solids. Criteria are developed in accordance with the guidance in Articles 131 and 132 of DOE 5480.6, *Radiological Control Manual* (DOE 1992).

2.4 SOLIDS

Solids consist of waste materials from soil sampling, drilling, and excavating for flume installation. It is the objective of this plan to return waste materials to the source of origination using best management practices that protect human health and the environment.

2.4.1 Disposition of Waste to Original Source

The criteria for the disposition of waste spoils to the source of origination are as follows:

1. The redisposition of spoils is not to change the aboveground radiation exposure rates from their presurvey radiation exposure rates measured 3 ft above the ground surface.

2. More than 1 ft of a seal may be used to assist in keeping the aboveground radiation exposure rates at the presurvey values.

3. The resuspension of soil particles may be halted by sealing the last 12 in. of the hole with grout/bentonite.

2.4.2 Surplus Solid Waste

Surplus solid wastes are those that could not be returned to the source of origination because of lack of space within the borehole or excavation site. Surplus solids that do not pose an undue exposure rate (> 100 mrem/h) will be transported to the consolidation area for disposal. Those surplus waste spoils that are deemed clean (< 1000 ppm/100 cm^2 beta-gamma) by initial probe survey or show no detectable alpha contaminants by initial probe survey will be stockpiled on site (on top of a high-density polyethylene liner) for use as fill material for other activities. Those waste spoils that exceed 100 mrem/h will be containerized, analyzed, and transferred to Energy Systems Waste Operations.

2.5 LIQUIDS

All liquids generated during WAG 5 field activities will be containerized, sampled, analyzed, and delivered to the Process Waste Treatment Plant (PWTP) if concentration levels [waste acceptance criteria (WAC)] are not exceeded (ORNL 1991). Those liquids exceeding the WACs given in Table 1 will be disposed of according to Energy Systems' internal procedures.

Table 1. Maximum allowable concentrations of specific wastewater contaminants for discharge to the PWTP

Contaminant	Concentration
Radionuclides	
Gross alpha	175 Bq/L
Gross beta	10,000 Bq/L
^{90}Sr	10,000 Bq/L
^{137}Cs	400 Bq/L
^{60}Co	185 Bq/L[a]
$^{Eu}152$	740 Bq/L[a]
$^{Eu}154$	740 Bq/L[a]
$^{Eu}155$	3700 Bq/L[a]
^{106}Ru	222 Bq/L[a]
$^{95}ZrNb$	1480 Bq/L[a]
Metals	
Ag	0.4 mg/L
As	40.0 mg/L
B	40.0 mg/L
Ba	120.0 mg/L
Be	0.2 mg/L
Cd	0.3 mg/L
Cr	7.5 mg/L
Cu	2.5 mg/L
Fe	500.0 mg/L
Hg	0.004 mg/L
Ni	65.0 mg/L
Pb	30.0 mg/L
Sb	65.0 mg/L
Se	15.0 mg/L
Zn	60.0 mg/L
Others	
Chlorine (Cl_2)	20.0 ppm
Cyanide (CN)	0.2 ppm
Nitrate (NO_3)	10.0 ppm
Oil and grease	100.0 ppm
pH	>6.0
Phosphate (PO_4)	5.0 ppm
Sulfate (SO_4)	3000.0 ppm
Total organic carbon	50.0 ppm
Total suspended solids	1000.0 ppm
Total toxic organics	100.0 ppm

[a]DOE Order 5400.5 Derived Concentration Guides values (DOE 1990).
Source: ORNL 1991.

2.6 SLUDGES

Sludges will be phase-separated, and components will be classified as for solids and liquids.

2.7 COMPACTIBLE SOLIDS

Compactible solids will be evaluated using the criteria in PP 1250, "Equipment Decontamination and Release for Unrestricted Use," and categorized and managed in accordance with PP 1401, "Waste Categorization for Solid Waste."

2.8 NONCOMPACTIBLE SOLIDS

Noncompactible solids will be evaluated using the criteria in PP 1250, "Equipment Decontamination and Release for Unrestricted Use," and categorized and managed in accordance with PP 1401, "Waste Categorization for Solid Waste."

2.9 SANITARY AND INFECTIOUS WASTES

No planned facility or process used during the WAG 5 investigation has been determined to generate sanitary or infectious wastes.

2.10 WASTE MINIMIZATION METHODS AND PLANNING

Because IDW materials (e.g., PPE, damaged machine parts, soil, water, and sludge) generated during a remedial investigation have the potential to be contaminated with hazardous substances, they will be treated as contaminated waste until survey or monitoring results establish that they may be released from the site. This section discusses the field methods and planning necessary for minimizing hazardous wastes in WAG 5.

It is the objective of this plan to return solids (i.e., soils and sludges) to the source of origination.

2.10.1 Material Selection

Materials (e.g., split spoon samplers, soil augers, and spatulas) selected for use in WAG 5 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. High-carbon steels will be used for tasks that require greater ductility.

Drums and boxes will be used to contain IDW wastes as they are generated. 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 conventional or hazardous waste. The coverings and containers will be located near the field activity inside the Controlled Access Area (CAA), and the IDW will be tentatively segregated into identified waste.

2.10.2 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 can expose project personnel to higher levels of contaminants will require additional sets of clothing such as washable or disposable coveralls and additional set of gloves. Protective equipment will be chosen to minimize the amount of waste material generated and to enable recycling of as much PPE as possible.

2.10.3 Contamination Control

Areas within WAG 5 that may contain elevated levels of hazardous contaminants will be controlled to minimize the potential for spread of contaminants. Ropes, barricades, and signs will control access to these areas, and individuals will be monitored before they leave CAAs. Materials will tentatively be segregated within the WAG 5 boundary as clean or contaminated, and field decontamination will reduce the amount of waste to be disposed of.

2.10.4 Material Minimization

Equipment and personnel entry into CAAs will be restricted to reduce waste. All packaging will be removed from materials before they enter potentially contaminated areas, and the size of field crews will be maintained at levels that allow the activity to be performed safely.

2.10.5 Decontamination

Materials that come in contact with potentially contaminated substances must be monitored and, if contaminated, must be decontaminated by nonaggressive (dry wiping) to 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. ESTIMATED WASTE VOLUMES TO BE GENERATED

Volumes of waste from WAG 5 remedial investigation activities have been estimated (see Table 2) from knowledge gained during WAG 1 and WAG 6 activities. Except for those occasions when highly contaminated materials are uncovered in WAG 5, all of the solid wastes estimated in Table 2 will remain inside the AOC. Liquids not exceeding the WAC will be transported to PWTP for treatment and disposal.

Table 2. Estimated waste volumes

	Clean	Radiological	Hazardous	Mixed
		(volumes in ft^3)		
Investigation-derived wastes				
Soils from soil sampling	23.52	432.77[a]	9.41	4.70
Soils from groundwater wells	39.32	723.53[a]	15.73	7.86
Soils from flume installation	28.67	527.44[a]	11.47	5.73
Soils from seep installation	11.76	216.38[a]	4.70	2.35
Soils from sediment sampling	0.74	13.52[a]	0.29	0.15
Liquids from groundwater wells	83.79	1541.74	33.52	16.76
Liquids from well purging and development	83.79	1541.74	33.52	16.76
Liquids from sampling	60.27	1108.97	24.11	12.05
Compactible trash	91.88	1690.50	36.75	18.38
Noncompactible trash		36.75	7.35	
Sanitary waste				
Noninvestigation-derived wastes				
Solids from decontamination activities		14.70		
Liquids from decontamination activities	22.05	405.72	8.82	4.41
Liquids from CSL activities	264.60	14.70	7.35	
Noncompactible FOF wastes	301.43			
Totals	1011.82	8268.46	192.02	89.15

Note: Total volume of wastes was calculated and categorized on the basis of prior activities as 5% clean, 92% radiological, 2% hazardous, and 1% mixed.

[a]It is expected that nearly 80% of these wastes will be returned to the point of origination within the AOC and an estimated 20% will require additional management.

4. WASTE HANDLING AND DISPOSITION METHODOLOGY

All types of materials will be checked for radioactivity and organic vapors. A containment system (e.g., plastic coverings) that restricts the release of the wastes to the environment may be provided for all waste materials (radioactive, chemically hazardous, and environmentally controlled as well as nonhazardous) throughout excavating operations. This section presents methods for implementing these requirements and incorporates the guidance given by ORNL for managing IDW. Options for handling and disposition are based on waste forms and classifications.

Non-IDW wastes will be handled and dispositioned in accordance with existing PPs. IDW, as appropriate, will be dispositioned within the WAG 5 AOC until final remedial action.

Some waste materials from both categories may be transferred to Energy Systems Waste Operations for disposal.

4.1 SOLIDS

As stated in Sect. 2.10, wastes will be segregated utilizing field instrument surveys (i.e., portable radiation and organic vapor survey instruments). It is expected that most of the solids will be returned to their source of origination. If necessary, surplus solid waste material will be maintained in the consolidation area in a manner consistent with the protection of human health and the environment.

4.2 LIQUIDS

Waste liquids will be containerized in the field in containers compatible with the anticipated characteristics of the liquids collected. They will be subsequently sampled/analyzed for contaminants. All liquids that do not exceed the concentrations given in Table 2 will be sent to PWTP for disposal; liquids that do exceed those concentrations will be packaged in appropriate containers and stored at the waste staging area until an appropriate disposal option is determined by the Liquid Radioactive Waste Operations Supervisor.

4.3 SLUDGES

Sludges from coring operations will be phase-separated so that each component can be treated as a separate waste form. Separation can be achieved through settling and decanting/skimming, bulk filtration, or centrifugation. Settling and decanting/skimming will be the primary method of separation. The solid phase will be maintained in the consolidation area in a manner consistent with the protection of human health and the environment. The liquid phase will be managed as described in Sect. 4.2.

4.4 COMPACTIBLE SOLIDS

Compactible solids such as contaminated PPE, wipes, and small containers that do not meet the criteria for release for unrestricted use will be collected in labeled polyethylene bags at the point of generation. These bags will be placed within appropriately marked, tightly sealed containers and temporarily retained within the AOC.

4.5 NONCOMPACTIBLE SOLIDS

Noncompactible solid wastes such as pipe, lumber, metals, concrete, and glass that are brought into the WAG 5 AOC and become contaminated and cannot be decontaminated will be retained within the AOC. Materials that do not exceed release limits will be released from the site.

5. TRAINING REQUIREMENTS

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

5.1 WASTE GENERATION CERTIFICATION OFFICER

The individual designated project WGCO will complete the following Energy Systems-required training:

- hazardous waste-generation certification training,
- solid low-level radioactive waste generator training, and
- ORNL TRU waste generator certification training.

The WGCO will also complete the training specified in PP 1404 and project-based training as specified on the individual's training work sheet by the ES&H Manager.

5.2 WASTE TECHNICIANS

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

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 Waste Management Plan will be made available as a reference for field personnel at the Field Operations Facility.

6. RECORDS

6.1 IDW MANAGEMENT LOGBOOK

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

- location and identification of borehole, well, monitoring station, or other facility where the IDW 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 IDW.

6.2 SECONDARY AND SUPPORTING RECORDS

Secondary and supporting records provide details concerning the entries in the IDW 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 (as deemed necessary by the WGCO).

Secondary and supporting records must be referenced in the IDW logbook.

6.3 DISPOSITION OF RECORDS

The IDW 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 ENERGY SYSTEMS ENVIRONMENTAL RESTORATION DIVISION

The Energy Systems Environmental Restoration Division will be responsible for providing project oversight, guidance in the disposition of wastes due to field activities, and a point of contact regarding the disposal of project-generated wastes. Energy Systems will be responsible for the disposal of wastes from WAG 5 activities.

7.2 WAG 5 PROJECT MANAGEMENT

The WAG 5 Task Manager will be responsible for coordinating staff and field activities necessary to implement this plan. In conjunction with program management and the Energy Systems/ORNL/Environmental Restoration Division Management, the WAG 5 Task Manager will be responsible for providing the resources necessary to effectively manage waste during WAG 5 field activities.

7.3 TECHNICAL SUPPORT

The Technical Support Lead will be responsible for all engineering, siting, permitting, 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, 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.

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.

8. REFERENCES

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