MARTIN MARIETTA

ORNL/ER-201/R1

ENVIRONMENTAL RESTORATION PROGRAM

Seeps and Springs Sampling and Analysis Plan for the Environmental Monitoring Plan at Waste Area Grouping 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee

ENERGY SYSTEMS ER

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY
UCN-17560 (6 7-91)

CDM Federal Programs Corporation

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

ORNL/ER-201/R1

Energy Systems Environmental Restoration Program
ORNL Environmental Restoration Program

Seeps and Springs Sampling and Analysis Plan for the Environmental Monitoring Plan at Waste Area Grouping 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee

Date Issued—September 1995

Prepared by
CDM Federal Programs Corporation
Oak Ridge, Tennessee 37830

Prepared for
U.S. Department of Energy
Office of Environmental Management
under budget and reporting code EW 20

Environmental Restoration and Waste Management Programs
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-8169
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

Seeps and Springs Sampling and Analysis Plan for the Environmental Monitoring Plan in Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee Revision 1

Approvals

D. L. Garrett
WAG 6 Project Manager

Date

P. A. Schrandt
Environmental Restoration Quality Assurance Specialist

Date

CONTENTS

FIGURES v

TABLES vii

ABBREVIATIONS ix

EXECUTIVE SUMMARY xi

1. INTRODUCTION 1-1
   1.1 PROJECT OVERVIEW 1-1
   1.2 SEEPS AND SPRINGS SAP OUTLINE AND OBJECTIVES 1-1
   1.3 SAMPLING LOCATIONS, FREQUENCIES, AND ANALYTES 1-4

2. TASK INSTRUCTIONS 2-1
   2.1 SEEPS AND SPRINGS WATER SAMPLING 2-1
   2.2 SEEPS AND SPRINGS CONTINUOUS FLOW MEASUREMENTS 2-5
   2.3 SEEPS AND SPRINGS TIMED VOLUMETRIC FLOW MEASUREMENTS 2-7
   2.4 EQUIPMENT INSTALLATION AND OPERATION 2-8
      2.4.1 Equipment Installation 2-9
      2.4.2 Equipment Configuration and Programming 2-9
      2.4.3 Equipment Calibration 2-10
      2.4.4 Equipment Maintenance and Servicing 2-11

3. QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS 3-1
   3.1 OVERVIEW 3-1
   3.2 MONITORING PROGRAM ORGANIZATION 3-1
   3.3 FIELD DOCUMENTATION 3-2
   3.4 SAMPLE IDENTIFICATION AND LABELING 3-7
   3.5 CHAIN OF CUSTODY 3-7
   3.6 ACTIVITY-SPECIFIC QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS 3-8

4. HEALTH AND SAFETY CONSIDERATIONS 4-1

5. WASTE MANAGEMENT 5-1
   5.1 ORGANIZATIONAL RESPONSIBILITIES 5-1
   5.2 GUIDANCE DOCUMENTS 5-2
   5.3 WASTE CHARACTERIZATION/SEGREGATION 5-3
      5.3.1 Solid Waste 5-3
      5.3.2 Liquid Waste 5-3
   5.4 WASTE PACKAGING 5-3
   5.5 WASTE TRANSPORTATION 5-5

6. DATA MANAGEMENT 6-1
6.1 INTRODUCTION 6-1
6.2 DATA DOWNLOADING 6-1
6.2.1 Manual Data 6-1
6.2.2 Electronic Data 6-1
6.3 PROCEDURES FOR COMPLETING SEEPS AND SPRINGS (SAS) FORMS 6-2

7. REFERENCES 7-1

APPENDIX A: FIELD FORMS A-1

APPENDIX B: SAMPLING SCHEDULES B-1

APPENDIX C: SITE-SPECIFIC HAZARD EVALUATION ADDENDUM C-1

FIGURES

2.1 Seeps and springs locations 2-2

2.2. Seeps and springs sampling and analysis activity flowchart 2-3

3.1. Organization chart for WAG 6 Environmental Monitoring Plan implementation 3-3

TABLES

1.1. WAG 6 Seeps and Springs SAP and project-level document cross-reference 1-2

1.2. SAP activities, purposes, and quality control levels 1-3

1.3. Analytical suites and associated analytes 1-5

1.4. Sampling locations, analytical suites, and frequencies 1-6

2.1. Sample containers, preservation methods, and holding times 2-6

2.2. Equipment calibration schedule 2-10

2.3. Equipment maintenance schedule 2-11

3.1. General responsibilities of WAG 6 EMP principal contractor personnel 3-4

3.2. Types of WAG 6 EMP field documentation and their required information 3-6

3.3. Quality control sample types and frequencies 3-8

3.4. Activity-specific quality control samples for Level III analyses 3-9

5.1. WAG 6 waste management 5-4

ABBREVIATIONS

ASME	American Society of Mechanical Engineers
CDM Federal	CDM Federal Programs Corporation
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	chemical of concern
DEC	Data Entry Clerk
DIC	dissolved inorganic carbon
DOC	dissolved organic carbon
DOE	U.S. Department of Energy
EMP	Environmental Monitoring Plan
EPA	U.S. Environmental Protection Agency
ESP	environmental surveillance procedure
FOP	field operations procedure
FTM	Field Task Manager
GCO	Generator Certification Official
H&S	health and safety
HD	high density
HDPE	high-density polyethylene
ID	identification
LGWOD	Liquid Gaseous Waste Operations Department
LMES	Lockheed Martin Energy Systems
MS	matrix spike
MSD	matrix spike duplicate
OREIS	Oak Ridge Environmental Information System
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Act
PCB	polychlorinated biphenyl
PID	photoionization detector
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SAP	Sampling and Analysis Plan
SAS	seeps and springs
SHSO	Site Health and Safety Officer
SLLW	solid low-level waste
STL	Sample Task Leader
VOC	volatile organic compound
WAG	Waste Area Grouping
WMO	Waste Management Operations
WMP	Waste Management Plan

EXECUTIVE SUMMARY

This Sampling and Analysis Plan addresses the monitoring, sampling, and analysis activities that will be conducted at seeps and springs and at two french drain outlets in support of the Environmental Monitoring Plan for Waste Area Grouping (WAG) 6. WAG 6 is a shallow-land-burial disposal facility for low-level radioactive waste at Oak Ridge National Laboratory, a research facility owned by the U.S. Department of Energy and operated by Lockheed Martin Energy Systems, Inc. Initially, sampling will be conducted at as many as 15 locations within WAG 6 (as many as 13 seeps and 2 french drain outlets). After evaluating the results obtained and reviewing the observations made by field personnel during the first round of sampling, several seeps and springs will be chosen as permanent monitoring points, together with the two french drain outlets. Baseline sampling of these points will then be conducted quarterly for 1 year (i.e., four rounds of sampling after the initial round). The samples will be analyzed for various geochemical, organic, inorganic, and radiological parameters. Permanent sampling points having suitable flow rates and conditions may be outfitted with automatic flow-monitoring equipment. The results of the sampling and flow-monitoring efforts will help to quantify flux moving across the ungauged perimeter of the site and will help to identify changes in releases from the contaminant sources.

1. INTRODUCTION

1.1 PROJECT OVERVIEW

This document is the Seeps and Springs Sampling and Analysis Plan (SAP) for Waste Area Grouping (WAG) 6 at Oak Ridge National Laboratory (ORNL). The activities and procedures described herein are part of the Environmental Monitoring Plan (EMP) for WAG 6, which also includes monitoring tasks for groundwater quality, groundwater levels, surface water flow and quality, and meteorological parameters. Separate SAPs are being issued concurrently to describe each of these monitoring programs.

This SAP has been written for the use of field personnel responsible for implementation of the EMP, with the intent that field personnel will be able to take this document to the field and quickly find the appropriate steps required to complete a specific task. In many cases, field operations procedures (FOPs) will define the steps required for an activity. The FOPs for the EMP are referenced and briefly described in the relevant sections of the SAPs, and are contained within the FOP Manual. Both these documents (the SAP and the FOP Manual) will be available to personnel in the field.

Information regarding the WAG 6 physical description, geology and hydrogeology, and waste disposal and regulatory history can be found in the *RCRA Facility Investigation Report for Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (Energy Systems 1991), and a description of the purpose and scope of the EMP can be found in the *Environmental Monitoring Plan for Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee* (DOE 1993a).

1.2 SEEPS AND SPRINGS SAP OUTLINE AND OBJECTIVES

The purpose of the seeps and springs SAP is to provide field workers with information on conducting activities that are unique and essential to accomplishing the task of seeps and springs sampling. Some information that is important to field workers is contained in other project-level documents. To avoid duplication of this information [which includes project-level quality assurance/quality control (QA/QC) and health and safety (H&S) protocols], other documents have been referenced as appropriate. Table 1.1 displays the organization of this SAP and the relevant reference documents. All documents will be made available to the field workers before the initiation of field activities. When field activities begin, the field workers will carry the SAP and the FOP Manual to the field. The other reference documents will be available at the field office. Copies of these reference documents will be available to the field workers to carry into the field for direct reference as the need arises.

The objectives of the Seeps and Springs Monitoring Program, as defined in the EMP, are

- to track and evaluate concentrations of primary chemicals of concern (COCs);
- to track and evaluate concentrations of site-related radionuclides; and

Table 1.1. WAG 6 Seeps and Springs SAP and project-level document cross-reference

Seeps and Springs SAP section	Project-level reference document(s)
Section 1 - Introduction contains limited information on the EMP, summarizes project objectives, and summarizes the seeps and springs sampling activities to be conducted.	DOE *Environmental Monitoring Plan* (1993a)
Section 2 - Task Instructions describes procedures for sampling and taking flow measurements; lists equipment to be used for each activity; lists analytical suites and corresponding test methods; discusses the installation, calibration, and maintenance of necessary equipment; and maps the locations of the seeps and springs.	DOE *Environmental Monitoring Plan*; CDM Federal *WAG 6 Field Operations Procedures Manual*
Section 3 - Quality Assurance/Quality Control Requirements contains information on the QA/QC requirements specific to seeps and springs sampling and analysis. This section includes information on project organization, field documentation as well as sample management, and activity-specific QA requirements, where applicable.	DOE *Quality Assurance Project Plan* (1993b)
Section 4 - Health and Safety Considerations briefly describes the health and safety aspects of the activity. Activity-specific instruction sheets are referenced in this section, and will address specific health and safety issues that are not covered by the Site Health and Safety Plan.	Energy Systems Site Health and Safety Plan
Section 5 - Waste Management briefly describes the waste management associated with the seeps and springs monitoring. The wastes associated with this activity will be restricted to personal protective equipment, very small quantities of decontamination fluids, contaminated soils, and nonhazardous solid waste.	Energy Systems Waste Management Plan
Section 6 - Data Management describes the data collection and management activities that will be conducted in the field, and the procedures for collecting these data to ensure that accurate data are transferred into the data base.	Energy Systems Data Management Plan/ Functional Systems Design

- to help quantify flux moving across the ungauged perimeter of the site and help identify changes in releases from contaminant sources.

Field workers should keep these objectives in mind when conducting the activities described in this SAP. An understanding of, and a constant adherence to, the objectives of the EMP will ensure the collection of data in quantities and at the quality level necessary to meet the objectives. The activities identified in Table 1.2 will be conducted to meet these seeps and springs quality objectives.

Table 1.2. SAP activities, purposes, and quality control levels

Activity	Purpose	Quality Control Levels[a]
1. Seeps and springs water sample collection	• Provide information for risk calculations	Level C (90%) Level D (10%)
	• Identify sources of COCs	
	• Characterize groundwater geochemistry	Level C
2. Continuous flow measurements	• Determine COC fluxes	Level B
3. Timed volumetric flow measurements	• Determine COC fluxes	Level A
4. Equipment decontamination	• Eliminate cross contamination between sampling locations	N/A[c]
5. Waste management	• Properly manage used personal protective equipment, contaminated soil, decontamination fluid, and nonhazardous solid waste	N/A
6. Data collection and management	• Properly record information in logbooks and field forms	Level A

[a] QC Levels I–IV in the EMP correspond to QC Levels A–D in the Quality Assurance Project Plan for this project (DOE 1993b).
[b] Q = discharge; C = concentration
[c] N/A = not applicable

Samples will be collected as grab samples from identified seeps or springs and french drains. The water samples will be obtained using manual surface-water-sampling methods. Data from field activities will be recorded on various forms (see Appendix A) and in field logbooks.

1.3 SAMPLING LOCATIONS, FREQUENCIES, AND ANALYTES

The EMP specifies that 10 seeps and springs and 2 french drain outlets will be sampled for various analytes at various frequencies. An initial survey during the dry season identified 13 seeps that may be suitable for sampling and monitoring in addition to the 2 french drain outlets (ECE 1993). (No springs were identified.) Initially, water from these 15 locations will be sampled and analyzed. When the data from the initial round of sampling is available, the information will be reviewed by a group of technical staff members identified by the Project Manager. Using the following criteria, the group will select the permanent monitoring points at which sampling will be conducted during the baseline period. Sampling schedules are shown in Appendix B.

The overall sampling objective is to ensure that contaminants leaving the perimeter of WAG 6 in potentially significant quantities are monitored. In order of importance, selection criteria for sampling locations are

- geographic distribution—that is, the seep provides a sample of the near-surface drainage from the five perimeter areas identified in the EMP (DOE 1993a);

- contaminant flux—that is, the seep provides a contribution to off-site flux of contaminants where COC concentration and estimated discharge are large (indirect or approximate methods may be required for measuring discharge for comparative purposes; routine measurements of discharge are not planned);

- lack of groundwater wells in the vicinity.

- the existence of large, known, upstream source of contaminants (based on burial data or groundwater quality data); and

- minimal uncertainty as to the source of the seep water—that is, the seep is unlikely to include water from WAG 7 or from White Oak Lake.

The two french drain outlets will also serve as permanent monitoring points.

Table 1.3 displays the specific analyte list constituting the analytical suites. The frequency and analytical suite for each sampling point are displayed in Table 1.4.

Table 1.3. Analytical suites and associated analytes

Analyte	Analytical suite[a]		
	RFI COC	NCOC	Geochemistry
	Organics		
CLP[b] volatiles	X	X	
CLP semivolatiles		X	
CLP pesticides/PCBs[c]		X	
Herbicides		X	
	Metals		
CLP metals	X	X	
	Radionuclides		
Gross alpha[d]	X	X	
Gamma scan (Cs, Co, Eu)	X	X	
Tritium	X	X	
Strontium-90	X	X	
Anions			X
DIC/DOC[e]			X
Alkalinity			X

[a] RFI COC = Site-related chemicals determined to be COCs during the RCRA Facility Investigaton (RFI)
NCOC = Non-COCs; expanded list of analytes infrequently analyzed to confirm RFI COC list.
[b] CLP = Contract Laboratory Program
[c] PCB = polychlorinated biphenyl
[d] If the gross alpha level exceeds 5 pCi/L, confirmation sampling will be required. If the confirmation also exceeds 5 pCi/L gross alpha, alpha spectroscopy will be conducted on an aliquot of the confirmation sample to determine the contributing radionuclide.
[e] DIC/DOC = dissolved inorganic carbon/dissolved organic carbon.

Table 1.4. Sampling locations, analytical suites[a], and frequencies

Number of sampling points	Pre-baseline	Sampling periods			
		First quarter	Second quarter	Third quarter	Fourth quarter
		Perimeter seeps			
10[b]	RFI COC	NCOC and geochemical parameters	RFI COC and geochemical parameters	RFI COC[c] and geochemical parameters	RFI COC[c] and geochemical parameters
		Internal seeps			
3[b]	RFI COC	NCOC and geochemical parameters	RFI COC and geochemical parameters	RFI COC[c] and geochemical parameters	RFI COC[c] and geochemical parameters
		French drains			
2	RFI COC	NCOC and geochemical parameters	RFI COC and geochemical parameters	RFI COC[c] and geochemical parameters	RFI COC[c] and geochemical parameters

[a]Analytical suites are defined in Table 1.3.

[b]During the pre-baseline phase, water samples will be obtained from as many as thirteen seeps and two french drain outlets identified in the initial survey, and will be analyzed as shown here. On the basis of the resulting analytical data and observed flow rates, several of these locations will be identified as permanent monitoring locations, and will be sampled during the baseline phase.

[c]NCOCs detected above background and above health-based criteria would require confirmation, as described in Sect. 4.4 of the EMP.

2. TASK INSTRUCTIONS

This section identifies the specific tasks to be performed during seeps and springs sampling and monitoring. Any deviations from this SAP will be documented on a WAG 6—Monitoring Variance Request Form (MV-01) and approved before implementation. If for any reason a task is not completed, the reason also will be documented on a WAG 6—Monitoring Variance Request Form (MV-01). Any problem or corrective action taken will be documented on the WAG 6—Seeps and Springs Site Inspection Form (SAS-02) and in the field logbook.

Monitoring tasks conducted under this plan will be coordinated with surface-water-sampling activities. Beginning with the first-quarter sampling round, the field crew will proceed from site to site, completing work at each site before moving to the next site. After the first round of sampling has been completed at each of as many as 15 locations, the resultant analytical data and field observations will be evaluated (Fig. 2.1). Several seeps, as well as the two french drain outlets, will be selected as permanent monitoring points. (See Sect. 1.3 for a discussion of the criteria for selecting these points.) Some of these monitoring points may be equipped with flow measurement equipment (see Sect. 1.3). Beginning with the baseline, sampling will be conducted only at those locations designated as permanent monitoring points. Flow monitoring data also will be collected where feasible. The field crew will wait until the beginning of the next quarter (three calendar months from the beginning of the preceding quarter) to initiate the next sampling round.

A flowchart of the tasks to be conducted as part of this activity is displayed in Fig. 2.2. This flowchart graphically depicts the sequence in which the tasks will be conducted, the decision points associated with conducting the tasks, and when information will be recorded on the forms for data collection and management.

2.1 SEEPS AND SPRINGS WATER SAMPLING

Water samples will be obtained from the initial locations during the pre-baseline phase, but only from the locations designated as permanent monitoring points during the second, third, and fourth quarters. Samples taken during the pre-baseline phase will be analyzed for COCs identified by the WAG 6 Resource Conservation and Recovery Act (RCRA) Facility Investigation. Samples taken during the baseline first quarter will be analyzed for non-COCs (verification contaminants) and geochemical parameters—anions, dissolved inorganic carbon/dissolved organic carbon (DIC/DOC), and alkalinity. Second-, third-, and fourth-quarter samples will be analyzed for COCs, any non-COCs requiring confirmation in accordance with Sect. 4.4 of the EMP, and geochemical parameters. Field measurements will be conducted and recorded in conjunction with sampling and monitoring activities. Water samples will be obtained according to Environmental Surveillance Procedure (ESP-) 301-1.

To obtain water samples and field measurements, the following equipment is required:

- surgical gloves and other appropriate personal protective equipment (PPE) as specified by the Site Health and Safety Officer (SHSO) and/or Site Health Physicist;
- scoop or shovel;

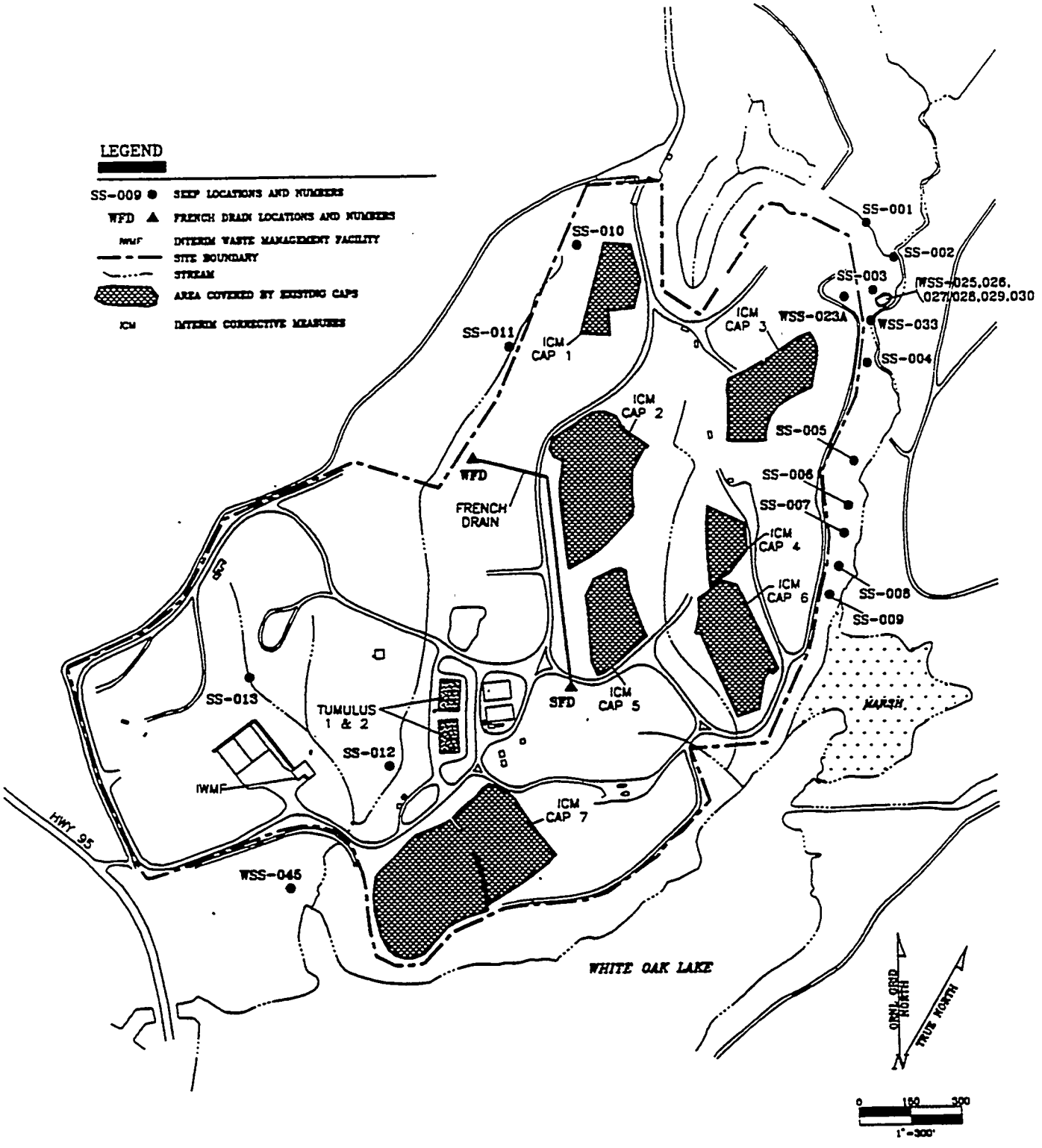


FIG. 2.1. Seeps and springs locations

OAK RIDGE NATIONAL LABORATORY
ORNL WAG 6

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

A745/06JUN94/400

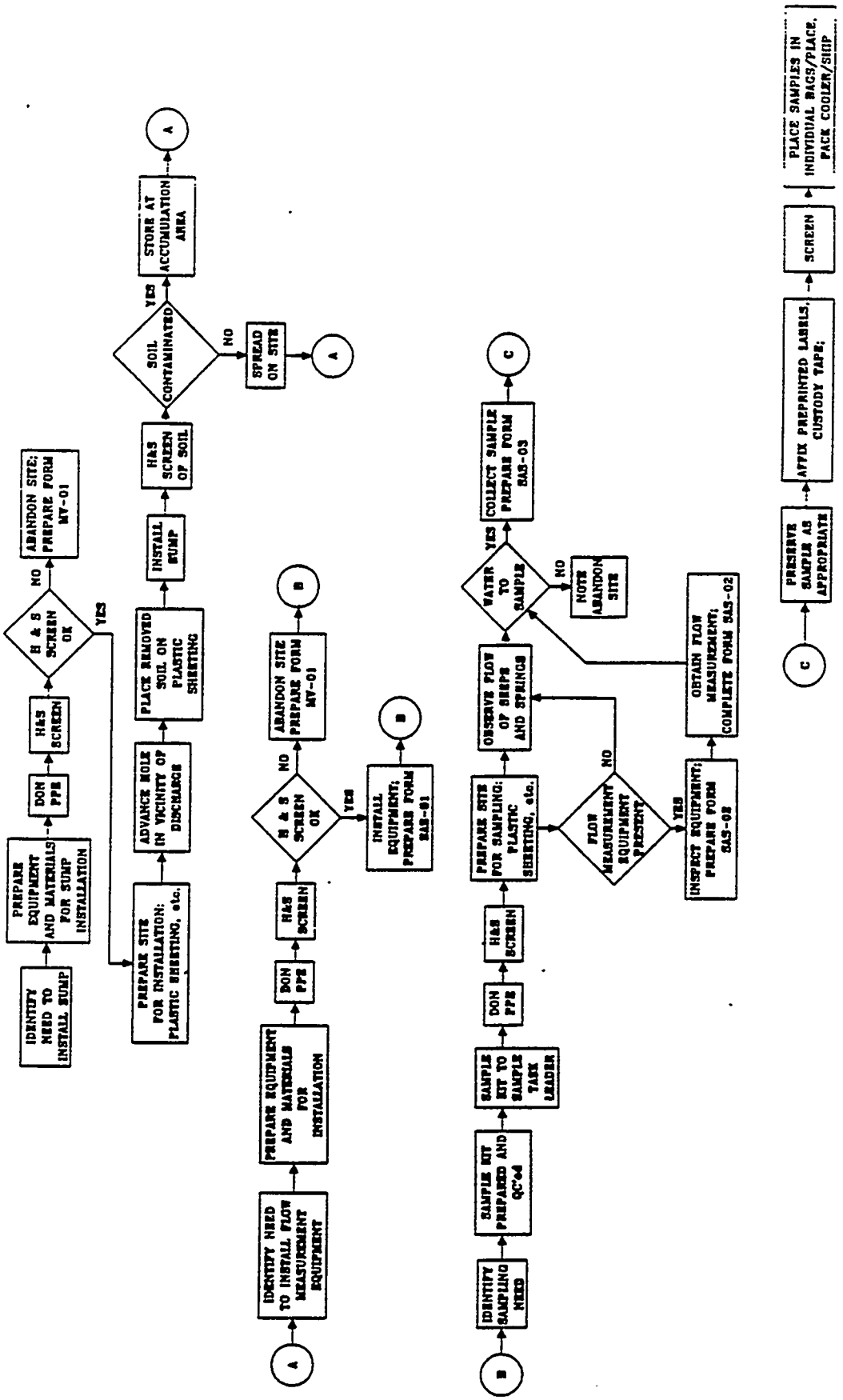


FIG. 2.2. Seeps and springs sampling and analysis activity flowchart.

OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TENNESSEE

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

A743/05JUN94/1=1

- peristaltic pump;
- plastic sheeting;
- sample dipper cup, clamp, and extension handles;
- polyethylene and glass sample bottles and caps, prewashed;
- extra sample bottles as needed for QC samples;
- volatile organic compound (VOC) analysis vials with Teflon-lined caps, 40-mL capacity;
- plastic sample bottle containment bags;
- sample containment cooler;
- Blue Ice™;
- sample preservation equipment and solutions;
- sample labeling equipment;
- calibrated, in situ, parameter-measurement equipment (i.e., HORIBA Water Quality Checker);
- ruler/staff gauge (if permanent gauge is not at site);
- watch (time accuracy verification);
- decontamination equipment;
- inkpens;
- field logbook and/or appropriate form(s); and
- chain-of-custody forms.

Before collecting samples, all personnel must don PPE as required by the SHSO and/or Site Health Physicist. A brief inspection of the hydraulic structure or sump will be performed, and observations will be documented on the WAG 6—Seeps and Springs Site Inspection Form (SAS-02). To prevent sampling equipment from coming into contact with potentially contaminated surfaces, plastic sheeting will be used as ground cover for staging of equipment and/or materials, as necessary.

If wading is required to collect the water samples, the sampling area will be approached from downstream. To collect the water samples, a decontaminated dipper will be submerged slowly in the water, avoiding splashing or mixing. When filled, the dipper will be lifted from the surface of the water, and the water will be poured into the sample containers. Sample containers will be filled in the order in which they are listed in Table 2.1 (VOC samples first, geochemical parameters samples last). VOC samples will be collected directly into the container,

if possible. If a dipper cannot be used because of low water levels, a peristaltic pump may be used for samples other than volatiles and semivolatiles. Once the sample containers are filled, they will be capped, leaving adequate air space for expansion (except in VOC containers). Each sample container will be labeled according to WAG 6—FOP 9. All samples for VOC analyses will be preserved with hydrochloric acid. All samples will be preserved according to ESP-701, including QC samples. The sample numbers, sample volume, and sample collection time will be documented in the field logbook and/or the WAG 6—Field Activity Sheet, Barcode Transaction sheet. All sample containers will be sealed with custody seals, placed in a plastic containment bag, and transferred to a clean sample cooler. The samples will be prepared for transport according to ESP-800. Chain-of-custody forms will be completed according to ESP-500. Table 2.1 presents the analytes, sample containers, preservation, and holding times for this task.

Measurements of field parameters such as temperature, dissolved oxygen, conductivity, and pH will be obtained directly in the water where possible and recorded in the field logbook and on the appropriate form. Where it is not possible, the water will be collected into an appropriate container for field measurements. The field parameters will be obtained according to ESP-003-012. Sampling equipment will be decontaminated according to ESP-900. The procedure is outlined in the following sentences.

- Rinse the dipper in tap water to remove any visible dirt or mud.
- Wash the dipper with tap water and Liquinox, using a scrub brush.
- Rinse the dipper with ASTM type 2 water
- Rinse the dipper with deionized water.
- Rinse the dipper twice with pesticide-grade isopropyl alcohol.
- Allow the dipper to air dry for 24 hours.
- Wrap the dipper in aluminum foil.

2.2 SEEPS AND SPRINGS CONTINUOUS FLOW MEASUREMENTS

The following paragraphs describe the guidelines for measuring flow rates at the permanent monitoring points under conditions that allow for continuous flow measurements where weirs or flumes exist. These measurements will not be obtained during the pre-baseline round of sampling, because the permanent monitoring points will not yet have been selected and the necessary equipment will not have been installed.

Continuous flow monitoring may be initiated at some locations using some combination of weirs, flumes, pressure sensors, and electronic data logging equipment. Continuous flow measurements will be obtained at suitable locations during each sampling event as conditions allow. Continuous flow measurements will be obtained according to WAG 6—FOP 3 or manufacturer's instructions, depending upon whether the equipment used is an ISCO Flow Meter or a Telog Level Tracker, respectively.

To obtain continuous flow measurements, the following equipment will be required:

- surgical gloves and other appropriate PPE as specified by the SHSO and/or Site Health Physicist,

Table 2.1. Sample containers, preservation methods, and holding times

Parameter	Analytical method	Container type	Container volume	Number of containers per sample	Preservation	Maximum holding time
Volatiles	CLP[a]	Teflon-lidded glass vial	40 mL	2	HCl, pH<2.0	14 d
Semivolatiles	CLP	Amber glass	1 L	1	4°C	Ext. in 7 d Analyze in 40 d
Pesticides/PCBs[b]	CLP	Amber glass	1 L	1	4°C	7 d
Herbicides	CLP	Amber glass	1 L	1	4°C	7 d
Gross alpha	EPA 900.0	HDPE	1L	1	HNO_3, pH<2	180 d
Gamma scan	EPA 901.1	HDPE	1L	1	HNO_3, pH<2	180 d
Strontium-90	EPA 905.0	HDPE[c]	1 L	1	HNO_3, pH<2	180 d
Tritium	EPA 906.0	HDPE	500mL	2	4°C	180 d
Metals	CLP	HDPE	500 mL	1	HNO_3, pH<2.0	180 d (28 d for Hg)
Anions	EPA 300.0	HDPE	1L	1	4°C	28 d
DOC[d]	EPA 415.1/415.1	Amber glass	1L	1	H_2SO_4, pH<2, and 4°C	28 d
DIC[d]		Amber glass	1L	1		
Alkalinity	EPA 310.1	HDPE	100mL	1	4°C	14 d

[a] CLP = Contract Laboratory Program
[b] PCB = polychlorinated biphenyl
[c] HDPE = high density polyethylene
[d] DIC/DOC = dissolved inorganic carbon/dissolved organic carbon

- continuous flow measurement equipment (previously installed on site),
- downloading equipment (i.e., laptop computer),
- field logbook and/or appropriate field form(s), and
- inkpens.

Before beginning work, all personnel will don PPE as required by the SHSO and/or Site Health Physicist. To obtain a continuous flow measurement, raw electronic data will be recorded using a laptop computer. The data will then be edited and analyzed according to WAG 6—FOP 10. All information and the names of the files retrieved or updated will be recorded in the appropriate form. Before leaving the site, an inspection will be conducted. Any problems encountered and any corrective actions taken will be documented on the WAG 6—Seeps and Springs Site Inspection Form (SAS-02) and in the field logbook.

2.3 SEEPS AND SPRINGS TIMED VOLUMETRIC FLOW MEASUREMENTS

Spring boxes, flumes, or pipes may be installed at selected permanent monitoring points to facilitate flow measurements. They will not be present at seeps or at the french drains during the first round of sampling; therefore, during the first round of sampling, timed volumetric flow measurements will not be taken. The configuration and magnitude of outflow from the seep or spring will influence the type of structure to be installed after the first round of sampling. The following paragraphs describe the guidelines for measuring flow rates at selected monitoring points under conditions that allow for timed volume measurements where pipes, weirs, or flumes exist and where stage-discharge relationships are available. These measurements will be obtained according to WAG 6—FOP 13. To obtain timed volumetric flow measurements, the following equipment is required:

- surgical gloves and other appropriate PPE as specified by the SHSO and/or Site Health Physicist,
- containers for volume measurement,
- ruler/staff gauge,
- hand-held calculator,
- stopwatch,
- field logbook and/or appropriate form(s), and
- inkpen.

Before beginning work, all personnel must don PPE as required by the SHSO and/or Site Health Physicist. To obtain a timed volumetric flow measurement, a container of sufficient size and known volume will be used to collect discharge from the pipe, weir, or flume. Discharge will be collected into the container while using a stopwatch to time the filling of the container. Containers will be filled to a predetermined mark to indicate the water level, and all volume and

time measurements will be collected on the WAG 6—Seeps and Springs Sample Collection Form (SAS-03) and in the field logbooks. Upon collection of the volume and time measurements, the water level in the structure will be obtained using a staff gauge or a ruler, and the water level will be recorded on the WAG—6 Seeps and Springs Sample Collection Form (SAS-03) and in the field logbook. All equipment will be decontaminated according to ESP-900. The water level will then be converted to the appropriate units for use in a specific discharge equation (depending upon the geometry of the structure), and the flow will be calculated in the field logbook. Before leaving the site, an inspection will be conducted according to the WAG 6—Seeps and Springs Site Inspection Form (SAS-02).

2.4 EQUIPMENT INSTALLATION AND OPERATION

Sumps will be installed at the designated permanent monitoring points. (See Sect. 1.3 for a discussion of the selection process.) The sumps will act as collection devices for seep discharge, and will consist of a 1-ft-diam., Stainless Steel, 0.010-in.-slot screen installed in a manually dug hole. When installing the sumps at selected monitoring points, field personnel will adhere to the following guidelines.

- Don PPE as specified by the SHSO and/or Site Health Physicist.
- Using a shovel and/or scoop, begin digging a hole adjacent to, and downgradient of, the seep or spring discharge.
- Upon breaking through the surface soils, and periodically during digging, have H&S personnel check the soil and atmosphere in the vicinity of the hole and the breathing zone with a photoionization detector (PID).
- If the breathing zone atmosphere is not hazardous according to the guideline provided in the H&S Plan, continue digging the hole. If the breathing zone is determined to be hazardous, then the site will be abandoned, the sump will not be installed, and a WAG 6—Monitoring Variance Request Form (MV-01) will be completed.
- Continue digging the hole until it is approximately 1.5 ft deep and 1.5 ft wide.
- Place a thin layer of clean, well-rounded, well-sorted, silica sand (approximately 1.0 in.) in the bottom of the hole.
- Put an end cap on the Stainless Steel screen and place it in the hole.
- Fill the resulting annulus with tightly packed sand (as previously described).

If the Project Manager decides that continuous flow measurements should be collected from one or more of the permanent monitoring locations, dedicated equipment must be installed. The monitoring equipment that may be installed includes flow meters and level trackers. A discussion is provided in this section of how each device will be installed, programmed, calibrated, and serviced.

2.4.1 Equipment Installation

There is no formal operating procedure addressing the installation of seeps and springs monitoring equipment. Field personnel must adhere to the instructions given in equipment instruction manuals and to the following guidelines when installing new or replacement equipment.

- The installation of flow equipment may require field personnel to come in contact with WAG 6 surface waters (by wading or other means). Therefore, installation will be done in accordance with the task-specific H&S Plan and Waste Management Plan (WMP), in consultation with the SHSO, Site Health Physicist, and WAG 6 Generator Certification Official (GCO).

- On-site equipment should be set up in a systematic manner at all sites. Note the layout of the flow meter connection cables, identified by name and part number.

- All flow meters must be installed in a level and protected location near the hydraulic structure. These devices, and the accompanying accessories (batteries, tubes, and cables), must be securely anchored at the site to prevent them from being tipped over or washed away during intense storms.

- The flow meter bubble lines and sampler suction lines must be securely fastened at the monitoring point so that they cannot be dislodged during high-velocity flows or winds.

- Every new- or replacement-equipment installation activity that occurs at a site must be documented in the site logbook and on the WAG 6—Seeps and Springs Initialization Form (SAS-01). Such information includes, but is not limited to, the following items:

  - personnel performing installation;
  - site identification;
  - date and time of installation;
  - equipment brand names and model numbers;
  - ORNL equipment identification (ID) numbers;
  - length of bubble tube;
  - location of bubble tube outlet;
  - length of suction tube, including copper intake tube;
  - location of equipment relative to hydraulic structure (provide photos/drawings);
  - all information programmed in flow meters and data loggers;
  - initial calibration of equipment; and
  - initial operation of equipment.

- Installation personnel must visit the site on the day after equipment installation to ensure that all devices are working properly. Observations made and any corrective actions taken during this site visit must be documented in the field logbook.

2.4.2 Equipment Configuration and Programming

Because of the complexity of several features of the monitoring equipment, FOPs have been developed to provide instruction for the operation, configuration, and programming of the ISCO 3700 Sampler and ISCO 3230 Flow Meter. These FOPs are intended to be used together

with the ISCO equipment instruction manuals. Operation of the Telog Level Tracker is simply detailed in its instruction manual; therefore, an operating procedure has not been developed for that device.

The ISCO equipment FOPs were developed specifically for the WAG 6 surface-water-monitoring task and address only those features of the devices that are required to monitor in the manner specified in the surface water SAP. However, should continuous seeps-and-springs monitoring take place, the procedure will be sufficient. There are many features of each device that are not used during WAG 6 monitoring and, therefore, are not discussed in the equipment operation FOPs. Furthermore, these FOPs do not provide any information on servicing equipment or troubleshooting in the event of possible problems. Persons using these procedures must be trained in the operation of each device, and are directed to the equipment instruction manuals for further information on each device as required.

2.4.3 Equipment Calibration

Seeps and springs monitoring equipment will be calibrated when initially installed on-site and periodically thereafter (Table 2.2). Calibration activities scheduled on a quarterly basis will be performed during the quarterly site inspection and must be documented on the WAG 6—Seeps and Springs Site Inspection Form (SAS-02). If calibration is performed at any other time, this information must be documented. The calibration of field-parameter-measurement equipment is to be performed daily by field personnel employing the equipment. Field equipment calibration must be documented in the field documentation form that is to be completed for that day's activities.

Table 2.2. Equipment calibration schedule

Equipment and calibration parameter	Standard	Procedure	Schedule
ISCO 3230 Flow Meter water level	Level measurements	WAG 6—FOP 4	Quarterly
Telog Level Tracker pressure-transducer water level	Level measurements	Manufacturer's instructions	Quarterly
HORIBA Water Quality Checker	Field parameters	WAG 6 ESP-003.012; manufacturer's instructions	Daily during use

2.4.4 Equipment Maintenance and Servicing

Periodic maintenance activities are required to keep the on-site equipment in proper working order (Table 2.3). If problems are encountered with any of the on-site equipment, servicing must be done immediately. To maintain the continuity of the equipment used, servicing should be done on-site. If on-site repair is not possible, then the equipment must be replaced with a calibrated alternate of the same brand and model number. If on-site repair is possible, the equipment must be calibrated after servicing. All service equipment must be checked on the day immediately following its repair (or return to the site) to ensure that the problem has indeed been corrected. All equipment servicing or replacement must be completely documented on the WAG 6—Record of Repair Form (RF-01) and in the equipment logbook. Each equipment service entry on the documentation form must be initialed by the person performing the service. Seeps and springs sampling personnel are also referred to equipment instruction manuals for additional calibration and maintenance information.

Table 2.3. Equipment maintenance schedule

Equipment name	Service required	Schedule[a]
ISCO 3230 Flow Meter	Clean the case and seals	Weekly
	Replace external dessicant cartridge	As needed
	Replace internal dessicant cartridge	As needed
	Replace the reference port tube	As needed
	Replace the bubble tube	As needed
	Replace the plotter paper roll	As needed
	Replace the plotter ink ribbon	As needed
	Replace the battery	As needed
	Adjust the bubble rate (1/second)	As needed
Telog Level Tracker	Inspect for leaks	Weekly
	Replace internal dessicant pack	As needed
	Replace the battery	As needed
Hydraulic Structure	Clean sediment and debris	As needed

[a] Equipment may require more frequent inspection and service during winter when equipment or lines may freeze.

3. QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

3.1 OVERVIEW

This section identifies QA/QC aspects of the *Quality Assurance Plan for Characterization and Monitoring Activities at Waste Area Grouping 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee* (CDM Federal 1993) that are required to implement the EMP and this SAP. Subjects addressed in this section include, but are not limited to, monitoring program organization and personnel responsibilities, documentation procedures and protocols, sampling and monitoring QC requirements, decontamination procedures, and equipment calibration and maintenance. The QA/QC considerations presented in this section have been developed to ensure that the data generated during all phases of the EMP will be of known quality and legally defensible.

Work on this assignment will be performed in accordance with the following:

- *Environmental Restoration Quality Program Plan*, ES/ER/TM-4/R3 (Energy Systems 1993);
- *Environmental Surveillance Procedures, Quality Control Program*, ESH/Sub/87-21706/1 (Energy Systems 1988);
- *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS-005/80 (EPA 1983);
- *Quality Assurance Program Requirements for Nuclear Facilities*, ASME NQA-1 (ASME 1989);
- *Quality Assurance Project Plan for the Environmental Monitoring Program in Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, DOE/OR/01-1193&D1 (DOE 1993b); and
- *WAG 6 Field Operations Procedures Manual.*

This SAP has been reviewed for QA/QC requirements by the Contract QA Manager, who will maintain QA oversight for the duration of the project. In addition, all deliverables will be subject to technical review by CDM Federal Programs Corporation (CDM Federal) technical specialists. All deliverables presenting measurement data will be reviewed by the CDM Federal QA staff. A description of the project can be found in the EMP.

3.2 MONITORING PROGRAM ORGANIZATION

The EMP personnel compose a subtask team of the Monitoring and Laboratory Analysis Group. The following principal contractor personnel are assigned to conduct the WAG 6 EMP:

- Mitch Goldberg (Project Manager),
- David Johnson (QA Specialist),
- Donnie McCurry (Field Task Manager),
- Richard Stout (Field QC Coordinator),
- Michael Charko (Field Technician),

- Julia Thompson (Analytical/Data Validation Coordinator),
- Connie Inman (Data Base Manager),
- Kelly Jones (Data Entry Clerk),
- Doug Hopper (Seeps and Springs and Surface Water Sample Task Leader),
- David Fugate (Groundwater Quality Sample Task Leader), and
- Patrick Gerbic (Meteorological Sample Task Leader).

Figure 3.1 shows the project organization, reporting relationships, and lines of authority for this project. General responsibilities are discussed in the following subsections. Other personnel will be assigned as necessary. The responsibilities of key team members are described in Table 3.1.

3.3 FIELD DOCUMENTATION

Field documentation shall consist of

- one master site logbook (to be maintained at field headquarters),
- an equipment maintenance and calibration logbook,
- activity-specific field logbooks,
- a telephone logbook,
- project- and activity-specific field forms (see Appendix A),
- chain-of-custody forms,
- sample labels, and
- bar code labels,

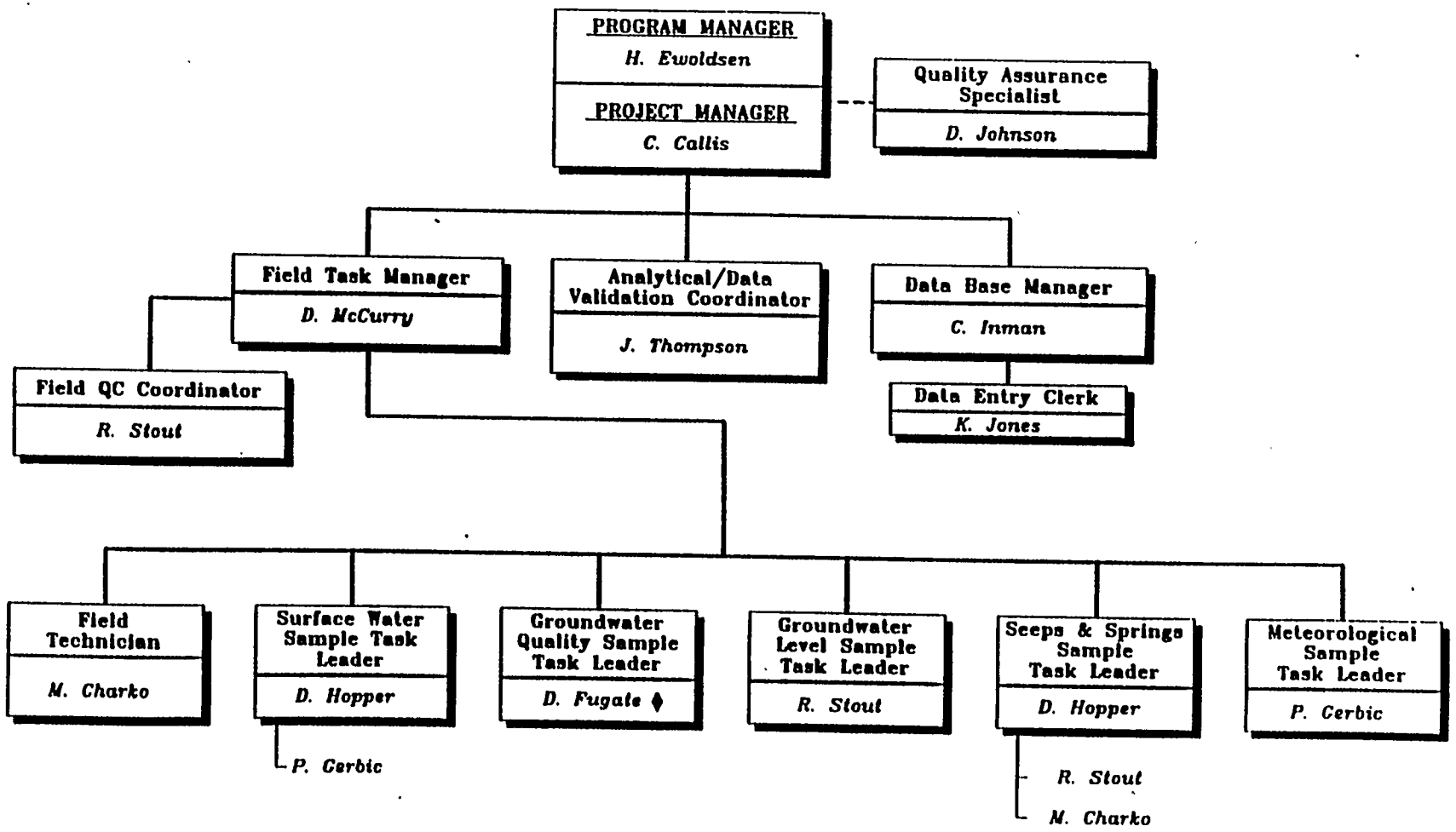
All documentation must be completed in waterproof black ink, and corrections must be marked through with a single line, dated, and initialed. Handwritten documents must be legible. Table 3.2 displays where, and what kind of, information must be recorded.

Field Documentation Forms

The following forms, which are located in Appendix A, are to be used for the specific activities addressed in this SAP.

- WAG 6—Seeps and Springs Initialization Form (SAS-01).
- WAG 6—Seeps and Springs Site Inspection Form (SAS-02).
- WAG 6—Seeps and Springs Sample Collection Form (SAS-03).
- WAG 6—Monitoring Variance Request Form (MV-01).
- WAG 6—Record of Repair Form (RF-01).
- WAG 6—Chain of Custody (COC-01).
- WAG 6—Weekly Activity Schedule (WAS-01)
- WAG 6—Field Activity Sheet (FAS-01)

Any information pertinent to the current field activity or field condition that is not requested on the field documentation form should also be entered in the "Comments" section of the form and in the field logbook. The forms used at each site will be numbered sequentially, using bar codes. The form bar-code label will be attached to the bottom right of the form, and also entered into the field logbook. In addition, any charts, oversize pages, and other printed material (e.g., runoff hydrographs, sample times) pertinent to current field activities will be securely



♦ Note that the sampling will be conducted by OECD ESP personnel and that D. Fugate will be responsible for documentation and sample management.

FIG. 3.1. Organization chart for WAG 6 Environmental Monitoring Plan implementation

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TENNESSEE

Table 3.1. General responsibilities of WAG 6 EMP principal contractor personnel

Position	Responsibilities
Project Manager	• Approving the SAP and verifying that all appropriate QA requirements, as specified in the WAG 6 QA Plan and in this document, are met in all field monitoring and laboratory activities; • consulting with the WAG 6 Program Manager and appropriate EMP QA authorities on all quality-related matters; • investigating field- and laboratory-related quality problems (e.g., out-of-control events), determining their root causes, proposing solutions, implementing corrective actions, and obtaining the concurrence of the WAG 6 Program Manager and QA authorities on the appropriateness of any corrective action; • submitting any proposed changes to the SAP, in the form of a WAG 6—Monitoring Variance Request Form (MV-01), to the WAG 6 Program Manager for approval; • maintaining custody of all original and copied EMP monitoring documentation; • reviewing all field data and documentation and laboratory data for completeness and adherence to QA protocols; • submitting all field data and documentation and laboratory data to the WAG 6 Program Manager for review; and • developing, gaining approval for, and implementing any cost-effective quality improvements.
Field Task Manager	• Implementing relevant requirements contained in the governing documents and plans; • ensuring and documenting that all field and laboratory personnel are properly informed and trained as specified in this SAP; • ensuring that there are adequate number of properly trained personnel for implementation of the seeps and springs monitoring activities; • ensuring that all equipment (including backup equipment) necessary for seeps and springs monitoring is available for immediate use; • keeping well-informed of scheduled interim remedial action and site upgrade construction activities, especially when such activities may hamper seeps and springs monitoring activities or affect data quality objectives and/or QA objectives; • initiating stop-work actions when the severity of conditions adverse to quality warrants immediate action; • managing or performing inspections and calibrations, and maintaining accurate documentation of all site equipment calibration and servicing activities; • managing or performing field monitoring and sampling activities, and ensuring that all such activities are performed and documented in accordance with QA protocols and approved procedures; • submitting all field documentation and electronic site data to the Project Manager for review; and • keeping the Project Manager informed of all site activities and quality-related problems.

Table 3.1 (continued)

Position	Responsibilities
QA Specialist	• Advising the contract Project Manager and team members of QA matters; • identifying project QA requirements and preparing QA procedures as required; • reviewing and approving the SAP and all subsequent changes to the SAP; • conducting or arranging scheduled audits or surveillances of task activities; • evaluating quality performance data from quality investigations, audits, and reviews; • preparing monthly QA summary reports for corporate management; • conducting or arranging QA training; • tracking the implementation of QA requirements in this plan and consulting periodically with the Project Manager; • tracking reports on conditions adverse to quality, reviewing corrective action, and tracking completion; and • initiating, reviewing, and following up on corrective actions as necessary.
Field QC Coordinator	• Implementation and documentation of training requirements, • QC review and verification of field forms and logbooks, and • verification of proper FOP usage.
Field Technician	• Maintenance and calibration of portable equipment, • inventory of supplies, • sample kit preparation, • sample shipping, • waste management, and • proper documentation of all field activities.
Sample Task Leader	• Performance and documentation of all field activities, • installation and maintenance of all dedicated equipment, • sample collection, and • monitoring and data acquisition activities.

Table 3.2. Types of WAG 6 EMP field documentation and their required information

Field documentation	Information
Site Logbook	• A list of all field logbooks; • daily temperature, weather conditions, and names and titles of personnel present during field activities;; • name, title, organization, and purpose of site visitors; • outline of daily field activities; • problems, their final resolution, and anticipated impact on the field investigation; • field changes or variances; and • a record of samples collected and shipped.
Equipment Maintenance and Calibration Logbook	• Equipment name, serial number, and ID number, • date of each calibration event, • identity of person performing calibration, and • calibration settings and values.
Field Logbooks	• Date and time task started; weather conditions; and names, titles, and organizations of personnel performing the task; • a description of site activities in specific detail; • a description, in detail, of any field test(s) (and results); • a description of environmental and QC samples collected; • a list of the time, equipment type and serial or identification number, and procedure followed for decontamination activities; • a list of equipment failures or breakdowns; and • a description of calibration activities in the field.
Telephone Logbook	• Date of call, • time of call, • whether incoming or outgoing, • participating parties, and • subject and pertinent information.

field documentation form must be written somewhere on the attached material. On a daily basis, the completed forms will be forwarded to the FTM, who will review the forms and forward them to the Data Manager for entry into the data base.

3.4 SAMPLE IDENTIFICATION AND LABELING

Labeling of all samples shall be performed in accordance with WAG 6—FOP 9. The following information must be recorded on the sample label:

- site name,
- unique sample identification,
- date and time of sample collection,
- type of sample (matrix),
- name of sampler,
- sample preservation,
- type of analyses to be conducted, and
- cleaning lot number.

All labels must be waterproof and preprinted or completed in permanent ink. An example sample label is located in Appendix A. Preprinted sample labels will be provided to the field team members in advance of scheduled sampling.

3.5 CHAIN OF CUSTODY

Preprinted chain-of-custody forms will be provided after scheduled sampling has been completed. Sample possession must be traceable and shall be maintained in accordance with ESP-500, "Manual Chain-of-Custody Procedures." To track sample possession, an official, documented chain-of-custody form (see Appendix A) shall be maintained for each sample. A sample is in custody if one or more of the following criteria are met:

- it is in the possession of a sampling team member,
- it is in a sampling team member's view after being in possession, or
- it is in a designated secure area.

The following information will be recorded on the completed chain-of-custody form:

- project name,
- signature of sampler,
- sampling station,
- unique sample number,
- date and time of collection,
- grab or composite designation,
- matrix,
- preservatives, and
- signatures of individuals involved in sample transfer.

Chain-of-custody forms will be placed in a plastic cover and taped inside the shipping container used for sample transport from the field to the laboratory. When samples are

relinquished to a shipping company for transport, the tracking number from the shipping bill/receipt will be recorded on the chain-of-custody form and in the field logbook. Individuals receiving samples will sign, date, and note the time of receipt on the chain-of-custody form.

3.6 ACTIVITY-SPECIFIC QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Refer to Table 3.3 for QC sample types, descriptions, and generic frequencies. Refer to Table 3.4 for activity-specific QC samples and numbers of QC samples to be collected.

Table 3.3. Quality control sample types and frequencies

QC sample types	Frequencies
Field Duplicates are collected sequentially with each sample into separate containers. Each sample is labeled according to the activity-specific labeling specifications, so that the identity of one of the samples as a duplicate is not obvious from the label.	1 duplicate per 10 samples
Matrix Spike/Matrix Spike Duplicates (MS/MSDs) are samples (one sample and one duplicate) collected in the field, labeled as an MS and an MSD.	1 MS/MSD per 20 samples
Field Blanks are collected from the deionized water used during decontamination of sampling and monitoring equipment.	1 field blank per month
Rinseate Blanks are collected by running deionized water over and/or through sampling and monitoring equipment after the equipment has been decontaminated. A preservative is added to these samples.	1 rinseate blank per 10 samples
Trip Blanks consist of 40-mL vials filled with organic-free distilled/deionized water preserved with HCl to pH <2. Trip blanks are supplied by the laboratory.	1 trip blank per cooler containing samples to be analyzed for volatile organic compounds

Table 3.4. Activity-specific quality control samples for Level III analyses[a]

Analyte	Pre-baseline (12 sampling points)				First quarter (estimated 12 sampling points)				Second, third, and fourth quarters (estimated 12 sampling points)			
	Duplicate	MS/MSD	Rinseates	Trip blanks	Duplicates	MS/MSD	Rinseates	Trip blanks	Duplicates	MS/SD	Rinseates	Trip blanks
CLP[b] volatiles[c]	3	2	3[d]	1	3	2	3	1	3[c]	2	3[d]	1[e]
CLP semivolatiles[f]	-	-	-	-	2	1	2	-	-	-	-	-
CLP pesticides/PCBs[f]	-	-	-	-	2	1	2	-	-	-	-	-
CLP herbicides[f]	-	-	-	-	2	1	2	-	-	-	-	-
CLP metals	2	1	2	-	2	1	2	-	2	1	2	-
Gross alpha	2	1	2	-	2	1	2	-	2	1	2	-
Gamma scan	2	1	2	-	2	1	2	-	2	1	2	-
Strontium-90	2	1	2	-	2	1	2	-	2	1	2	-
Tritium[c]	3	2	3	-	3	2	3	-	3	2	3	-
Anions	-	-	-	-	2	1	2	-	-	-	-	-
DIC/DOC[g]	-	-	-	-	2	1	2	-	-	-	-	-
Alkalinity	-	-	-	-	2	1	2	-	-	-	-	-
Total	14	8	14	1	26	14	26	1	14	8	14	1

[a] Field blanks will be collected from the deionized/distilled water used during decontamination of sampling and monitoring equipment. One field blank from each of the two water sources will be collected per month.
[b] CLP = Contract Laboratory Program
[c] Two samples per location
[d] For every 10 samples collected, one rinseate sample will be collected if a dipper is used to collect grab samples.
[e] One trip blank will be prepared per cooler containing samples to be analyzed for volatile organic compounds.
[f] Included in rounds 2, 3, and/or 4 if detected above background and health-based levels and requiring confirmation, as described in Sect. 4.4 of the EMP.
[g] DIC/DOC = dissolved inorganic carbon/dissolved organic carbon

4. HEALTH AND SAFETY CONSIDERATIONS

The provisions of the project H&S Plan are mandatory for all personnel assigned to the program. In no case may work be performed in a manner that is inconsistent with the intent and cautions expressed in the project H&S Plan. All field personnel will be properly trained in health and safety regulations associated with handling hazardous materials and the safe operation of sampling equipment. As specified in 29 CFR 1910.120, all field personnel will have attended Occupational Health and Safety Act (OSHA) 40-h hazardous-waste-worker training, and must have completed necessary yearly 8-h updates.

In general, personnel will work in groups or pairs. However, personnel will perform some work activities independently of other members of the WAG 6 field team. At these times, personnel will abide by a "buddy system." Each member of the WAG 6 field team will be responsible for keeping track of personnel working independently. Before leaving the monitoring area, all personnel and conveyed equipment will be checked with a beta-gamma meter for evidence of radiological contamination. Personnel will take precautions to help prevent contact with hazards identified in the project H&S Plan.

Activity-specific health and safety considerations are addressed in task instructions. The SHSO and/or Site Health Physicist shall specify the PPE required for site activities, tasks, and work zones. The SHSO and/or Site Health Physicist shall train all site personnel in PPE donning and doffing procedures before beginning any site activities. The task instructions in Appendix C address activity- and location-specific health and safety issues.

SEEPS AND SPRINGS SAMPLING AND ANALYSIS PLAN SPECIFIC HEALTH AND SAFETY ISSUES

SECTION 1. TASK DESCRIPTION

Per the Seeps and Springs Sampling and Analysis Plan, samples will be collected quarterly from 14 sources. Associated tasks include the recording of timed volumetric flow measurements and continuous flow measurements, and water sampling. Task instructions, data collection guidelines, sample collection guidelines, and locations at which surface water will be sampled are discussed in Sect. 2 of the Seeps and Springs Sampling and Analysis Plan (SAP).

To obtain timed volumetric flow measurements, measure the time required for seep discharge to flow into a given volume. When the data are collected, conduct a brief inspection of the site.

Continuous flow measurements will be obtained by downloading into a computer the data collected on-site. When data are downloaded, perform a brief field inspection and equipment check.

Water sampling involves donning the required personal protective equipment (PPE) (which may include wading equipment), collecting a sample in a dipper, and depositing the sample in a clean sample container. Immediately after water samples are collected, decontaminate used equipment, conduct a brief field inspection, and complete the appropriate sample documentation.

SECTION 2. HAZARD ANALYSIS

The primary hazard associated with seeps and springs monitoring involves manual sampling, which may necessitate that workers wade into the water, thereby increasing the possibility of their slipping and falling.

The industrial hygienist (IH) or site health and safety officer (SHSO) will review site characterization information and anticipated work activities to assess low-level radiological hazards. Areas known to contain radiologically hazardous material are clearly marked; however, workers are not expected to encounter such material. Further information regarding radiological hazards is contained in Sect. 4.1.3 of the Site Health and Safety Plan (SHSP).

During sampling activities, field workers may be physically affected by temperature variance, meteorological conditions, exposure to contaminants, and illness. All field personnel will be given an adequate number of breaks throughout the day to prevent cold stress, frostbite, heat exhaustion, and heat stroke. Trailers will be located on-site in a

clean zone to shelter workers from inclement weather. The IH or SHSO may require that field personnel don waterproof PPE during manual sampling activities. If a field worker feels ill, exhibits symptoms of overexposure to the elements, or is unable to perform his or her tasks, he or she should notify the IH or SHSO immediately.

Tables will be included upon verification of the location at the seeps and springs. These tables will include the threshold limit values/permissible exposure limit, target organ, symptoms and health effects of overexposure, and chemical and physical properties of each monitored constituent. In the field, chemicals may not be encountered in their pure states; rather, a combination of chemical constituents may be present, so possible combinations of symptoms may indicate overexposure. If an action limit is reached for the prescribed period of time, the IH or SHSO should be notified immediately.

Site conditions may present a range of biological hazards, including allergens, insect bites, poison ivy or other plant irritants, and wildlife such as snakes and rodents. If team members encounter any biological hazards, they should notify the IH or SHSO immediately.

SECTION 3. MONITORING

The IH and SHSO will monitor the site during sampling activities to detect changes in field conditions with regard to possible contaminants. The SHSO will use a photoionization detector to monitor for organic contaminants and will use a combustible gas indicator to monitor for vapors. These instruments will be calibrated by the IH or SHSO and will be operated whenever work is being conducted in the exclusion zone.

SECTION 4. REQUIRED PERSONAL PROTECTIVE EQUIPMENT

Level D, D+, or C PPE will be required during surface water sampling. The components of these levels of PPE are listed in Sect. 5.3.2 of the SHSP. If conditions necessitate that PPE be upgraded or downgraded, the IH or SHSO will instruct field team to don or doff the appropriate PPE.

SECTION 5. DECONTAMINATION OF PERSONAL PROTECTIVE EQUIPMENT

Procedures for decontamination of Level D, D+, and C PPE are explained in Sect. 8 of the SHSP.

5. WASTE MANAGEMENT

The WAG 6 EMP WMP states that CDM Federal, as waste generator, will perform waste segregation, packaging, labeling, and transportation to the central accumulation area as required during the project. [Waste Management Operations (WMO) will transport liquid waste from the temporary waste storage area to the appropriate facility.] CDM Federal is not responsible for final disposition of waste.

Anticipated wastes from seeps and springs sampling activities include decontamination fluids, PPE, sample residuals, and various other trash items such as used paper towels and plastic sheeting. No purge water waste will be generated during this activity. However, some soil waste may be generated when installing sumps at selected seep and spring locations.

5.1 ORGANIZATIONAL RESPONSIBILITIES

The following personnel will be responsible for various aspects of WAG 6 waste management.

Laboratory Certification Official

The Laboratory Certification Official has the following responsibilities:

- implementing and managing the ORNL Solid Low-Level Waste (SLLW) Certification program,
- reviewing and approving project WMPs and WMP checklists, and
- providing direction if an unforeseen waste situation is encountered.

Generator Certification Official

The GCO has the following responsibilities:

- serving as interface between the project, the ORNL Laboratory Certification Official, and the ORNL WMO in addressing generator problems and waste certification requirements;
- initiating preparation of the Waste Pickup Request Form;
- certifying that the waste was packaged in accordance with the ORNL waste acceptance criteria, the ORNL SLLW certification program, and SLLW QA Plan requirements;
- making arrangements with WMO for pickup and transfer of waste packages to the designated storage or treatment facility; and
- assuming other duties as specified in the WMP.

Field Task Manager

The FTM has the following responsibilities:

- ensuring that site personnel follow the WMP,
- coordinating with Health Physics and Industrial Hygiene, and
- assuming responsibility for transportation of waste as required.

Sample Task Leader or Waste Management Designee

As the generator, the Sample Task Leader (STL) or designee has the following responsibilities:

- properly containerizing, packaging, and segregating all waste generated as part of the project;

- engaging in interface with the FTM to ensure that any issues pertaining to SLLW characterization are promptly brought to the attention of the responsible individuals and that any new certification requirements are promptly instituted;

- assisting the GCO with the preparation of the Waste Pickup Request Form and the Container Packing List; and

- assuming other duties as specified in the project WMP.

Health Physics and Industrial Hygiene Personnel

Health Physics and Industrial Hygiene personnel are responsible to conduct surveys as necessary to determine if waste contains RCRA-regulated or radiologically contaminated materials.

5.2 GUIDANCE DOCUMENTS

The following documents will provide guidance for waste management activities conducted during the implementation of the WAG 6 EMP:

- WAG 6 Project WMP,
- "Waste Management" (ESP-1000),
- *Waste Acceptance Criteria for Radiological Solid Waste Disposal* (WMRA-WMPC-203),
- *ORNL Liquid Waste Treatment Systems Waste Acceptance Criteria* (WM-WMCO-201),
- Waste Item Description (UCN-2109) Form User Instructions,
- Container Packing List (TX-5749) Form User Instructions, and
- *Management of Investigation-derived Waste During Site Investigations* (EPA 1991).

5.3 WASTE CHARACTERIZATION/SEGREGATION

When waste is first generated, liquid waste will be containerized and solid waste will be isolated in a container or on plastic sheeting. Table 5.1 shows the various categories into which waste will be segregated for this project, the criteria for segregation, and packaging requirements.

5.3.1 Solid Waste

At the end of each day, Health Physics personnel will use portable alpha and beta/gamma detectors to monitor the material (miscellaneous trash) removed for the presence of radioactivity. They will designate waste as "clean," "very low activity," or "low level" waste.

Health Physics personnel will be responsible for scanning all waste leaving WAG 6. If the waste is within Energy Systems standards, the waste will be issued a "green tag," signifying that it is "clean" of radioactive contamination. An on-site dumpster adjacent to personnel trailers will be available for "clean" waste generated on-site, such as office papers.

Health Physics and Industrial Hygiene personnel will use portable alpha and beta/gamma detectors and PIDs, respectively, to monitor excavated soil during the sump installation activities. Contaminated soil will be collected on plastic sheeting and maintained in polyvinyl-covered stockpiles or 55-gal drums until disposal on-site or at the Oak Ridge Y-12 Plant recontour site. The GCO will designate the area for stockpiling the contaminated soil. Noncontaminated soils will be spread out in the vicinity of the newly installed sump, if determined by Health Physics to be appropriate.

5.3.2 Liquid Waste

Liquid waste from decontamination activities will be accumulated in a container, then consolidated at a central location. For ease of transportation, 26-L carboys or some other suitable container may be substituted for 55-gal drums at the GCO's or Field Task Manager's discretion.

According to the project WMP, accumulation containers of liquid waste will be monitored for radioactivity, volatile organics, and pH. When a container is full, a sample will be taken by Energy Systems personnel, and the Liquid Waste Laboratory Certification Official will be consulted regarding the analyses necessary for characterization. The same sample custody procedure used for other samples (ESP-500) will be followed. While analytical results are pending, a replacement accumulation container will be used.

5.4 WASTE PACKAGING

After waste has been characterized and segregated according to category, waste packets can be created. Waste is packaged by the Sample Task Leader according to guidance provided by the GCO. A Waste Item Description Form is filled out for each packet. One bar code label is placed on the waste packet, and the other is placed on the Waste Item Description Form associated with the specific packet. The bar-code-label number is then copied onto the Container Packing List. When the container is full, the GCO and the Sample Task Leader will complete a Waste Pickup Request Form to be submitted to WMO by the GCO. The Waste Management forms and their instructions for use, as well as the solid and liquid waste acceptance criteria, will be located on-site in the WAG 6 project trailers.

Table 5.1. WAG 6 waste management

Type of waste	Category of waste[a]	Segregation requirements	Packaging requirements[b]	Accumulation/ staging area	Final disposal[b]
Used sample bottles[c]	-	-	-	-	Cleaned by laboratory and returned for reuse
Soil[d]	1	No α or β/γ; no volatiles	None	None	On site
	1	α or β/γ; volatiles	Maintain in polyvinyl-covered stockpile or 55-gal drum	GCO-designated area	Y-12 Plant recontour site or reuse on site
Miscellaneous trash (personal protective equipment, plastics, paper)	5	No α or β/γ; no volatiles	Plastic bags in garbage cans at site	Green dumpster adjacent to personnel trailers	Y-12 Plant landfill
	8	Suspected α or β/γ but no volatiles	Package per Solid Waste Storage Area (SWSA) 6 Waste Area Criteria instructions (WMRA-WMPC-203)	GCO-designated area	Site designated by Waste Management Operations
	14	α or β/γ; no volatiles	Package per SWSA 6 Waste Area Criteria instructions (WMRA-WMPC-203)	GCO-designated area	SWSA 5-box compactor
Decontamination water	22	Based on procedure: solvent, acid, etc; α or β/γ	Arrange with Liquid Gaseous Waste Operations Department (LGWOD)	Carboy	Process waste treatment plant
	24	Based on procedure: solvent, acid, etc; no α or β/γ	Arrange with LGWOD	Carboy	Nonradiological waste treatment plant
	25	No hazardous substance used in decontamination; no α or β/γ	Arrange with LGWOD	Carboy	Storm sewer system

[a] Categories of waste as delineated by the Project WMP.
[b] According to Tables 3.2 and 3.3 in the Project WMP.
[c] Although these are called out in the Project WMP and will be generated, it is unlikely that they will be returned to the site.
[d] Soil deemed "investigation-derived waste" will be handled according to *Management of Investigation-Derived Waste During Site Investigations*, EPA/540/G-91/009 (EPA 1991), as discussed in the project WMP.

5.5 WASTE TRANSPORTATION

When waste containers become full of liquid, if there is not sufficient analytical data available to categorize the waste, the containers will be sampled. When the liquid waste can be categorized, the original container site will be considered the temporary waste storage area and the containers will be transported by WMO. Energy Systems personnel will manage and conduct all transportation of waste to locations outside WAG 6 as well as all liquid waste transportation.

6. DATA MANAGEMENT

6.1 INTRODUCTION

The data management team will create "Blank Form Books" filled with previously bar coded forms to be used by the field teams. Each form will be stored in a separate book and will have the bar code preattached to the bottom right corner of the form. A copy of the appropriate form will be inserted on the outside cover of the "Blank Form Book," and the binder will signify the form number. The form bar-code label will be scanned as the STL enters it into the bar code reader for uploading to the data base when he/she actually uses the form. If that form is not used after being taken to the field, the STL will return the blank form to the notebook for later use.

When the STL returns to the trailer at the end of the day, the forms will be forwarded to the FTM for review. The Data Entry Clerk (DEC) will receive all completed forms and the data diskette downloaded from the bar code reader on a daily basis. The diskettes on which electronic data are downloaded from the monitoring equipment will be forwarded to the Data Manager by the FTM on a monthly basis (and more frequently if necessary).

6.2 DATA DOWNLOADING

Field data collected during the WAG 6 Seeps and Springs Monitoring Program will be obtained manually and electronically. A majority of the manual data will be entered into the WAG 6 data base using bar code equipment when available. However, field documentation forms also will be completed and used by the sampling team as a quality check against the data base. Electronic data will be collected by Telogs and ISCO 3230 Flow Meters, and will be downloaded, edited, and analyzed by the sampling team.

6.2.1 Manual Data

Manual data generated for seeps and springs monitoring will consist of manual-sample-collection information and in situ parameter measurements, and may include reference flow rates. A majority of the manual data will be entered into the WAG 6 data base using bar code equipment. However, field documentation forms will also be completed by the sampling team. These forms will be compared with the data base at a later time to ensure that all the information entered into the bar code reader was correct.

6.2.2 Electronic Data

If feasible, raw electronic flow data may be generated for seeps and springs monitoring. If obtained, it may consist of flow rates and water levels. Electronic data obtained will be downloaded, edited, analyzed, and gathered into site report files according to WAG 6—FOP 10. Data files will be traced, from downloading to archiving and internal verification, on the Electronic Data File Management Form presented in the WAG 6 FOP Manual. If electronic data are collected, the following guidelines should be followed when manipulating electronic data.

- Download water level data collected by the ISCO 3230 Flow Meter or the Telog to DAT files as specified in WAG 6—FOP 3.

- Use DATAMAN, the file management module of FLOWLINK, to combine data sets if they were not joined at the time of data downloading.

- Copy the raw data to a working, 3.5-in., high-density (HD) diskette and to the archival Bernoulli. Use the working diskette to "clean up" data. Attach a label to the archival Bernoulli and place in temporary storage. Attach a second label to the working diskette and begin processing.

- Use EXPORT, the FLOWLINK data-translation module, to export the FLOWLINK-formatted level and sample-collection data set to ASCII-formatted files. During the FLOWLINK-to-ASCII translation, EXPORT will automatically convert the continuous water-level data to flow using the FCS file that was downloaded with the level data.

- Use the EZ-BRK program or similar validation software to remove redundant data and to gather the data in monthly files.

- When all data have been processed for all sites for the month, assemble a transfer package of the archival Bernoulli and corresponding working diskette. Record each on a log sheet and send all materials (i.e., transfer package and log sheets) to the Data Manager for uploading to the Oak Ridge Environmental Information System (OREIS).

6.3 PROCEDURES FOR COMPLETING SEEPS AND SPRINGS (SAS) FORMS

The WAG 6 seeps and springs sampling team will be using a bar code reader in the field when available to record most of the information that will be tracked in the WAG 6 project data base. The team will use a menu card to input the project task code, monitoring location, sample type, and analyte when gathering that information on one of the following SAS forms. Because the container type and preservative are always the same dependent upon the analyte, the sampler will not be prompted for this information.

SAS-01: WAG 6—Seeps and Springs Initialization Form

Before leaving the trailer, the STL will pull one form SAS-01 for each location to be monitored that day. Upon arrival at the site, the STL will scan the Project Task Code from a menu card, the monitoring location, the sample team's badges by role, the field logbook number, the form bar code label, and the equipment bar code ID of each piece of equipment to be initialized at that location. The "Comments" field is optional. If there is anything concerning the event that the STL wants tracked in the data base, the STL will note that information in the "Comments" field of the form. The Data Manager will manually enter the information once the form has been submitted and the field data have been added to the data base.

SAS-02: WAG 6—Seeps and Springs Site Inspection Form

Before leaving the trailer, the STL will pull one form SAS-02 for each site to be inspected or downloaded. Upon arrival at the site, the STL will scan the Project Task Code from a menu card, the monitoring location, the sample team's badges by role, the field logbook number, the form bar code label, and the equipment IDs of each piece of equipment at the site. The "Comments" field is optional. If there is anything concerning the event that the STL wants tracked in the data base, the STL will note that information in the "Comments" field of the form.

The Data Manager will manually enter the information once the form has been submitted and the field data have been added to the data base.

SAS-03: WAG 6—Seeps and Springs Sample Collection Form

Before leaving the trailer, the STL will attach a sample label/bar code label to each sample bottle to be used, and will pull one SAS-03 form. Upon arrival at the site, the STL will scan the Project Task Code from a menu card, the monitoring location, the sample team's badges by role, the field logbook number, and the form bar code number. The reader will then prompt the Sample Task Leader to perform the following procedure:

- input the flow rate;
- scan the HORIBA Bar Code ID Number;
- observe that the reader has captured the date and time of measurement;
- input the temperature, pH, Eh, conductivity, and dissolved oxygen level;
- scan the Bar Code Sample ID located on the sample bottle;
- scan the sample type from a menu card; and
- scan the analyte from a menu card.

The "Comments" field is optional. If there is anything concerning the event that the STL wants tracked in the data base, the STL will note that information in the "Comments" field of the form. The Data Manager will manually enter the information once the form has been submitted and the field data have been added to the data base.

7. REFERENCES

ASME (American Society of Mechanical Engineers) 1989. Quality Assurance Program Requirements for Nuclear Facilities. ASME NQA-1, New York.

CDM Federal (CDM Federal Programs Corporation) 1993. *Quality Assurance Plan for Characterization and Monitoring Activities at Waste Area Grouping 6, Oak Ridge National Laboratory, Oak Ridge, Tennessee.*

CDM Federal (CDM Federal Programs Corporation). *WAG 6 Field Operations Procedures Manual.*

DOE (U.S. Department of Energy) 1993a. *Environmental Monitoring Plan for Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, ORNL/ER-158. Oak Ridge National Laboratory, Oak Ridge, Tennessee, September.

DOE (U.S. Department of Energy) 1993b. *Quality Assurance Project Plan for the Environmental Monitoring Program in Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee.* DOE/OR/01-1193&D1, Prepared by Gilbert/Commonwealth, Inc., Oak Ridge National Laboratory, Oak Ridge, Tennessee, September.

ECE (Environmental Consulting Engineers) 1993. *Results of Seep and Spring Reconnaissance: Waste Area Grouping 6 Dry Season Reconnaissance.*

Energy Systems (Martin Marietta Energy Systems, Inc.) 1991. *RCRA Facility Investigation Report for Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, ES/ER-22/V2&D1. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Energy Systems (Martin Marietta Energy Systems, Inc.) 1993. *Environmental Restoration Quality Program Plan.* ES/ER/TM-4/R3, Oak Ridge, Tennessee, September.

EPA (U.S. Environmental Protection Agency) 1983. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans.* QAMS-005/80, EPA/600/4-83/004, Washington, D.C.

EPA (U.S. Environmental Protection Agency) 1991. *Management of Investigation-derived Waste During Site Investigations.* EPA/540/G-91/009, Washington, D.C.

Kimbrough, C. W., L. W. Long, and L. W. McMahan, eds., 1988. *Environmental Surveillance Procedures, Quality Control Program.* ESH/Sub/87-21706/1, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, September.

APPENDIX A

FIELD FORMS

WAG 6 - SEEPS AND SPRINGS INITIALIZATION FORM (SAS-01)

Monitoring Location: _____ Field Logbook Number: _____

STL Badge #: _____ Date: _____

Weather: _____ Time: _____

_____

Comments: _____

_____

_____

ISCO FLOW METER

New/Replacement Installation: _____ Equipment Bar Code ID: _____

Old ID Number: _____

Clock Synchronization: _____ Comments: _____

Recording Interval: _____ _____

Flow Pace Interval: _____ _____

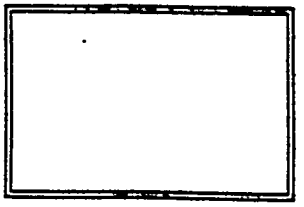
Activation Level: _____ _____

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

Form Bar Code Label



WAG 6 - SEEPS AND SPRINGS SITE INSPECTION FORM (SAS-02)

Monitoring Location: _____ Field Logbook No.: _____

STL Badge # : _____ Date: _____

Time: _____

Weather: _____

_____

Water Level (ft): _____

Flow Rate (cfs): _____

HYDRAULIC STRUCTURE INSPECTION CHECKLIST

Inspection Item	Initials	Inspection Comments, Problems, Service Performed, etc.
Flow Obstructions		
Sediment Accumulation or Erosion		
Algae Growth		
Other		

ISCO FLOW METER INSPECTION CHECKLIST
EQUIPMENT BAR CODE ID: _____

Inspection Item	Initials	Inspection Comments, Problems, Service Performed, etc.
Meter Program Clock synchronization Recording interval Flow pulse interval Activation level		
Meter Case and Seals		
Internal Desiccant External Desiccant		
Reference Port Tube		
Bubble Tube		
Plotter Paper and Ink		
Bubble Rate (one per second)		
Connections to Tube, Battery, and Samplers		
Battery Voltage		
Tampering, Water Seepage, or Damage		

COLLECTION OF SITE FLOW AND WATER LEVEL DATA

Flow Meter Bar Code ID:
Path and filename to which all data were retrieved or appended:
Device and procedure used to download data:
Sample Task Leader: Date:

Comments: _____

_____

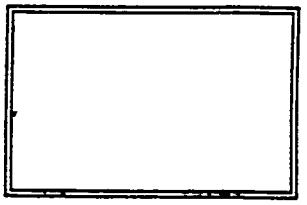
_____

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

Form Bar Code Label



WAG 6 - SEEPS AND SPRINGS SAMPLE COLLECTION FORM (SAS-03)

Monitoring Location:_____ Field Logbook Number:_____

STL Badge No.:_____ Date:_____

Time:_____

Weather:_____

_____

Comments:_____

_____

Water Level (ft)[1]:_____

Flow Rate (cfs)[1]:_____

HORIBA Bar Code No.:_____ Time of Calibration Check:_____ Recalibrate Yes/No:_____

Date/Time of Measurement:_____

Temperature (°C):_____ pH:_____ Conductivity (mS/cm):_____ DO (mg/L):_____

Comments:_____

_____

_____

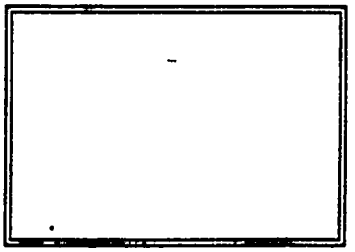
Sample Task Leader Signature/Date:_____

Data Entry Signature/Date:_____

Data Validation Signature/Date:_____

[1] Should be obtained at sites where ISCO Flow Meters are installed.

Form Bar Code Label



WAG 6 - MONITORING VARIANCE REQUEST FORM (MV-01)

Matrix:

ID of affected site(s):

Name, title, and badge number of person making request:

Date:

Document very specifically the variance being requested. Be sure to identify all pertinent Data Quality Objectives that are affected by this variance:

Document the reasons for requesting the variance:

Document the time scale of the variance. Include dates at which this variance will start and end (if applicable):

Variance approval signature:	STL:	Date:
	FTM:	Date:
	SAP Coordinator:	Date:
	WAG 6 Project Manager:	Date:
	WAG 6 Technical Lead:	Date:

Form Bar Code Label

Data entry signature/date: _____

Data verification signature/date: _____

WAG 6 - RECORD OF REPAIR FORM (RF-01)

DATE: _____ EMPLOYEE BADGE NO.: _____

EQUIPMENT BAR CODE NO.: _____

EQUIPMENT STATUS: (circle one) IN-USE AVAILABLE TEMPORARILY OUT-OF-SERVICE RETIRED

Disposition of unit: _____

Comments: _____

Was damage discovered during routine site inspection? Yes _____ No _____

If yes, list inspection form number or logbook number. _____

Nature of damage if known: _____ Date found: _____

Was unit repairable in situ? Yes _____ No _____

If yes, list repairs made and person making them. _____

_____

Did in situ repairs include replacing any parts/accessories? Yes _____ No _____

If yes, list and describe. _____

_____

Was equipment sent to offsite vendor for repair? Yes _____ No _____

If yes, list:

Vendor: _____ Address: _____

Airbill No. (if shipped): _____

Work Order No: _____

Date Sent: _____ Initial: _____

Date returned: _____ Received by: _____

Type of repair: _____

Was unit returned in good working condition? Yes / No

If no, please describe: _____

_____

Returned Equipment Status: _____

Form Bar Code Label

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

WAG 6 - CHAIN OF CUSTODY (COC-01)

Sample ID	Sample Location	Sample Date	Sample Time	Sample Type	Container		Preservative	Requested Analysis	Transferred from FAS No.	Remarks
					Type	Volume				

Sample Types: RB = Rinse Blank, FB = Field Blank, TB = Trip Blank, FLD = Field Sample, MS/MSD

Container Types: P = High Density Polyethylene, G = Glass, T = Teflon

Preservative: A = HCl to pH < 2, B = HNO_3 to pH < 2, C = H_2SO_4 to pH < 2, D = NaOH to pH > 12, E = Other (Specify)

Laboratory:	Date Submitted to Lab:		SDG ID:	Cooler Temperature: °C	
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished by:	Date:	Time:	Received By:	Date:	Time:
Relinquished by:	Date:	Time:	Received By:	Date:	Time:
Sample Disposed by:		Date:	Time:	Airbill No.:	

Form Bar Code Label

WEEKLY ACTIVITY SCHEDULE (WAS-01)

FTM Badge No.:_____ Date (mm/dd/yy):_____

Groundwater Quality

Activity Period:

Site I.D.s	Task	Planned Date	Surplus Bottles		
			Quantity	Type	Volume

Surface Water

Activity Period:

Site I.D.s	Task	Planned Date	Surplus Bottles		
			Quantity	Type	Volume

Seeps and Springs

Activity Period:

Site I.D.s	Planned Date	Task	Surplus Bottles		
			Quantity	Type	Volume

FTM Signature/Date:_____

Data Entry Signature/Date:_____

WAG 6 - FIELD ACTIVITY SHEET (FAS-01) PAGE OF

WAG 6 PROJECT	PLANNED DATE:	ACTUAL DATE:
TASK:	FIELD MATRIX:	KIT IDENTIFIER:
TEAM LEADER :	FIELD LOGBOOK NO.:	

SAMPLE ID	SAMPLE TIME	MONITORING LOCATION	SAMPLE TYPE	CONTAINER		ANALYSIS GROUP	PRESERVATIVE	pH	SAMPLING DEVICE	COLLECTION FOP	LAB CODE	SHIPPING CONTAINER NO.	REMARKS
				VOL./ UNIT	TYPE								

CONTAINER TYPES: HDPE = High Density Polyethylene, AGLS = Amber Glass, TFL = Teflon, CUBI = Cubitainer, GLS = Glass

SAMPLE TYPES: REG = Regular, RIN = Rinseate, FB = Field Blank; TB = Trip Blank; FR = Field Duplicate, MS/MSD = Matrix Spike/Matrix Spike Duplicate

PRESERVATIVE: HCL/CH = HCl to pH <2, 4°C; HNO3 = HNO_3 to pH <2; H2SO4 = H_2SO_4 to pH <2; CHILL = 4°C, --- = No Preservative

RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:
RELINQUISHED BY:	DATE:	TIME:	RECEIVED BY:	DATE:	TIME:

Form Bar Code Label

APPENDIX B

SAMPLING SCHEDULES

Table B.1. Pre-Baseline Sampling

Site ID	CLP Volatiles	CLP Semivolatiles	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan	Tritium	Strontium-90	Anions, DIC/DOC,[a] Alkalinity	Rinseate[b]
SS-003	X				X	X	X	X	X		
SS-005	X				X	X	X	X	X		
SS-006	X, T				X	X	X	X	X		
SS-007	X,F[d],M				X,F,M	X,F,M	X,F,M	X,F,M	X,F,M		X
SS-008	X				X	X	X	X	X		
SS-009	X				X	X	X	X	X		
WSS-025–WSS-030	X, T				X	X	X	X	X		
WSS-023A	X				X	X	X	X	X		
WSS-033	X, T				X	X	X	X	X		
WSS-045	X				X	X	X	X	X		X
WFD	X, T				X	X	X	X	X		
SFD	X, F				X, F	X, F	X, F	X, F	X, F		

[a] DIC/DOC = dissolved inorganic carbon/dissolved organic carbon.

[b] This sampling schedule assumes that a dipper will be needed to collect samples 100% of the time. The actual number of rinseate blanks may differ from what is depicted here. However, they will always be taken at a rate of 1/10 or fewer samples.

[c] T = Trip blank. The actual number of trip blanks may vary, but one trip blank will be present in each cooler in which samples for volatiles analyses are present.

[d] F = Field duplicate, M = matrix spike/matrix spike duplicate (MS/MSD). Field duplicates will be taken at a rate of 1/10 or fewer samples. MS/MSD samples will be collected at a rate of 1/20 or fewer samples.

Table B.2. First Quarter Sampling

Site ID	CLP Volatiles	CLP Semivolatiles	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan	Tritium	Strontium-90	Anions, DIC/DOC,[a] Alkalinity	Rinseate[b]
SS-003	X	X	X	X	X	X	X	X	X	X	
SS-005	X	X	X	X	X	X	X	X	X	X	
SS-006	X, T	X	X		X	X	X	X	X	X	
SS-007	X,F[d],M	X,F,M	X,F,M	X,F,M	X,F,M	X,F,M	X,F,M	X,F,M	X,F,M	X,F,M	X
SS-008	X	X	X,F,M	X,F,M	X	X	X	X	X	X	
SS-009	X	X	X,F,M	X,F,M	X	X	X	X	X	X	
WSS-025–WSS-030	X,T	X	X,F,M	X,F,M	X	X	X	X	X	X	
WSS-023A	X	X	X,F,M	X,F,M	X	X	X	X	X	X	
WSS-033	X,T	X	X,F,M	X,F,M	X	X	X	X	X	X	
WSS-045	X	X	X,F,M	X,F,M	X	X	X	X	X	X	X
WFD	X,T	X	X,F,M	X,F,M	X	X	X	X	X	X	
SFD	X,F	X,F	X,F	X,F	X,F	X,F	X,F	X,F	X,F	X,F	

[a] DIC/DOC = dissolved inorganic carbon/dissolved organic carbon.

[b] This sampling schedule assumes that a dipper will be needed to collect samples 100% of the time. The actual number of rinseate blanks may differ from what is depicted here. However, they will always be taken at a rate of 1/10 or fewer samples.

[c] T = Trip blank. The actual number of trip blanks may vary, but one trip blank will be present in each cooler in which samples for volatiles analyses are present.

[d] F = Field duplicate, M = matrix spike/matrix spike duplicate (MS/MSD). Field duplicates will be taken at a rate of 1/10 or fewer samples. MS/MSD samples will be collected at a rate of 1/20 or fewer samples.

Table B.3. Second Quarter Sampling[a]

Site ID	CLP Volatiles	CLP Semivolatiles	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan	Tritium	Strontium-90	Anions, DIC/DOC[b], Alkalinity	Rinseate
Selected Seeps	X				X	X	X	X	X	X	X
WFD	X, T				X	X	X	X	X	X	
SFD	X, F	F			X, F	X, F	X, F	X, F	X, F	X, F	

[a]Based on the flow of the seeps, several seeps will be selected as permanent monitoring points in addition to the two french drain outlets. Field duplicates, trip blanks, MS/MSD, and rinseate samples for seeps samples will be obtained at the same rates as for first quarter sampling, but for fewer sampling points.
[b]DIC/DOC = dissolved inorganic carbon/dissolved organic carbon.

Table B.4. Third and Fourth Quarter Sampling[a]

Site ID	CLP Volatiles	CLP Semivolatiles	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan	Tritium	Strontium-90	Anions, DIC/DOC[b], Alkalinity	Rinseate
Selected Seeps	X				X	X	X	X	X	X	X
WFD	X, T				X	X	X	X	X	X	
SFD	X, F				X, F	X, F	X, F	X, F	X, F	X, F	X

[a] Based on the flow of the seeps. Field duplicates, trip blanks, MS/MSD and rinseate samples for seeps samples will be obtained at the same rates as for First Quarter sampling, but for fewer monitoring points.

[b] DIC/DOC = dissolved inorganic carbon/dissolved organic carbon

APPENDIX C

SITE-SPECIFIC HAZARD EVALUATION ADDENDUM FOR WAG 6 SEEPS AND SPRINGS SAMPLING AND ANALYSIS PLAN

SITE-SPECIFIC HAZARD EVALUATION ADDENDUM FOR WAG 6 SEEPS AND SPRINGS SAMPLING AND ANALYSIS PLAN

S. D. Van Hoesen 3/21/94
S. D. Van Hoesen
Environmental Restoration Division
WAG 6 Project Manager

B. L. Morgan 3/21/94
B. L. Morgan
ORNL Construction Engineer

A. W. Saulsbury 3/17/94
A. W. Saulsbury
ORNL HAZWOPER Program Coordinator
Environmental Restoration Division
Industrial Hygiene Representative

S. N. Burman 3/24/94
S. N. Burman
Site Safety and Health Manager

W. C. Hayes 4/25/94
W. C. Hayes
ORNL Applied Health Physicist

K. Wilson 3/21/94
K. Wilson
WAG 6 Facility Manager

J. D. Miller 3/28/94
J. D. Miller
ORNL Industrial Safety

C. Clark 4/25/94
C. Clark, Jr.
Environmental Restoration Office

J. S. Abercrombie 3/21/94
J. S. Abercrombie
Laboratory Protection

J. Sweeney
J. Sweeney
DOE Environmental Restoration Division
Project Manager

SITE-SPECIFIC HAZARD EVALUATION ADDENDUM FOR WAG 6 SEEPS AND SPRINGS SAMPLING AND ANALYSIS PLAN

This Site-Specific Hazard Evaluation Addendum is for the performance of the Waste Area Grouping (WAG) 6 seeps and springs sampling and analysis plan. The work will be conducted by CDM Federal Programs Corporation (CDM Federal) as a subcontractor and by associated Oak Ridge National Laboratory (ORNL) environmental, safety, and health support groups. This activity will fall under the scope of 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER). The purpose of this document is to establish site-specific health and safety guidelines to be followed by all personnel involved in conducting work for this project. Work will be conducted in accordance with requirements as stipulated in the ORNL HAZWOPER Program Manual and applicable ORNL, Martin Marietta Energy Systems, Inc. (Energy Systems), WAG 6 Site Health and Safety Plan (HASP), and U.S. Department of Energy (DOE) policies and procedure, and this addendum. The WAG 6 Site HASP serves as an extension of the ORNL HAZWOPER Program Manual; combined with this addendum, they fulfill the requirements of 29 CFR 1910.120. The DOE Project/Facility Management Procedures (PFMP-19-03), as applicable, serve as guidelines for the restart of any construction project shut down for health and safety reasons.

The levels of protection and the procedures specified in this plan are based on the best information available from historical data and preliminary evaluations of the area. Therefore, these recommendations represent the minimum health and safety requirements to be observed by all personnel engaged in this project. Unforeseeable site conditions, changes in scope of work, or hazardous conditions not previously considered will warrant a reassessment of protection levels and controls stated. Minor changes, such as downgrade of personal protective equipment (PPE) or change in the model of a site instrument, may be justified and documented in the site logbook by the Site Safety and Health Officer (SSHO). Significant changes will require revision of the HASP and must have approval by the appropriate ORNL safety and health discipline and the HAZWOPER Program Coordinator (HPC) before restart of site operations.

1. PROJECT AND SITE DESCRIPTION

1.1 PROJECT DESCRIPTION

The objectives of the Seeps and Springs Monitoring Program, as defined by the Environmental Monitoring Program, are

- to verify primary chemicals of concern (COCs) that contribute to risk,
- to track and evaluate concentrations of site-related radionuclides detected above derived concentration guide levels, and
- to identify major sources of COCs by tracking changes in groundwater beneath COC sources.

These objectives will be achieved by performing seeps and springs water sampling, continuous flow measurements, and timed volumetric flow measurements. Other seeps and springs tasks to be performed include equipment monitoring and installation.

Initially, thirteen water sampling locations determined during the seeps and springs survey have been evaluated. Samples will be manually collected using Environmental Surveillance Procedure (ESP)-301-1. Before sample collection, a brief site inspection of the hydraulic structure or sump will be performed. Based on this inspection, it may be necessary to part the residuum in the vicinity of the seep or spring, using a scoop or shovel, to create a pooling area for collection of the discharge. Another concern may include the possibility of wading to obtain a sample. Upon collection of the water sample, all equipment will be decontaminated according to ESP-900. Hazards are addressed in Sect. 3 of this document.

Seeps and springs continuous flow monitoring may be conducted at some locations using some combination of weirs, flumes, pressure transducers, and electronic data-logging equipment. Data will be collected using WAG 6—FOP 3 or manufacturers' instructions, depending on whether the equipment used is an ISCO Flow Meter or a Telog Level Tracker, respectively. Functions required for this task include donning appropriate PPE, downloading data, and site and equipment inspection. Hazards are addressed in Sect. 3 of this document.

To obtain seeps and springs timed volumetric flow measurements, spring boxes, flumes, or pipes may be installed. Volumetric flow measurements will be manually collected according to WAG 6—FOP 13. The steps required in collecting data include donning the appropriate PPE, performing the data collection, documenting the event, and performing a brief site inspection. All equipment will be decontaminated according to ESP-900. Hazards are addressed in Sect. 3 of this document.

Equipment installation includes both electronic instrument setup, a nonintrusive process, and sump, weir, spring box, and pipe installation, which may be intrusive. Equipment will be installed according to the manufacturers' specifications. Hazards that may be encountered during equipment installation are outlined in Sect. 3 of this document.

1.2 SITE DESCRIPTION

Information regarding the WAG 6 site description can be found in the *Draft RCRA Facility Investigation Report for Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee*, ES/ER-22/V2&D1 (Energy Systems 1991).

2. SITE ORGANIZATION AND COORDINATION

The work will be performed by CDM Federal. ORNL Industrial Hygiene (IH), Industrial Safety (IS), and Radiation Protection (RP) will provide appropriate health and safety oversight.

The following section details the organizational structure for this project. Key personnel and their project responsibilities are listed. An approved representative of the Measurement Applications and Development (MAD) Group will serve as the SSHO and alternate SSHO, and will subcontract to provide IH/Health Physics (HP) monitoring.

2.1 SITE SAFETY AND HEALTH OFFICER/ENVIRONMENTAL SAFETY AND HEALTH TECHNICIAN

The SSHO is the primary on-site contact for safety and health during field activities, oversees the on-site execution of all field activities regarding safety and health procedures, and has the authority to stop all work if conditions are judged to be hazardous to on-site personnel or to the public. The SSHO will remain at the project site at all times while workers are performing site activities. The SSHO also may serve as the Environmental Safety and Health representative on site, who can perform Health Physics and Industrial Hygiene surveys. Other specific responsibilities are as follows.

1. Ensures that all on-site project personnel meet the required level of training, meet medical requirements including a respirator fit test (as required), attend a pre-entry briefing on potential and project site hazards, and review the Work Plan and HASP. Maintains copies of this documentation at the project site and ensures that documentation is available for on-site review. Note: The ORNL Special Access Training Badge may be used as verification of training.

2. Requires personnel to obtain immediate medical attention in the case of a work-related injury or illness.

3. Denies access to all or any portion of the work area as warranted.

4. Orders work to cease, orders the evacuation of the work area by all personnel, and reestablishes safe working conditions, as needed.

5. Controls access to the site by visitors and unauthorized personnel. Advises visitors and unauthorized personnel of their responsibilities and ensures that they meet access requirements before their entry into the contamination reduction zone or exclusion zone is allowed.

6. Ensures the correct field execution of the Work Plan and HASP.

7. Ensures that this Work Plan and HASP are revised and approved if there are changes in site conditions or tasks.

8. Advises emergency response personnel in an emergency.

9. Coordinates with IH, IS, and RP to establish site work zones, levels of required personnel protection, monitoring, and other controls.

10. Coordinates and minimizes the number of personnel and amount of equipment in the work zones.

11. Coordinates accident prevention by oversight of field activities and by awareness of all site operations.

12. Ensures that needed work permits are obtained and made available on site.

13. Ensures that the HPC, IH, IS, and RP are notified before commencement of site work.

14. Conducts daily inspection of the work site.

15. Ensures that site personnel have the appropriate medical surveillance.

16. Ensures that appropriate fall protection measures are in place, as warranted.

17. Ensures that an approved hoisting and rigging plan is available, as warranted.

18. Ensures that appropriate measures have been taken to prevent spills.

19. Ensures that appropriate monitoring/sampling services are available.

20. Ensures that the appropriate chain of command is followed in reporting environmental safety and health issues.

21. Maintains a Site Safety Logbook.

2.2 FIELD PERSONNEL

Specific responsibilities are as follows.

1. Take all reasonable precautions to prevent injury to themselves and to their fellow employees; be alert to potentially harmful situations.

2. Perform only those tasks that they believe they can do safely, and immediately report any accidents and/or unsafe conditions to the SSHO.

3. Notify the SSHO of any special medical conditions (e.g., allergies, diabetes).

4. Prevent spills to the extent possible. If a spill occurs, contain the spill, notify the SSHO, and clean it up immediately using safe cleanup measures as directed by the SSHO. Note: Do not engage in spill containment or cleanup if conditions are not safe and if the cleanup cannot be accomplished with supplies available at the site. Evacuate the area. All spills must be reported to the ORNL Environmental Interface (574-8770).

5. Avoid splashing materials to the extent possible.

6. Practice good housekeeping by keeping the work area neat, clean, and orderly to the extent possible.

7. Report all injuries, no matter how minor.

8. Comply with the Work Plan and with the HASP and Addendum, as well as with postings and rules at the project site.

9. Follow the appropriate chain of command for reporting and addressing safety and health issues.

2.3 RADIATION PROTECTION (Jim Ed Irwin)

ORNL Radiation Protection will be responsible for oversight and approval of personnel radiation-protection requirements. A representative from the Office of Radiation Protection will review and approve the Work Plan and HASP before commencement of field activities. ORNL Radiation Protection will be consulted before entry into any posted radiological area and will instruct field participants on requirements for that area, including the need for a Radiation Work Permit, appropriate monitoring, dosimetry, and PPE. The Radiation Protection representative will maintain an instrumentation and calibration file/log in association with the Instrumentation and Calibration Department. The Radiation Protection representative will be contacted for radiological concerns at the site that cannot be addressed by the SSHO or HP.

2.4 INDUSTRIAL HYGIENE (Ann Saulsbury)

The ORNL Industrial Hygiene Section and the HPC will be responsible for the oversight and approval of personnel protection related to industrial hygiene and the requirements of 29 CFR 1910.120 (HAZWOPER). The IH Divisional Representative and the HPC will review and approve the Work Plan and HASP before commencement of field activities. The IH representative and the HPC will provide guidance regarding PPE, as well as industrial hygiene monitoring and sampling requirements. The IH Section will be contacted for industrial hygiene and HAZWOPER concerns at the site that cannot be addressed by the SSHO or HP. The MAD group will be subcontracted to provide IH monitoring, as required.

2.5 INDUSTRIAL SAFETY (Doug Miller)

The ORNL Industrial Safety Section will be responsible for oversight and approval of personnel protection requirements related to safety. A representative from IS will review and approve the Work Plan and HASP before commencement of field activities. IS will provide guidance regarding potential safety hazards, PPE, and safety requirements. The IS Section representative will be contacted regarding safety concerns at the site that cannot be addressed by the SSHO or HP.

2.6 ENVIRONMENTAL RESTORATION PROGRAM ENVIRONMENTAL SAFETY AND HEALTH MANAGER (Charles Clark)

The ORNL ER Program ESH Manager is a designated Energy Systems employee who is responsible for the oversight of all ORNL ER Program activities. The responsibilities of the ORNL ER Program ESH Manager include, but are not limited to,

- reviewing and approving all site safety and health plans and all site safety and health evaluation addendums,
- reviewing all self-assessment and -surveillance reports,
- providing interface between ER projects and the HPC, and
- reviewing and approving the qualifications of the Site Safety and Health Managers and SSHOs.

The ER Program ESH Manager provides a direct interface between field personnel and the HPC for safety and health issues that cannot be resolved at the ER Program level or the SSHO level.

A complete organizational structure and description of responsibilities may be found in Sect. 3 of the HASP.

3. PROJECT HAZARD EVALUATION

Task: Seeps and springs sampling and analysis.

Although there are a number of tasks performed during the seeps and springs sampling and analysis program, the project hazards are the same for each. Therefore, the conditions indicated below are applicable to all tasks performed.

3.1 PHYSICAL HAZARDS

(X) Heat stress	(X) Cold stress	( ) Noise
( ) Confined space	( ) Enclosed space	( ) Lifting
(X) Tripping/falling	(X) Ergonomic	( ) High pressure
( ) Oxygen deficient	( ) Explosives/flammables	( ) Vibration
( ) Oxygen enriched	( ) Water	

3.2 SAFETY/CONSTRUCTION HAZARDS

( ) Trenching	( ) Excavating	( ) Heavy equipment operation
( ) Demolition	( ) Elevated work	( ) Welding/cutting
( ) Hoisting/rigging	( ) Underground hazards	( ) Overhead hazards
(X) Personnel decon	(X) Equipment decon	( ) ISU
( ) Drilling	( ) Drum handling	( ) Work in water/boat
(X) Environmental sampling		

3.3 CHEMICAL HAZARDS

(X) Volatile organics	(X) Inorganics	(X) Carcinogens
(X) Corrosives	( ) Reproductive toxicants	( ) Metals
( ) Mutagens	( ) Asbestos	( ) PCBs
( ) OSHA specific	( ) Flammables/explosives	

3.4 IONIZING RADIOLOGICAL HAZARDS

( ) Internal exposure	(X) External exposure	(X) Contamination

3.5 NON-IONIZING RADIOLOGICAL HAZARDS

( ) UV	( ) RF	( ) Microwave
( ) Laser	( ) High voltage	

3.6 BIOLOGICAL/VECTOR HAZARDS

(X) Wildlife	(X) Plants	( ) Medical waste
( ) Bacteria	(X) Parasites	

3.7 DESCRIPTION OF HAZARDS AND CONTROLS

3.7.1 Physical Hazards

Temperature Extremes

Task: Seeps and springs sampling in RAD area.

Temperature working conditions are of concern in two primary tasks that include heat stress while working in Tyvek PPE during the summer and early autumn months and include hypothermia while performing equipment decontamination during the winter.

Work load:
(X) Light
( ) Moderate
( ) Heavy

Precautions (*specify*): Decrease work load during extremely hot or cold days, and take frequent breaks to warm up or cool down. Increase water intake on extremely hot or cold days, and make frequent trips to either vehicles or trailers during cold days. The SSHO will adhere to the guidelines for temperature extremes listed in the American Conference of Government Industrial Hygienists publication, *Threshhold Level Values for Chemical Substances, Physical Agents, and Biological Exposure Indices.*

Cooling/heating equipment needed: None; because of the light work load, frequent breaks will be adequate.

Ergonomic Hazards

Task: Sampling in/near seeps and springs or in muddy conditions

Heavy lifting ( ) Yes (X) No

Vibrating equipment ( ) Yes (X) No

Tripping/falling (X) Yes ( ) No

Controls/protective equipment: The buddy system will be employed to assist in monitoring field personnel safety. Protective controls to assist in prevention of tripping and falling include shoe covers (black rubber boots). In addition, care will be taken while working at stream bank areas.

3.7.2 Chemical Hazards

For chemicals identified in Sect. 3.3, provide the following information. Available historical and site characterization data should be used to complete this section. Additional information is available in the Zone Contaminant list at the end of this section. The tables include historical data indicating possible chemical contaminants. The possibility of the presence of chemical overexposure is low as a result of the PPE required for each task and the low probability of chemicals in their pure state (environmental concentrations and detected concentrations are low).

Substance: Hydrochloric acid (HCl)
Use (for materials brought on site): Sample preservative
Location (for substances identified at the site): NA
TLV: NA PEL: 5 ppm IDLH: 100 ppm STEL: NA
Route of exposure: Inhalation, ingestion, contact/absorption
Target organs: Respiratory system, eyes, skin
LEL: NA UEL: NA FP: NA
Signs and symptoms of exposure: Inflammation of nose and throat; coughing, burning sensation in eyes and on skin.
Health effects: May cause damage to the respiratory system or mucous membrane; may cause epidermal burns.
Additional comments and controls: None

Substance: Nitric acid (HNO_3)

Use (for materials brought on site): Sample preservative
Location (for substances identified at the site): NA
TLV: 2 ppm PEL: 2 ppm IDLH: 100 ppm STEL: 10 mg/m^3
Route of exposure: Inhalation, ingestion, contact (absorption)
Target organs: Eyes, skin, respiratory system, teeth
LEL: NA UEL: NA FP: NA
Signs and symptoms of exposure: Skin irritation or burning; irritation of eyes; irritated respiratory system (burning, coughing, choking)
Health Effects: May cause epidermal burns or discoloration; may cause damage to the respiratory system or mucous membrane
Additional comments and controls: None

Substance: Liquinox
Use (for materials brought on site): Equipment decontamination
Location (for substances identified at the site): NA
TLV: NA PEL: NA IDLH: NA STEL: NA
Route of exposure: Absorption, ingestion
Target organs: Eyes, skin
LEL: NA UEL: NA FP: NA
Signs and symptoms of exposure: Redness or dryness of the skin; stomach discomfort or nausea if ingested.
Health Effects: NA
Additional comments and controls: None

Substance: Deionized water
Use (for materials brought on site): Equipment decontamination
Location (for substances identified at the site): NA
TLV: NA PEL: NA IDLH: NA STEL: NA
Route of exposure: Ingestion
Target organs: NA
LEL: NA UEL: NA FP: NA
Signs and symptoms of exposure: NA
Health Effects: NA
Additional comments and controls: None

More information regarding specific chemicals at the site is provided at the end of this section. See Sect. 5 for Industrial Hygiene monitoring/sampling requirements.

3.7.3 Ionizing Radiation

For ionizing radiological hazards identified in Sect. 3.4, the following information is provided. Available historical and site characterization data were used to complete this section. An Office of Radiation Protection representative was contacted to assist in completion of this section. Additional information concerning ionizing radiation information can be found in the tables at the end of this section.

Any known contamination present (from prior scanning or history)? (X) Yes ( ) No

Primary contaminating isotope(s): See tables

Radiation type: Alpha/beta/gamma

Location on site: Possible at all seeps and springs sites

Radiation work permit required? (X) Yes ( ) No

Dose rate: (weekly) 100 mR

Worker dose limit: 20 mR/day

Contamination level	(removable):	Alpha	20 dpm
		Beta/gamma	200 dpm
	(fixed):	Alpha	200 dpm
		Beta/gamma	1000 dpm

Note: Dose rate, worker dose limit, and contamination levels are administrative guidelines.

Airborne contamination concentration: NA μCi/mL

Water contamination potential? (X) Yes ( ) No

Unrestricted airborne contamination release potential? ( ) Yes (X) No

Health Physics coverage: Continuous/Intermittent/Conditional

High volume sampling to be conducted? ( ) Yes (X) No
Low volume sampling to be conducted? (X) Yes ( ) No
Personal monitoring/sampling? (X) Yes ( ) No

Additional controls/requirements: None

Instruments to be used and monitoring requirements are identified in Sect. 5.

3.7.4 Sanitation

Task: Seeps and springs sampling and analysis

A clean zone located on WAG 6 provides workers with an area for eating and drinking, toilet facilities, washing facilities (hand wash and emergency eye wash only), and a changing room.

Potable water required? Not permitted on work site

Nonpotable water used? Yes, for decontamination

Eating, drinking, chewing, use of tobacco permitted?
Location: As stated above.

Toilet facilities required?
Location and number: As stated above.

Washing facilities required?
Location: As stated above.

Change rooms required?
Specify: As stated above.

3.7.5 Illumination

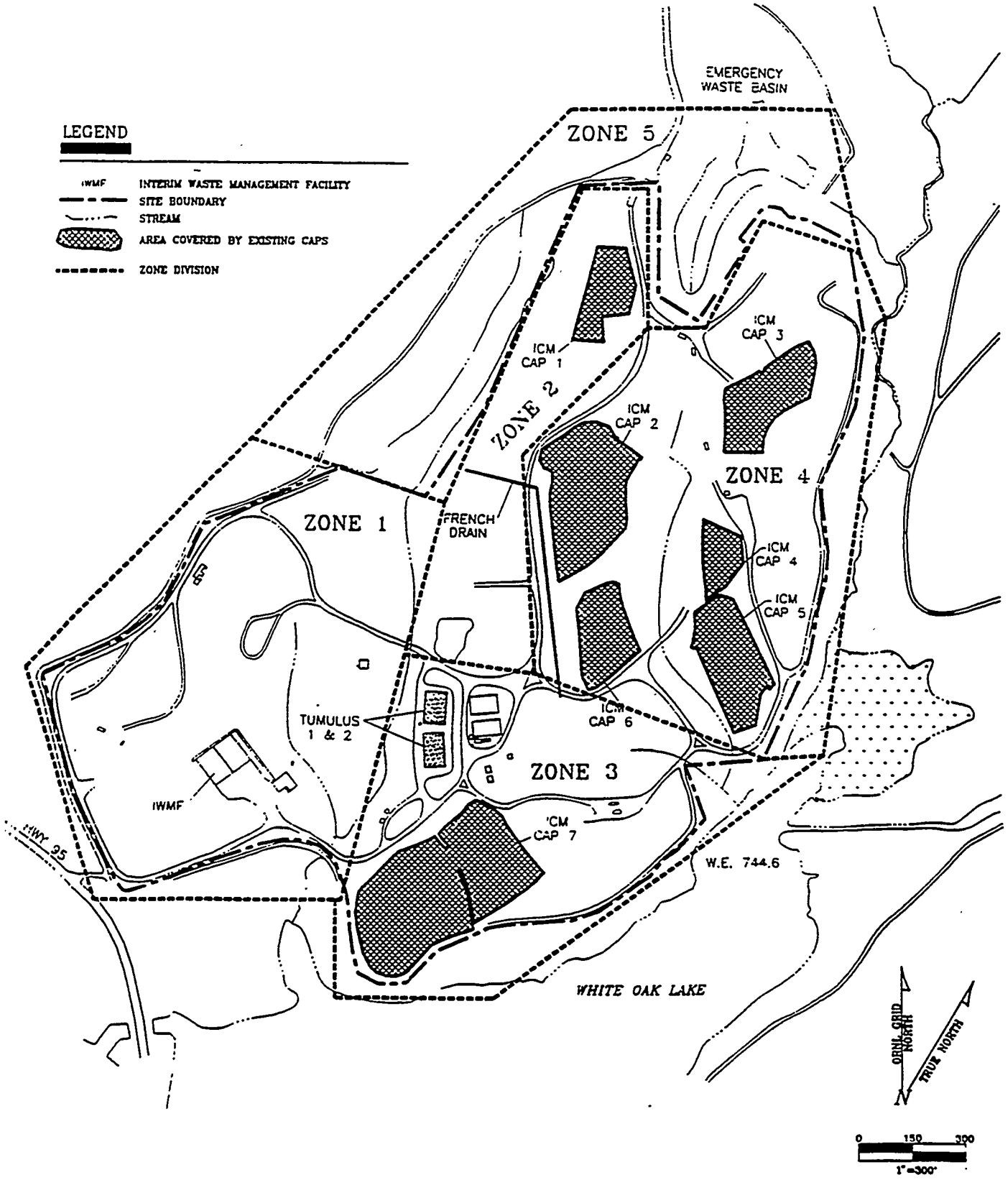
Tasks: Seeps and springs sampling and analysis

Additional illumination needed? ( ) Yes (X) No ( ) NA

All field activities will be performed during daylight hours. No additional illumination will be required.

3.7.6 Biological/Vector Hazards

Appropriate PPE and site monitoring ensures protection against biological hazards. Site-specific information will be communicated by IH/HP personnel before entering a work area.



WAG 6 ZONE DIVISION

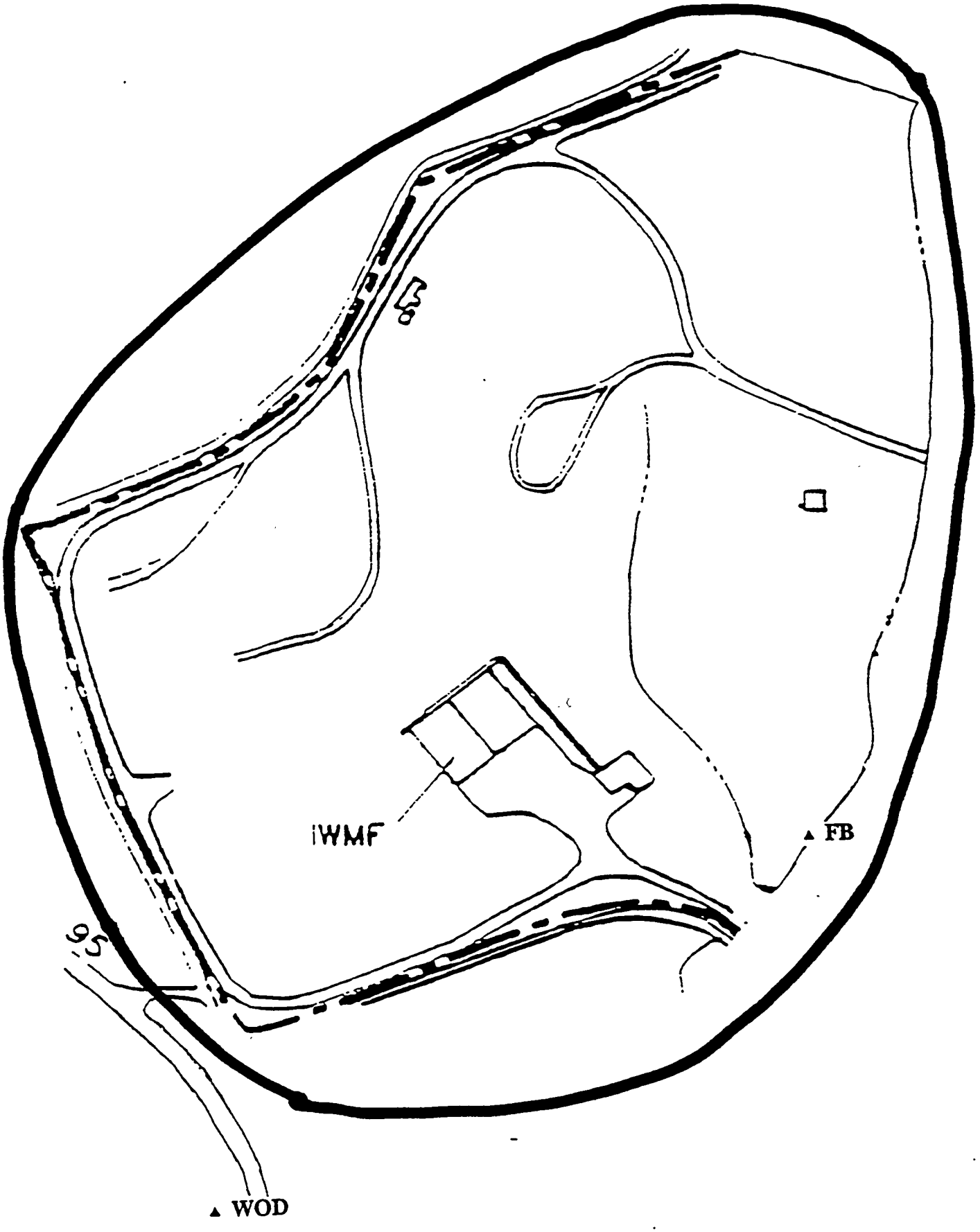
OAK RIDGE NATIONAL LABORATORY
ORNL WAG 6

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

Seeps and Springs
Contaminant List - Zone 5

The following table lists the seeps and springs contaminants for Zones 1–4. There are no seeps and springs sampling locations in Zone 5. However, following the seeps and springs contaminant list is a table listing surface water contaminants for Zones 1–5. This information is given to provide additional potential contaminant data for unsampled seeps and springs sampling locations.

ZONE 1
Surface Water Monitoring Sites



Oak Ridge National Laboratory

Zone 1 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
1,1-1 Trichloroethane Color: Colorless O known carcinogen ◉ suspect carcinogen	TLV: 350 ppm PEL: 350 ppm REL: NE DAC:	STEL: 450 ppm IDLH: 1000 ppm	CNS, CVS, eye, skin irritant, headaches, drowsiness, impaired judgement, can be absorbed through skin to heart	Liquid, mild chloroform like odor;Sol:0.4%; LEL:7.5%
Acetone Color: Colorless O known carcinogen O suspect carcinogen	TLV: 750 ppm PEL: 750 ppm REL: 250 ppm DAC:	STEL: 1000 ppm IDLH: 20,000 ppm	Eyes, nose, throat, skin	Liquid with mint like odor;LEL:2.5%
Americium-244 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC: 8E-8 µCi/mL	STEL: NE IDLH: NE	Respiratory, liver, skeleton	Variable
Cesium-137 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC: 7E-8 µCi/mL	STEL: NE IDLH: NE	GI, Lower large intestine	

Legend:
C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: Ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take

Zone 1 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-ST EL/ TLV-C or IDLH	Heath effects/target organs	Chemical/physical properties
Ethyl benzene Color: colorless O known carcinogen O suspect carcinogen	TLV: 100 ppm PEL: 100 ppm REL: 100 ppm DAC:	STEL: 125 ppm IDLH: 2000 ppm	Eyes, upper respiratory system, skin, CNS	Liquid with an aromatic odor; Sol:0.01%, LEL:1.0%
Napthalene Color: Colorless to brown O known carcinogen O suspect carcinogen	TLV: 10 ppm	STEL: NE IDLH: NE	Eyes, kidney, liver blood, skin, RBC, CNS	Solid, odor of mothballs, VP: 0.08 mm; MTL: 176 F; UEL: 5.9%, LEL: 0.9%
Strontium-90 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	STEL: NE IDLH: NE	Skeletal system, respiratory system	Variable
Tetrachloroethylene Color: Colorless ● known carcinogen O suspect carcinogen	TLV: 50 ppm PEL: 25 ppm REL: DAC:	STEL: 200 ppm IDLH: 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 1 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-ST EL/ TLV-C or IDLH		Health effects/target organs	Chemical/physical properties
Tetrachloroethylene Color: Colorless ◉ known carcinogen ○ suspect carcinogen	TLV:	50 ppm	STEL: IDLH:	200 ppm 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform; IP: 9.32; FP: 0; LFL: nonflammable; UFL: nonflammable
Toluene Color: Colorless ○ known carcinogen ○ suspect carcinogen	TLV: PEL: REL: DAC:	100 ppm 100 ppm 100 ppm	STEL: IDLH:	150 ppm 2000 ppm	CNS, liver, kidneys, skin	Liquid with sweet, pungent benzene-like odor; LEL:1.2%
Trichloroethylene Color: Colorless ◉ known carcinogen ○ suspect carcinogen	TLV:	50 ppm	STEL: IDLH:	NE 1000 ppm	Respiratory, heart, skin; headaches, dermatitis, nausea, vomiting	Liquid with a chloroform odor
Xylene Color: Colorless ○ known carcinogen ○ suspect carcinogen	TLV:	100 ppm	STEL: IDLH:	NE 1000 ppm	CNS, GI tract, liver, kidneys, skin; dizziness, staggering gait, nausea, stomach pain	Liquid with aromatic odor

Legend:

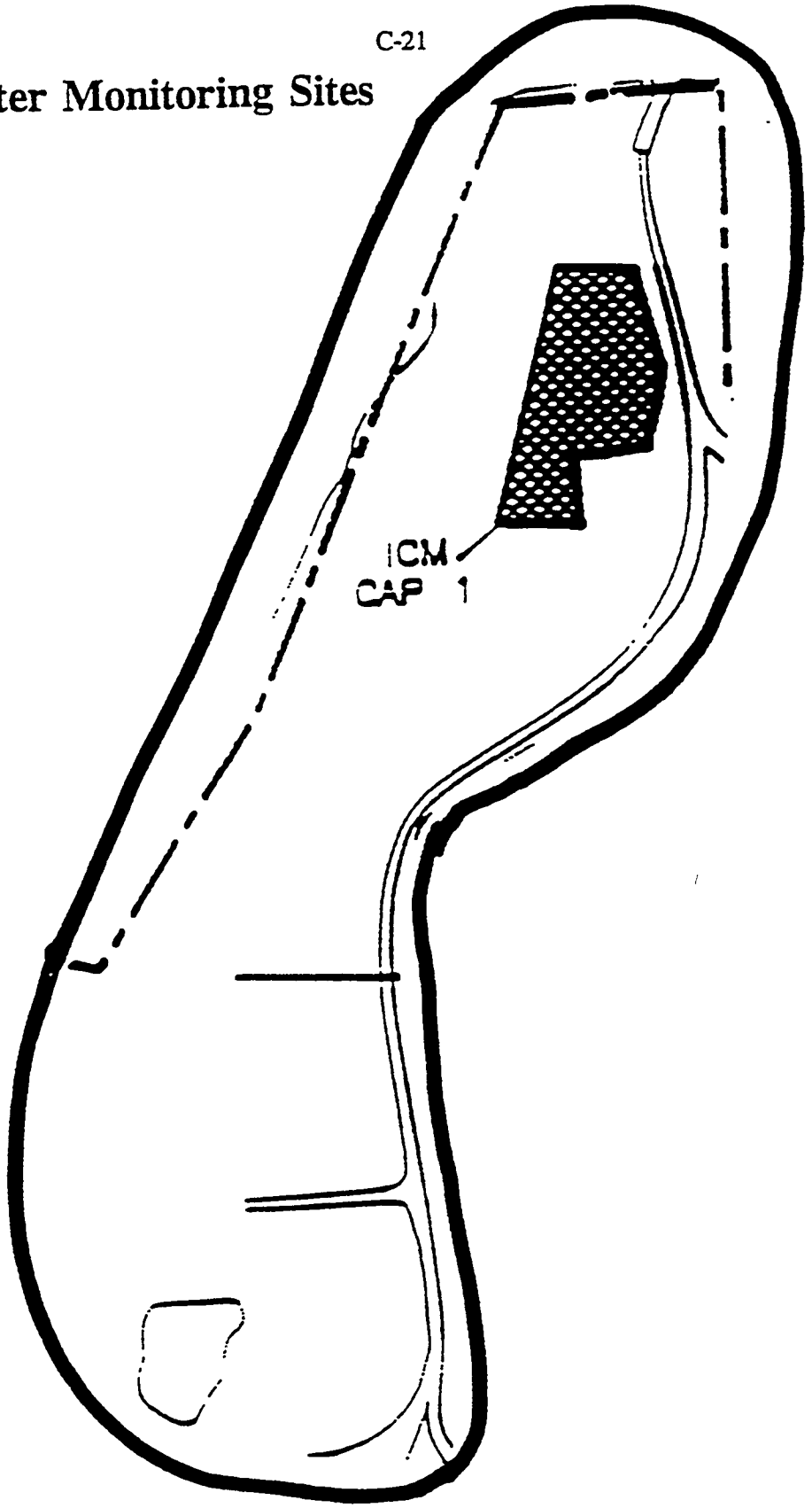
C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take

ZONE 2

C-21

* No Surface Water Monitoring Sites



Oak Ridge National Laboratory
WAG - 6

Zone 2 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-ST EL/ TLV-C or IDLH	Heath effects/target organs	Chemical/physical properties
1,1-1 Trichloroethane Color: Colorless O known carcinogen ◉ suspect carcinogen	TLV: 350 ppm PEL: 350 ppm REL: NE DAC:	STEL: 450 ppm IDLH: 1000 ppm	CNS, CVS, eye, skin irritant, headaches, drowsiness, impaired judgement, can be absorbed through skin to heart	Liquid, mild chloroform like odor;Sol:0.4%; LEL:7.5%
1,2-dichloroethane Color: Colorless O known carcinogen O suspect carcinogen	TLV: 1000 ppm	STEL: IDLH: 4000 ppm	CNS, skin, liver, kidneys	Liquid with a chloroform-like odor
Acetone Color: Colorless O known carcinogen O suspect carcinogen	TLV: 750 ppm PEL: 750 ppm REL: 250 ppm DAC:	STEL: 1000 ppm IDLH: 20,000 ppm	Eyes, nose, throat, skin	Liquid with mint-like odor;LEL:2.5%
Americium-244 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC: 8E-8 µCi/mL	STEL: NE IDLH: NE	Respiratory, liver, skeleton	Variable

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take

Zone 2 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-STEL/ TLV-C or IDLH		Health effects/target organs	Chemical/physical properties
Bis(2-ethylhexl)phthalate Color: ◉ known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	5 mg/m3 5 mg/m3 5 mg/m3	STEL: IDLH:	10 mg/m3 NE	Mild irritant to eyes and skin; affects GI tract	When heated emits acrid smoke;insoluble
Carbon disulfide Color: Colorless to faint yellow O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	10 ppm	STEL: IDLH:	 500 ppm	CNS, CVS, eyes, skin, liver, kidneys/dizz.,h.a.,ftg, ocular changes	Liquid with strong sweetish odor
Cesium-137 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	 7E-8 µCi/mL	STEL: IDLH:	NE NE	GI, Lower large intestine	
Strontium-90 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	 	STEL: IDLH:	NE NE	Skeletal system, respiratory system	Variable

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 2 Contaminant List

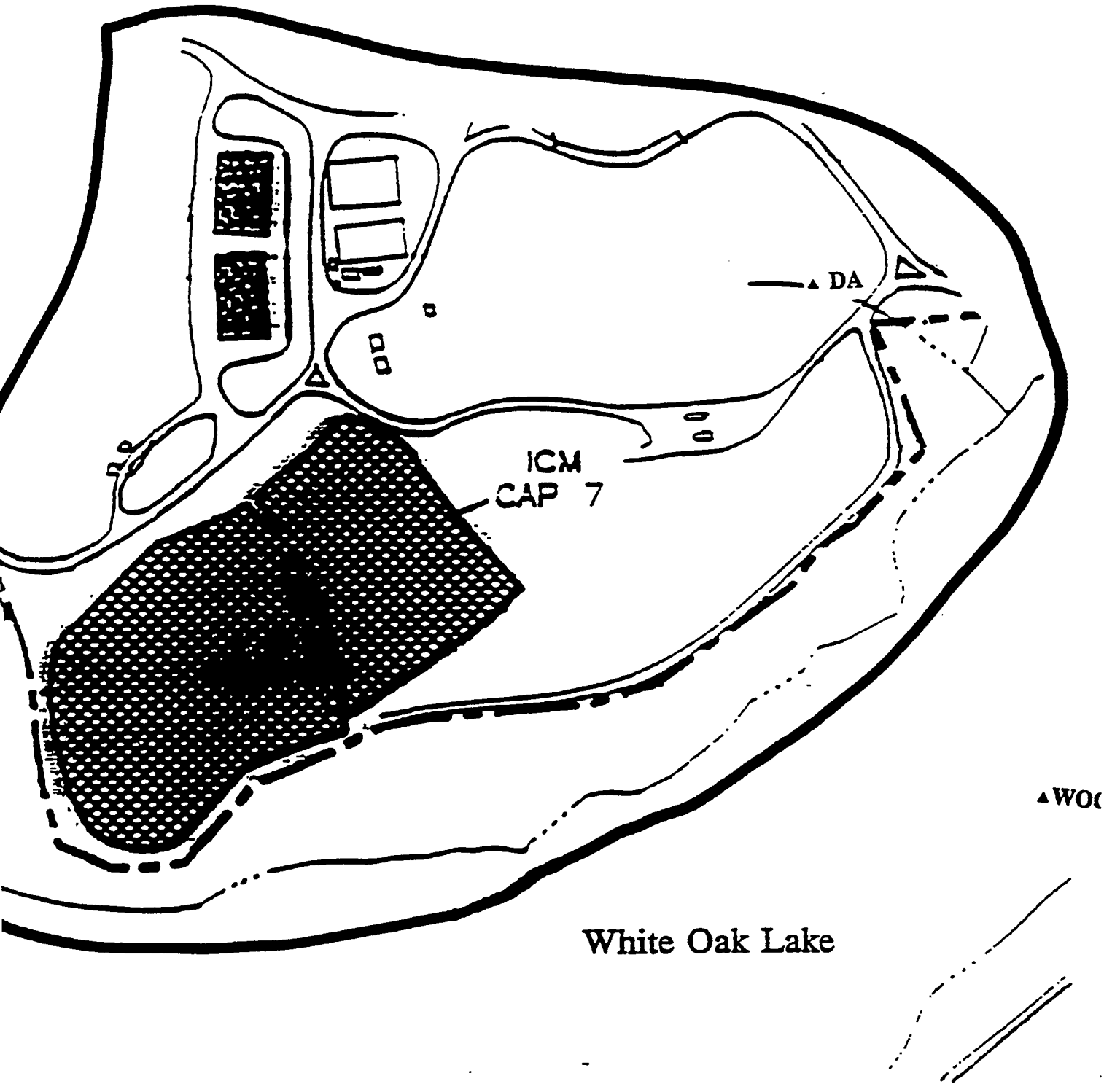
Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-ST EL/ TLV-C or IDLH	Heath effects/target organs	Chemical/physical properties
Tetrachloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm	STEL: 200 ppm IDLH: 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform; IP: 9.32; FP: 0; LFL: nonflammable; UFL: nonflammable
Toluene Color: Colorless O known carcinogen O suspect carcinogen	TLV: 100 ppm PEL: 100 ppm REL: 100 ppm DAC:	STEL: 150 ppm IDLH: 2000 ppm	CNS, liver, kidneys, skin	Liquid with sweet, pungent benzene like odor, LEL:1.2%
Trichloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm	STEL: NE IDLH: 1000 ppm	Respiratory, heart, skin; headaches, dermatitis, nausea, vomiting	Liquid with a chloroform odor
Xylene Color: Colorless O known carcinogen O suspect carcinogen	TLV: 100 ppm	STEL: NE IDLH: 1000 ppm	CNS, GI tract, liver, kidneys, skin; dizziness, staggering gait, nausea, stomach pain	Liquid with aromatic odor

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take

ZONE 3
Surface Water Monitoring Sites



Oak Ridge National Laboratory
WAG - 6

Zone 3 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
Acetone Color: Colorless O known carcinogen O suspect carcinogen	TLV: 750 ppm PEL: 750 ppm REL: 250 ppm DAC:	STEL: 1000 ppm IDLH: 20,000 ppm	Eyes, nose, throat, skin	Liquid with mint-like odor;LEL:2.5%
Cesium-137 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC: 7E-8 µCi/mL	STEL: NE IDLH: NE	GI, Lower large intestine	
Chloroform Color: colorless ● known carcinogen O suspect carcinogen	TLV: 10 ppm PEL: REL: DAC:	STEL: IDLH:	Liver, kidneys, heart, eyes, skin/ anesthesia, dizz, mental dullness, naus, h.a., fatigue, irr.	Liquid with pleasant sweet odor;sol:0.8%, not combustible
Isopropyl Alcohol Color: O known carcinogen O suspect carcinogen	TLV: 400 ppm	STEL: NE IDLH: NE	Eyes, skin, respiratory	Liquid, odor of rubbing alcohol, BP: 181F; Sol: miscible; FLP: 53 F; VP: 33 mm; FRP PT: -127 F; UEL: 12.7%; LEL: 2.0%

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-STEL/ TLV-C or IDLH		Health effects/target organs	Chemical/physical properties
Mercury Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	0.01 mg/m3 0.01 mg/m3 0.01 mg/m3	STEL: IDLH:	0.03 mg/m3 10 mg/m3	CNS, kidney, skin, eyes, respiratory system, liver; tremors, cough, pneumonitis, headache, fatigue, emotional instability	Variable depending on alkyl compound
Strontium-90 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:		STEL: IDLH:	NE NE	Skeletal system, respiratory system	Variable
Thorium Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:		STEL: IDLH:	NE NE	Respiratory system	Variable
Trichloroethene Color: Colorless ● known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	50 ppm 50 ppm 25 ppm	STEL: IDLH:	200 ppm 1000 ppm	Respiratory system, heart, liver, kidneys, CNS, skin	Liquid with chloroform-like odor;Sol:0.1 at 77 F;FLP: 90 F; LEL:8% at 77 F

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 3 Contaminant List

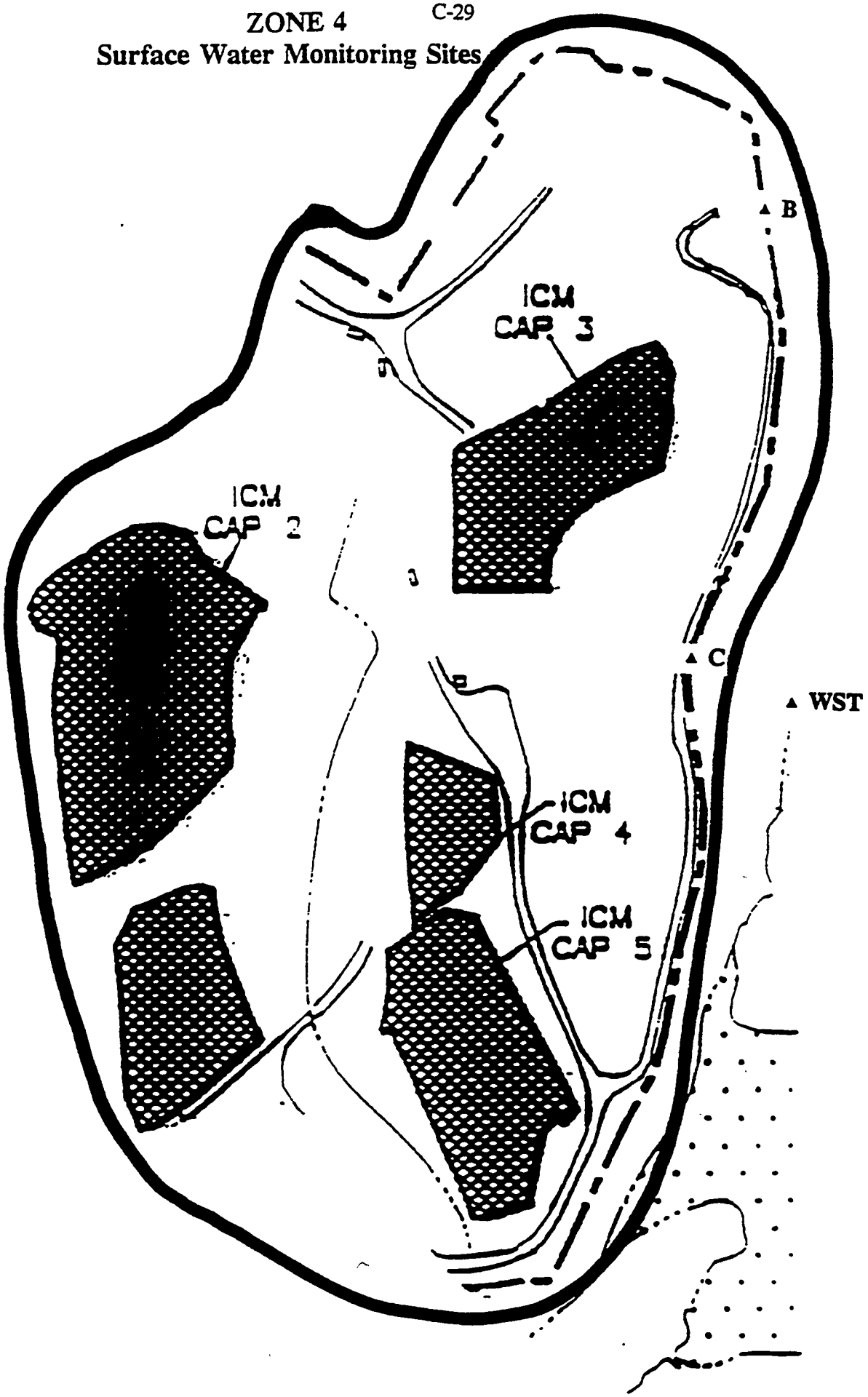
Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
Uranium-235 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	STEL: IDLH: NE	Respiratory system, kidneys, GI; irritant	Variable

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

ZONE 4
Surface Water Monitoring Sites



Oak Ridge National Laboratory
WAG - 6

Zone 4 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
Bis(2-ethylhexl)phthalate Color: ◉ known carcinogen O suspect carcinogen	TLV: 5 mg/m3 PEL: 5 mg/m3 REL: 5 mg/m3 DAC:	STEL: 10 mg/m3 IDLH: NE	Mild irritant to eyes and skin; affects GI tract	When heated emits acrid smoke;insoluble
Methylene chloride Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm PEL: 500 ppm REL: NE DAC:	STEL: NE IDLH: 3000 ppm	Eyes, skin, liver, CVS, CNS irritant, numbness, tingling, vertigo, angina	Liquid with chloloform like odor; LEL:12%;Sol:2%
Strontium-90 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	STEL: NE IDLH: NE	Skeletal system, respiratory system	Variable
1,1-1 Trichloroethane Color: Colorless O known carcinogen ◉ suspect carcinogen	TLV: 350 ppm PEL: 350 ppm REL: NE DAC:	STEL: 450 ppm IDLH: 1000 ppm	CNS, CVS, eye, skin irritant, headaches, drowsiness, impaired judgement, can be absorbed through skin to heart	Liquid, mild chloroform like odor;Sol:0.4%; LEL:7.5%

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-ST EL/ TLV-C or IDLH	Heath effects/target organs	Chemical/physical properties
Acetone **Color:** Colorless O known carcinogen O suspect carcinogen	TLV: 750 ppm PEL: 750 ppm REL: 250 ppm DAC:	STEL: 1000 ppm IDLH: 20,000 ppm	Eyes, nose, throat, skin	Liquid with mint like odor;LEL:2.5%
Tetrachloroethylene **Color:** Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm PEL: 25 ppm REL: DAC:	STEL: 200 ppm IDLH: 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform
Toluene **Color:** Colorless O known carcinogen O suspect carcinogen	TLV: 100 ppm PEL: 100 ppm REL: 100 ppm DAC:	STEL: 150 ppm IDLH: 2000 ppm	CNS, liver, kidneys, skin	Liquid with sweet, pungent benzene-like odor; LEL:1.2%
Carbon disulfide **Color:** Colorless to faint yellow O known carcinogen O suspect carcinogen	TLV: 10 ppm PEL: REL: DAC:	STEL: IDLH: 500 ppm	CNS, CVS, eyes, skin, liver, kidneys/dizz.,h.a.,ftg, ocular changes	Liquid with strong sweetish odor

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 4 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-ST EL/ TLV-C or IDLH		Heath effects/target organs	Chemical/physical properties
Chloroform Color: colorless ◉ known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	10 ppm	STEL: IDLH:		Liver, kidneys, heart, eyes, skin/ anesthesia, dizz, mental dullness, naus, h.a., fatigue, irr.	Liquid with pleasant sweet odor;sol:0.8%, not combustible
Americium-244 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	 8E-8 µCi/mL	STEL: IDLH:	NE NE	Respiratory, liver, skeleton	Variable
Cobalt-60 Color: NA O known carcinogen O suspect carcinogen	 DAC:	 6e-8 µCi/mL	STEL: IDLH:	NE NE	Respiratory, liver, skeletal	Variable
1,2-dichloroethane Color: Colorless O known carcinogen O suspect carcinogen	TLV:	1000 ppm	STEL: IDLH:	 4000 ppm	CNS, skin, liver, kidneys	Liquid with a chloroform like odor

C-32

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
Tetrachloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm	STEL: 200 ppm IDLH: 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform; IP: 9.32; FP: 0; LFL: nonflammable; UFL: nonflammable
Trichloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm	STEL: NE IDLH: 1000 ppm	Respiratory, heart, skin; headaches, dermatitis, nausea, vomiting	Liquid with a chloroform odor
Xylene Color: Colorless O known carcinogen O suspect carcinogen	TLV: 100 ppm	STEL: NE IDLH: 1000 ppm	CNS, GI tract, liver, kidneys, skin; dizziness, staggering gait, nausea, stomach pain	Liquid with aromatic odor

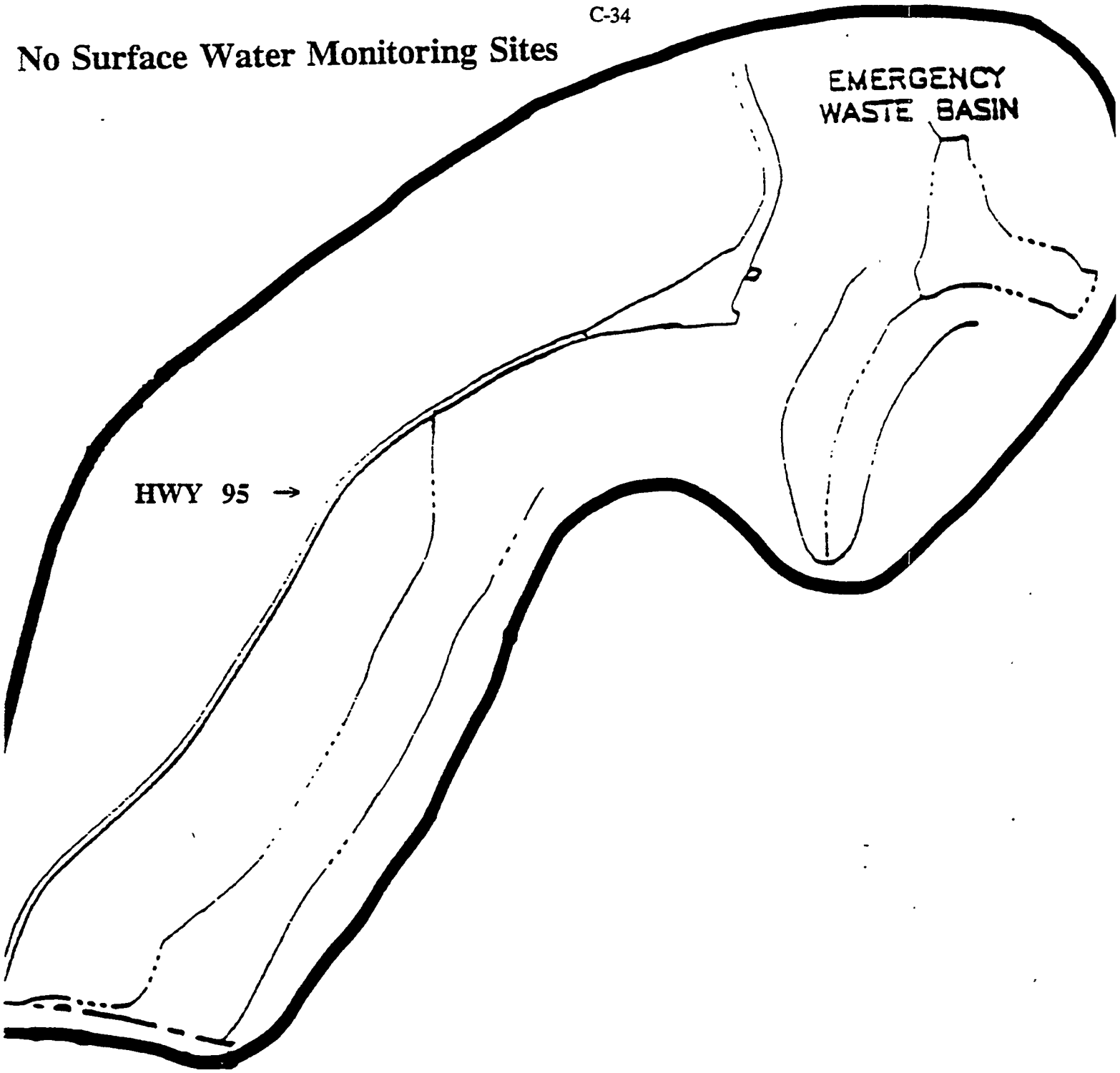
Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

ZONE 5

No Surface Water Monitoring Sites



Oak Ridge National Laboratory
WAG - 6

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
1,1-1 Trichlorocthane Color: Colorless O known carcinogen ◉ suspect carcinogen	TLV: 350 ppm PEL: 350 ppm REL: NE DAC:	STEL: 450 ppm IDLH: 1000 ppm	CNS, CVS, eye, skin irritant, headaches, drowsiness, impaired judgement, can be absorbed through skin to heart	Liquid, mild chloroform like odor;Sol:0.4%; LEL:7.5%
Acctone Color: Colorless O known carcinogen O suspect carcinogen	TLV: 750 ppm PEL: 750 ppm REL: 250 ppm DAC:	STEL: 1000 ppm IDLH: 20,000 ppm	Eyes, nose, throat, skin	Liquid with mint like odor;LEL:2.5%
Americium-244 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC: 8E-8 µCi/mL	STEL: NE IDLH: NE	Respiratory, liver, skeleton	Variable
Benzene Color: Colorless O known carcinogen ◕ suspect carcinogen	TLV: 10 ppm PEL: 1.0 ppm REL: 0.1 ppm DAC:	STEL: 5.0/1 ppm IDLH: 3000 ppm	Blood, CNS, skin, respiratory system, bone marrow, and eyes	Aromatic liquid; Sol:0.07%;LEL:1.3%

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: Ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 5 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-STEL/ TLV-C or IDLH		Heath effects/target organs	Chemical/physical properties
Benzyl Alcohol Color: Colorless O known carcinogen O suspect carcinogen	TLV:	NE	STEL: IDLH:	NE NE	Skin, CNS, eyes, respiratory, kidneys, cardiovascular	Liquid, faint aromatic odor, BP: 204.7 C; MP: -15.19 C; FLP: 90 C
Bis(2-ethylhexl)phthalate Color: ◉ known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	5 mg/m3 5 mg/m3 5 mg/m3	STEL: IDLH:	10 mg/m3 NE	Mild irritant to eyes and skin; affects GI tract	When heated emits acrid smoke;insoluble
Carbon disulfide Color: Colorless to faint yellow O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	10 ppm	STEL: IDLH:	 500 ppm	CNS, CVS, eyes, skin, liver, kidneys/dizz.,h.a.,ftg, ocular changes	Liquid with strong sweetish odor
Cesium-137 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	 7E-8 µCi/mL	STEL: IDLH:	NE NE	GI, Lower large intestine	

C-36

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-STEL/ TLV-C or IDLH		Health effects/target organs	Chemical/physical properties
Chloroform Color: colorless ◉ known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	10 ppm	STEL: IDLH:		Liver, kidneys, heart, eyes, skin/ anesthesia, dizz, mental dullness, naus, h.a., fatigue, irr.	Liquid with pleasant sweet odor;sol:0.8%, not combustible
Cobalt-60 Color: NA O known carcinogen O suspect carcinogen	DAC:	6e-8 µCi/mL	STEL: IDLH:	NE NE	Respiratory, liver, skeletal	Variable
Isopropyl Alcohol Color: O known carcinogen O suspect carcinogen	TLV:	400 ppm	STEL: IDLH:	NE NE	Eyes, skin, respiratory	Liquid, odor of rubbing alcohol, BP: 181F; Sol: miscible; FLP: 53 F; VP: 33 mm; FRP PT: -127.F; UEL: 12.7%; LEL: 2.0%
Methylene chloride Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	50 ppm 500 ppm NE	STEL: IDLH:	NE 3000 ppm	Eyes, skin, liver, CVS, CNS irritant, numbness, tingling, vertigo, angina	Liquid with choloform-like odor; LEL:12%;Sol:2%

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 5 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-ST EL/ TLV-C or IDLH		Heath effects/target organs	Chemical/physical properties
Phenol Color: Colorless to pink O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	5 ppm 5 ppm 5 ppm	STEL: IDLH:	NE 250 ppm	Liver, kidneys, skin	Crystalline solid, sweet acrid odor, Sol:9%;LEL:1.8%
Strontium-90 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:		STEL: IDLH:	NE NE	Skeletal system, respiratory system	Variable
Tetrachloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	50 ppm 25 ppm	STEL: IDLH:	200 ppm 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform
Tetrachloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV:	50 ppm	STEL: IDLH:	200 ppm 500 ppm	Liver, kidneys, eyes, upper respiratory system, CNS; irritant flush face, vertigo	Liquid with odor like ether or chloroform; IP: 9.32; FP: 0; LFL: nonflammable; UFL: nonflammable

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health effects/target organs	Chemical/physical properties
Thorium Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	STEL: NE IDLH: NE	Respiratory system	Variable
Toluene Color: Colorless O known carcinogen O suspect carcinogen	TLV: 100 ppm PEL: 100 ppm REL: 100 ppm DAC:	STEL: 150 ppm IDLH: 2000 ppm	CNS, liver, kidneys, skin	Liquid with sweet, pungent benzene-like odor; LEL:1.2%
Trichloroethylene Color: Colorless ◉ known carcinogen O suspect carcinogen	TLV: 50 ppm	STEL: NE IDLH: 1000 ppm	Respiratory, heart, skin; headaches, dermatitis, nausea, vomiting	Liquid with a chloroform odor
Uranium-235 Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	STEL: NE IDLH: NE	Respiratory system, kidneys, GI; irritant	Variable

Legend:

C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

• These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

Zone 5 Contaminant List

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Heath effects/target organs	Chemical/physical properties
Xylene Color: Colorless	TLV: 100 ppm	STEL: NE IDLH: 1000 ppm	CNS, GI tract, liver, kidneys, skin; dizziness, staggering gait, nausea, stomach pain	Liquid with aromatic odor

O known carcinogen
O suspect carcinogen

Legend:
C: ceiling
CNS: central nervous system
GI: gastrointestinal
IDLH: immediately dangerous to life and health
MW: molecular weight
PEL: permissible exposure limit
REL: recommended exposure limit
SG: specific gravity
STEL: short-term exposure limit
TLV: threshold limit value
VP: vapor pressure
IP: ionization potential
NF: nonflammable

* These Chemicals are not expected to present a health and safety hazard on the site because either (1) their toxicity in nature depends on the elements with which they are bonded or (2) the published exposure limits are based on occupational exposures to the chemicals that will not take place in the environment.

4. TASK BREAKDOWN

4.1 SUMP INSTALLATION TASK DESCRIPTION

Task: Install sumps in the vicinity of the seep or spring discharge, using shovel or scoop to excavate the hole and remove slough.
Type of Work: (X) Intrusive ( ) Nonintrusive
Engineering Controls: N/A
Administrative Controls (e.g., required permits, training): Training administrative controls can be found in the WAG 6 Training Program (X-QE-703, Rev. 0) and in the WAG 6 HASP.

4.2 INITIAL LEVEL OF PERSONAL PROTECTIVE EQUIPMENT FOR SUMP INSTALLATION

Level of Protection: ( ) A ( ) B ( ) C (X) D (X) Modified

Respirator: ( ) SCBA ( ) Full-face ( ) Half-face respirator
( ) PAPR ( ) Other
Cartridge: _____

Protective Clothing:
( ) Encapsulating suit
( ) Saranex
( ) C-zone
( ) Other
(X) Tyvek (if upgraded by the SSHO; see action levels in Sect. 5)
( ) Splash suit
(X) Company clothing (khakis)

Head/eye/ear:
( ) Hard hat
(X) Splash shield
( ) Other
(X) Safety glasses
( ) Ear plugs
( ) Goggles
( ) Ear muffs

Gloves:
( ) Nitrile
(X) Latex
( ) Other
( ) Neoprene
( ) Vinyl
( ) PVC
( ) Leather

Footwear:
(X) Steel-toed leather
( ) Steel-toed rubber
(X) Chemical overboots
( ) Other

Describe the donning/doffing steps: Donning and doffing steps for PPE are provided here and in the HASP for WAG 6.

DONNING LEVEL D (Modified)

1. Don inner plastic boots.
2. Don cotton liners (gloves).
3. Don rubber gloves.
4. Don outer rubber boots.
5. Tape over outside pants cuffs.

DOFFING LEVEL D (Modified)

1. Remove outer tape.
2. Remove outer rubber boots (upon exiting the controlled access zone).
3. Remove rubber gloves.
4. Remove plastic boots (upon exiting the controlled access zone).
5. Remove cotton liners (gloves).
6. Perform whole-body frisk.

DONNING LEVEL C

1. Tear and tab tape (5 pieces for wrists, ankles, and front seam of Tyvek).
2. Don Energy Systems- or contractor-furnished clothing and Tyvek; button to the neck.
3. Check for proper badging and dosimetry.
4. Tape front seam; place tab at the top for each access.
5. Check shoe covers (black rubber boots) for holes and tears.
6. Don shoe covers.
7. Tuck contractor-furnished clothing or Tyvek into shoe covers (black rubber boots) and tape seams.
8. Don coveralls and tape front seams (if applicable).
9. Tape coveralls to the outside (over) shoe covers (black rubber boots).
10. Don cotton glove liners and tuck under sleeves.
11. Check rubber outer gloves (magenta/red) for leaks.
12. Don rubber gloves and tape seams over Tyvek sleeves.
13. Don respirator.

DOFFING LEVEL C

1. Remove exposed tape
   a. from rubber gloves,
   b. from front seam of coveralls,
   c. from shoe covers (black rubber boots).
2. Remove rubber gloves (pull inside out).
3. Remove Tyvek, inside outward, touching inside only.
4. Remove tape from shoe covers (black rubber boots) and contractor-furnished clothing.
5. Remove shoe cover (black rubber boot) and place each foot across the step-off pad one at a time.
6. Remove respirator.
7. Perform personnel frisking before exiting the controlled access zone.

4.3 SAMPLING AND ANALYSIS TASK DESCRIPTION

Task: Seeps and springs sampling and analysis
Type of Work: ( ) Intrusive (X) Nonintrusive
Engineering Controls: N/A

Administrative Controls (e.g., required permits, training): Training administrative controls can be found in the WAG 6 Training Program

4.4 INITIAL LEVEL OF PERSONAL PROTECTIVE EQUIPMENT FOR SAMPLING AND ANALYSIS

Level of Protection: ( ) A ( ) B ( ) C (X) D (X) Modified

Respirator: ( ) SCBA ( ) Full-face ( ) Half-face respirator
( ) PAPR ( ) Other
Cartridge: _____

Protective Clothing:
( ) Encapsulating suit
( ) Saranex
( ) C-zone
( ) Other
(X) Tyvek (if upgraded by the SSHO; see action levels in Sect. 5)
( ) Splash suit
(X) Company clothing (khakis)

Head/eye/ear:
( ) Hard hat
(X) Splash shield
( ) Other
(X) Safety glasses
( ) Ear plugs
( ) Goggles
( ) Ear muffs

Gloves:
( ) Nitrile
(X) Latex
( ) Other
( ) Neoprene
( ) Vinyl
( ) PVC
( ) Leather

Footwear:
(X) Steel-toed leather
( ) Steel-toed rubber
(X) Chemical overboots
( ) Other

Describe the donning/doffing steps: Donning and doffing steps for PPE are provided in Sect. 4.2 and in the HASP for WAG 6; no additional requirements are warranted.

Modifications allowed: All upgrades of PPE must be approved by the SSHO and by the appropriate safety and health representative. Downgrades in PPE will be justified and documented in the site logbook by the SSHO.

Additional PPE information may be found in Sect. 5 of the WAG 6 HASP.

5. MONITORING REQUIREMENTS

5.1 DIRECT READING INSTRUMENTS

	Task(s)	Monitoring Frequency	Action Levels	Action Guidelines
LEL meter	NA		10%LEL	Contact IH
O_2 meter	NA		<19.5 or >22% O_2	Contact IH
Colorimetric indicator tubes	NA		1/2 PEL	Contact IH
Photoionization detector (PID)	HP	Intermittent*	5 ppm**	Contact IH
Flame ionization detector (FID)	HP	Intermittent*	5 ppm**	Contact IH
Alpha meter	HP	Before exiting	See HASP Table 3	Contact HP
Beta/gamma meter	HP/worker	Upon exiting	See HASP Table 3	Contact HP
Area radiation monitors	NA			
Noise meter	NA		85 dBA	
Other (Specify)	NA			

* Before performing intrusive work, data will be collected to ensure that PID and FID readings are below action levels.

** Action levels are ppm above background per 5 min. All personnel are to frisk themselves and sampling equipment before exiting each sampling area.

5.2 PERSONAL MONITORING

	Task(s)	Monitoring Frequency	Action Guidelines
Whole-body dosimetry	SAS	Continuous	Contact HP
Extremity dosimetry	NA		
Whole-body count	SAS	Yearly	Contact HP
Urinalysis/bioassay	SAS	6 Months	Contact HP
Chemical air sampling	NA		
Radiation air sampling	NA		
Personal sampling pumps	NA		

Instruments used by IH representatives will be calibrated and maintained in accordance with IH Standard Operating Procedures. Instruments used by the Office of Radiation Protection are calibrated and source-checked in accordance with established Health Physics procedures. Instruments used by MAD representative will be calibrated and maintained in accordance with MAD Procedures.

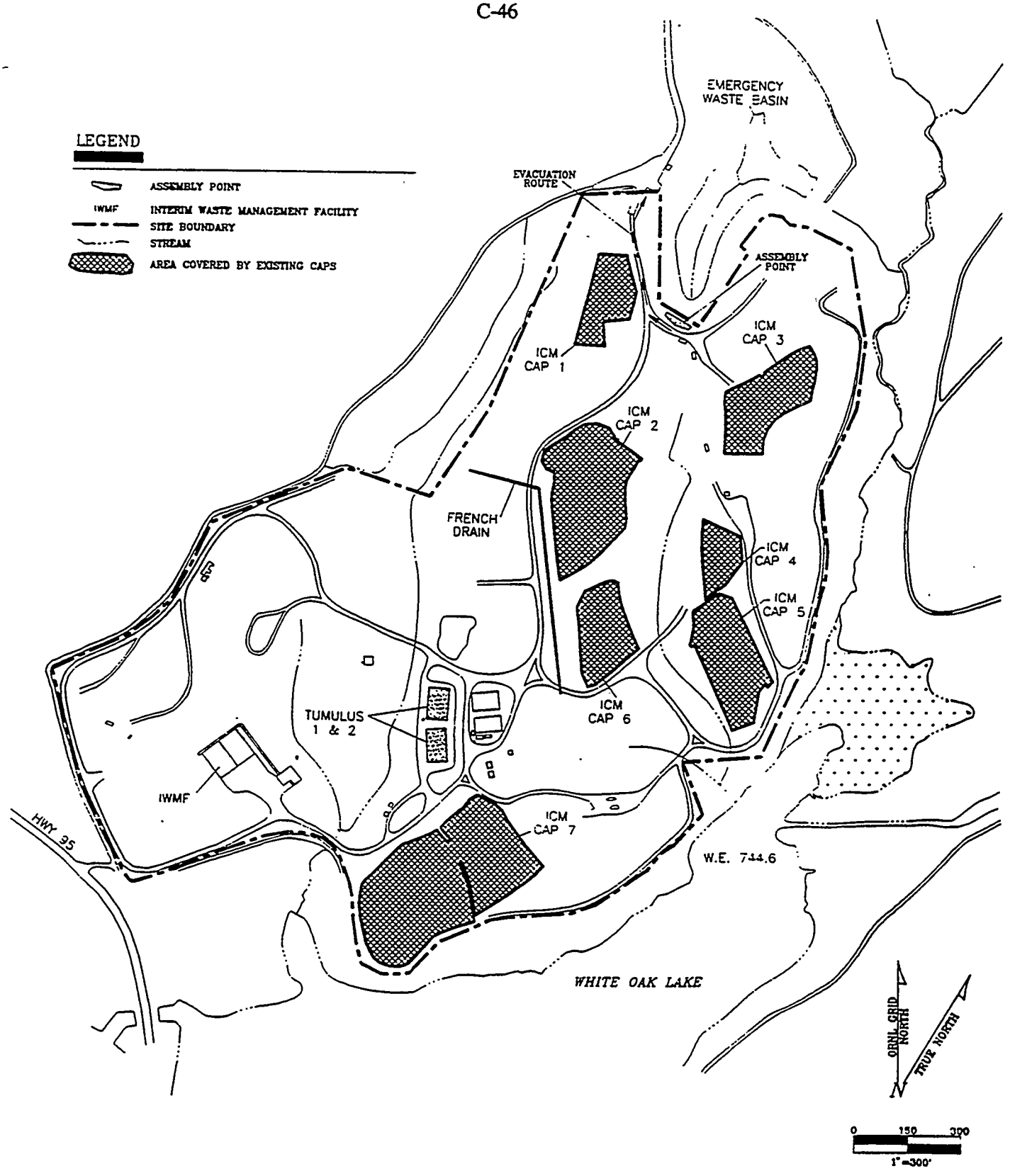
Site monitoring requirements may change based on site conditions. All changes must be documented in the site logbook.

6. SITE CONTROL

Site work zones are required to reduce the accidental spread of hazardous substances from contaminated areas to clean areas. Therefore, a controlled access zone will be established at the site. The identification of the zone will provide for control of operations and flow of personnel. The HPC will provide signs to be posted at the site for HAZWOPER requirements. The HP will determine radiological postings. Should additional barriers (e.g., rope, tape) or signs be required, HP, IH, and IS will be consulted. The HPC may modify the zone for short-term, transient-type projects. The modification would include use of the HAZWOPER barrier tape and A-frame sign, if material is in stock. Additional information regarding site control may be found in Sect. 7 of the ORNL HAZWOPER Program Manual.

Personnel accessing the zone must meet access requirements as stated in the WAG 6 HASP and this plan, and at the entrance of the zone. Entrance and exit points for the zone will be clearly marked. The SSHO is responsible for ensuring that all workers and visitors meet site access requirements. Section 9 is a record of site access requirements and personnel qualifications.

A site map is provided at the end of this section that contains the location of the emergency assembly area and the emergency evacuation routes.



EMERGENCY ASSEMBLY POINT AND EVACUATION ROUTE

OAK RIDGE NATIONAL LABORATORY
ORNL WAG 6

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

A807/23JAN94/393

7. DECONTAMINATION

The purpose of decontamination is to prevent contaminants that may be present on protective clothing and equipment from coming into contact with personnel as they doff PPE. Also, decontamination protects workers from hazardous substances that may contaminate and eventually permeate the PPE used on site; it protects personnel by minimizing the transfer of harmful materials into clean areas. Combining decontamination with the correct sequential method of removing PPE will prevent exposure to personnel leaving the work areas as well as offsite migration of contaminants. Generally, decontamination is accomplished by starting with the most heavily contaminated item and progressing to the least contaminated item.

Personnel will remove any disposable PPE and dispose of it in provided containers before leaving the controlled access zone. Materials needed for decontamination for this project include (1) liquinox and (2) deionized water. Equipment decontamination procedures (in accordance with ESP-900) can be found in Sect. 2 of the Seeps and Springs Sampling and Analysis Plan.

8. EMERGENCY PREPAREDNESS

The responsibility for day-to-day implementation of this information lies primarily with the SSHO. During an actual emergency response situation, the SSHO will serve as the Emergency Coordinator until the Laboratory Shift Superintendent (LSS) or emergency response team arrives.

Medical assistance will be provided by the Health Division, which is located at Building 4500N. In the event of an emergency, dial 911 to reach ORNL Emergency Response. The LSS will provide emergency response personnel and coordinate emergency assistance. The radio number for the LSS is Station 295. The telephone number for the LSS is 574-6606. The nearest telephone and fire alarm box is located at the tumulus site. In the event that the LSS is not available, emergency services may be reached at the telephone numbers shown below.

The SSHO will perform the following pre-emergency tasks before starting field activities and will coordinate emergency response with the LSS.

1. Locate nearest telephone and alarm station.
2. Confirm and post emergency telephone numbers.
3. Post site map of work areas marked with evacuation routes.
4. Inventory and check out on-site emergency equipment and supplies, as warranted.

In the event of an emergency, a first extinguisher, medical kit, and emergency eye wash kit are located in the CDM Federal vehicles and in the clean zone. In addition, spill control kits may be found in the permanent decontamination area located outside the clean zone.

In the event of an emergency that requires evacuation of the site, verbal instruction will be given by the SSHO to evacuate the area. Personnel will exit to a predesignated support area. At this point, the SSHO will account for all personnel, ascertain information about the emergency, and give further instructions to the on-site personnel. In all situations that require evacuation, personnel shall not reenter the work area until the conditions causing the emergency have been corrected; the hazard reassessed; the Work Plan and HASP revised, approved, and reviewed with on-site personnel; and instructions given for reentry.

Emergency Personnel	Phone	Radio #
ORNL Emergency Response	**911**	
Laboratory Shift Superintendent	**574-6606**	295
Fire Department	574-5678	
Medical Center	574-7431	
Security	574-7199	
Industrial Hygiene	576-5064	
Industrial Safety	574-6679	
Radiation Protection	599-1338	
Environmental Compliance	574-7294	
Emergency Communication Center	574-6646	295
Facility Manager (K. Wilson)	576-5290	
Project Manager (D. McCurry)	421-4724	
ORNL ER and Environmental Health and Safety Manager (C. Clark)	574-8268	

The SSHO will brief workers on emergency response procedures and the evacuation route in the pre-entry briefing.

9. TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

List applicable training/medical requirements for this project. All site personnel and visitors requiring access to the work zones (contamination reduction zone and exclusion zone) will be required to meet these access requirements.

9.1 PROJECT TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS

Training

__X__ General Employee Training
__X__ 24 h HAZWOPER (SARA/OSHA) training
__X__ 40 h HAZWOPER (SARA/OSHA) training
__X__ Current HAZWOPER 8-h Annual Refresher (as applicable)
__X__ 8-h HAZWOPER Supervisor training
__NA__ Radiation Worker Training
__X__ Radiation Worker Training II
__X__ Respirator fit test/training (only if respirators are required)
__N/A__ Confined space entrant
__N/A__ Confined space attendant
_____ Other (list)

Twenty-four-hour HAZWOPER training is applicable for individuals not requiring the use of respiratory protection.

Medical Surveillance

The ORNL Hazardous Waste Worker Medical Surveillance Program is applicable for Energy Systems employees meeting criteria as specified in Sect. 9 of the ORNL HAZWOPER Program Manual. Subcontracted personnel are enrolled in a medical surveillance program comparable with the ORNL Medical Surveillance Program and in accordance with the Medical Surveillance Program Guidelines outlined in the Office of Environmental Restoration's health and safety guidelines (EM-40).

Note: If site conditions change, or if other hazards are detected, the training and access requirements will be revised accordingly.

9.2 SITE PERSONNEL QUALIFICATIONS

Name: Douglas Hopper Badge number: 625518
Assigned tasks: Seeps and springs sample task leader

	YES	NO	DATE
General Employee Training:	(X)	( )	9/93
24-h training:	( )	( )	NA
40-h training:	(X)	( )	5/94

	YES	NO	DATE
Annual Refresher Training:	( )	( )	NA
Supervisor Training:	(X)	( )	10/93
Radiation Worker Training:	( )	( )	NA
Radiation Worker Training II:	(X)	( )	9/93
Respirator fit tested/trained:	(X)	( )	5/93
Confined Space Entry Training:	( )	( )	NA
Medical Surveillance Program:	(X)	( )	5/93
Whole Body Count (in vitro):	(X)	( )	9/94
Bioassay (in vitro):	(X)	( )	9/94
Specialized Equipment Training:	( )	(X)	N/A
First Aid/CPR:	(X)	( )	9/94

Other training: Waste Generator Training for 90-Day Accumulation, Hazardous Waste Characterization, RCRA Cap Access Training, Satellite Waste Accumulation Training, Low-level Waste Training.

Name: Richard Stout Badge number: 626015

Assigned tasks: Groundwater level monitoring

	YES	NO	DATE
General Employee Training:	(X)	( )	9/93
24-h training:	( )	( )	NA
40-h training:	(X)	( )	6/88
Annual Refresher Training:	(X)	( )	10/93
Supervisor Training:	(X)	( )	10/93
Radiation Worker Training:	( )	( )	NA
Radiation Worker Training II:	(X)	( )	10/93
Respirator fit tested/trained:	(X)	( )	8/93
Confined Space Entry Training:	( )	( )	NA
Medical Surveillance Program:	(X)	( )	8/93
Whole Body Count (in vitro):	(X)	( )	9/93
Bioassay (in vitro):	(X)	( )	9/93
Specialized Equipment Training:	( )	( )	N/A
First Aid/CPR:	(X)	( )	9/93

Other training: Satellite Accumulation, RCRA Cap Access, Waste Generator, Hazardous Waste Characterization

DISTRIBUTION

1. C. A. Bednarz
2. T. Bonine
3. H. L. Boston
4. W. D. Brickeen
5. S. N. Burman
6. D. L. Garrett
7. H. K. Hepworth
8. A. J. Kuhaida
9. G. R. Moline
10. P. A. Schrandt
11. M. M. Stephens
12. D. R. Watkins
13. K. A. Wilson
14. P. S. Wood
15. ER Document Management Center-RC
16. ORNL ER Document Management Center-PF
17. Laboratory Records Department

18. C. L. Callis, CDM Federal Programs Corporation, 800 Oak Ridge Turnpike, Suite 500, Oak Ridge, TN 37830
19. J. Jones, Gilbert/Commonwealth, Inc., Suite 200, 1055 Commerce Park Drive, Oak Ridge, TN 37830
20. S. Pack, SAIC, 800 Oak Ridge Turnpike, Suite 500, Oak Ridge, TN 37830