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Energy Systems Environmental Restoration Program
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Surface Water Sampling and Analysis Plan for Environmental Monitoring in Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

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Surface Water Sampling and Analysis Plan for the Environmental Monitoring Plan in Waste Area Grouping 6 at Oak Ridge National Laboratory, Oak Ridge, Tennessee

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11/9/93
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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
DM	Data Manager
DOE	U.S. Department of Energy
EMP	Environmental Monitoring Plan
Energy Systems	Martin Marietta Energy Systems, Inc.
EPA	U.S. Environmental Protection Agency
ESP	environmental surveillance procedure
FOP	field operations procedure
GCO	Generator Certification Official
H&S	health and safety
HP	Health Physics Section
ID	identification
IH	Industrial Hygiene Section
LGWOD	Liquid and Gaseous Waste Operations Group
MS	matrix spike
MSD	matrix spike duplicate
NIST	National Institute of Standards and Technology
OREIS	Oak Ridge Environmental Information System
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RS	radiation scan
SAP	Sampling and Analysis Plan
SHSO	Site Health and Safety Officer
SLLW	solid low-level waste
SW	surface water
SWSA	solid waste storage area
TSS	total suspended solids
WAG	waste area grouping
WMO	Waste Management Operations
WMP	Waste Management Plan
WOC	White Oak Creek
WOD	White Oak Dam
WST	West Seep Tributary

EXECUTIVE SUMMARY

This Sampling and Analysis Plan addresses surface water monitoring, sampling, and analysis activities that will be conducted in support of the Environmental Monitoring Plan for Waste Area Grouping (WAG) 6. WAG 6 is a shallow-burial land disposal facility for low-level radioactive waste at the Oak Ridge National Laboratory, a research facility owned by the U.S. Department of Energy and managed by Martin Marietta Energy Systems, Inc. Surface water monitoring will be conducted at nine sites within WAG 6. Activities to be conducted will include the installation, inspection, and maintenance of automatic flow-monitoring and sampling equipment and manual collection of various water and sediment samples. The samples will be analyzed for various organic, inorganic, and radiological parameters. The information derived from the surface water monitoring, sampling, and analysis will aid in evaluating risk associated with contaminants migrating off-WAG, and will be used in calculations to establish relationships between contaminant concentration (C) and flow (Q). The C-Q relationship will be used in calculating the cumulative risk associated with the off-WAG migration of contaminants.

1. INTRODUCTION

1.1 PROJECT OVERVIEW

This document is the Surface Water Sampling and Analysis Plan (SAP) for Waste Area Grouping (WAG) 6 at Oak Ridge National Laboratory (ORNL). The procedures described herein are part of the Environmental Monitoring Plan (EMP) for WAG 6, which also includes monitoring tasks for groundwater quality, groundwater levels, seeps and springs, 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 the 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 *Resource Conservation and Recovery Act 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 SURFACE WATER SAP OUTLINE AND OBJECTIVES

The purpose of the surface water SAP is to provide the field workers with information on conducting activities that are unique and essential to accomplishing the task of surface water monitoring. 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. Once field activities have begun, 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 Surface Water Monitoring Program, as defined in the EMP, are to provide data to

1. estimate risk at the boundary of the waste unit and relative risk at White Oak Dam (WOD),

Table 1.1. WAG 6 Surface Water SAP and project-level document cross-reference

Surface Water SAP section	Project-level reference document(s)
Section 1 - Introduction contains limited information on the EMP, summarizes project objectives, and summarizes the surface water monitoring activities to be conducted.	DOE *Environmental Monitoring Plan*
Section 2 - Task Instructions identifies the specific tasks to be conducted, contains activity-specific instructions on the work to be performed, and lists the procedures to be used at various stages of the work.	DOE *Environmental Monitoring Plan; WAG 6 Field Operations Procedures Manual*
Section 3 - Quality Assurance/Quality Control Requirements contains information on the QA/QC requirements specific to surface water sampling and analysis. This section includes information on documentation; analytical requirements; and frequencies, numbers, and types of QC samples.	DOE *Quality Assurance Project Plan for Characterization and Monitoring Activities in Waste Area Grouping 6 at Oak Ridge National Laboratory*
Section 4 - Health and Safety Considerations briefly describes the health and safety aspects of the activity. Activity-specific instruction sheets (located in Appendix C) 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 for Waste Area Grouping 6 at Oak Ridge National Laboratory*
Section 5 - Waste Management briefly describes the waste management associated with the surface water monitoring. The wastes associated with this activity will be restricted to PPE and very small quantities of decontamination fluids.	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*

2. verify primary chemicals of concern (COCs) that contribute to risk,

3. refine risk estimates, and

4. develop technologies to support site characterization and remediation activities.

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 the objectives. Data from these activities will be collected on various forms (see Appendix A) and in field logbooks.

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

Surface Water Monitoring SAP activity	Activity purpose and elements	EPA Quality Control Levels[a]
1. Water level and flow monitoring	• Determine COC fluxes • establish C-Q[b] relationships	Level I
2. Flow-paced sampling	• Determine COC fluxes	Level III (90%) Level IV (10%)
3. Baseflow sampling	• Determine COC fluxes • establish C-Q relationships	Level III (90%) Level IV (10%)
4. Storm event sampling	• Determine COC fluxes • establish C-Q relationships	Level II[c]
5. Bedload sediment sampling	• Determine COC fluxes in bedload portion of sediment transport	Level III (90%) Level IV (10%)
6. Equipment decontamination	• Eliminate cross-contamination between wells	N/A[d]
7. Waste management	• Properly document and manage personal protective equipment and decontamination fluid	N/A
8. Data collection and management	• Properly record information in logbooks and field forms • properly download data from electronic field instruments	N/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] C = concentration; Q = discharge
[c] As stated in Sect. 2.3.6.1 of the EMP, an analytical quality Level II may be used for samples taken to address the C-Q relationship.
[d] N/A = not applicable

1.3 SAMPLING LOCATIONS, FREQUENCIES, AND ANALYTES

It has been determined that the quality and location of the existing gauged monitoring stations should be upgraded at WAG 6 before performing baseline sampling activities. However, the planned upgrades will not be completed until April 1994. The upgrades will merge drainage DA and DB discharges (new MS1) and drainage FA and FB discharges (new MS3) into stations fully equipped to handle all expected ranges of flow. Although the EMP states that gauged monitoring station MS4 will be established in the small tributary north of the West Seep

fully equipped to handle all expected ranges of flow. Although the EMP states that gauged monitoring station MS4 will be established in the small tributary north of the West Seep Tributary, this action will be reconsidered after an evaluation of the levels of contamination and estimates of contaminant flux are made. Subsequently, if warranted, the flume at MS4 will be installed. Until a decision is made, drainage MS4 will be considered an ungauged surface water site, and sampling will conform to that conducted at drainages B and C. Because the upgrades will not take place until the spring of 1994, the following defines the monitoring to be conducted.

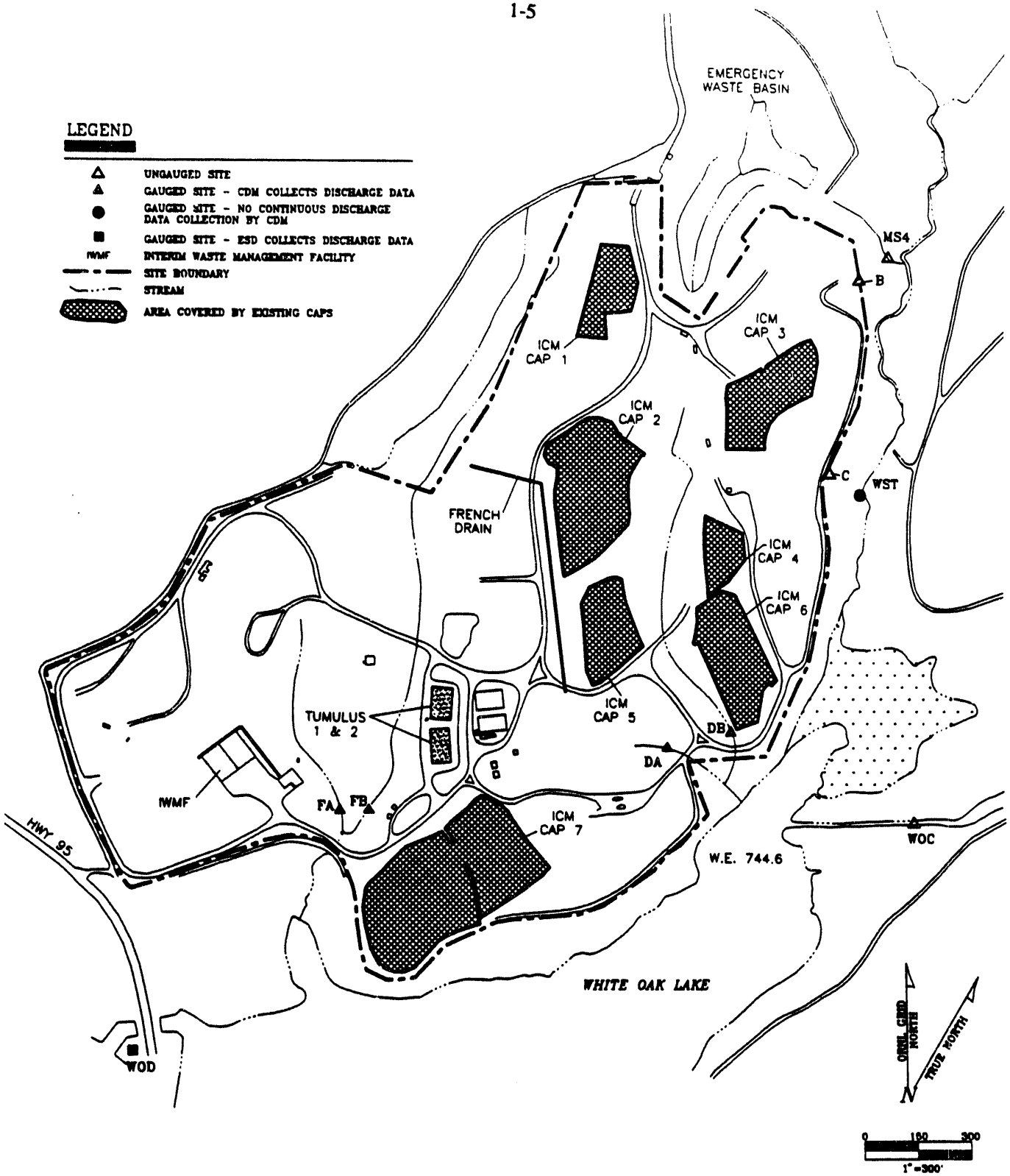
- Surface-water-flow monitoring at the existing flumes (FA, FB, DA, and DB) will be conducted using the new equipment and procedures identified here.

- Flow-paced sampling will commence at FB and DA. Contaminant discharge at sites FA and DB are judged to be relatively small (DOE 1993a, Table A.3), and these discharges will be monitored when the upgraded stations are operational.

- Flow-paced sampling and analysis at WOD will be conducted by Energy Systems Environmental Surveillance and Protection in order to use their advanced collection system and to eliminate expensive redundancy. Continuous flow logging will be conducted by the Watershed Hydrology Task team of the WAG 2 Site Investigation Program. The data are collected by Environmental Sciences Division staff.

- The capability to drive sequential samplers during storm sampling in addition to flow-paced sampling is being evaluated along with laboratory arrangements to allow less expensive Level II QC. Smaller sample size will allow simpler and less expensive sampling equipment to be used. Contaminant concentration and flow relationship (C-Q) samples are considered to be secondary in importance to the flow-paced sampling.

The locations of the gauged and ungauged sites are shown in Fig. 1.1. The frequency and analytical suite for each monitoring site are displayed in Table 1.3. The specific analyte list comprising the analytical suites is displayed in Table 1.4. Based upon the information contained in Tables 1.3 and 1.4, the sampling frequency and list of analytes for each site are displayed in Appendix B.



SURFACE WATER MONITORING SITES

OAK RIDGE NATIONAL LABORATORY
ORNL WAG 6

CDM FEDERAL PROGRAMS CORPORATION
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FIGURE No. 1.1

A738/210SC33/400

Table 1.3. Analytical suites and associated analytes for surface water sampling

Analyte	Analytical suite[a]		
	PRC	RFI COC	RS
Organics			
CLP volatiles		X	
CLP semivolatiles			
CLP pesticides/PCBs			
Herbicides			
RCRA volatiles			
Metals			
CLP metals		X	
ICP metals			
Radiological			
Gross alpha[b]		X	X
Gamma scan (Cs, Co, Eu)		X	X
Tritium	X	X	
Strontium	X	X	

[a] PRC = Site-related chemicals that contribute to the majority of risk and should be analyzed for more frequently.
RFI COC = Site-related chemicals determined to be chemicals of concern (COCs) during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) sampling analysis.
RS = Radiation scans.
PCB = polychlorinated biphenyl.
ICP = inductively coupled plasma.

[b] 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.

Table 1.4. Surface water sampling locations, analytical suites, and frequencies

Site ID	Type of sampling[a]	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
DA, FB	Flow-paced[b]	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS
	Baseflow	TAL/TCL PRC+RS[b]	PRC	PRC	RFI COC	PRC	PRC	RFI COC	PRC	PRC	RFI COC	PRC	PRC
	Storm Event[c]	PRC		PRC	PRC		PRC	PRC		PRC	PRC		PRC
	Bedload						RS						RS
DB, FB	Baseflow	TAL/TCL PRC+RS			RFI COC			RFI COC			RFI COC		
WOD	Flow-paced	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS	RFI COC TSS
	Baseflow[d]	PRC	PRC						PRC				
B, C	Storm Event[e]	TAL/TCL PRC+RS			RFI COC			RFI COC			RFI COC		
MS4	Storm Event[e]	TAL/TCL PRC+RS			RFI COC			RFI COC			RCI COC		
WOC	Baseflow[d]		PRC						PRC				
WST	Baseflow[d]		PRC						PRC				

[a] Refer to Table 1.3 for an identification of the various analytical suites.
RFI COC = Site-related chemical determined to be a chemical of concern (COC) during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) sampling analysis.
TSS = total suspended solids.
TAL/TLC = Target Analyte List/Target Compound List Contract Laboratory Program (CLP) metals, volatiles, semivolatiles, and pesticides/polychlorinated biphenyls (PCBs), and herbicides.
PRC = primary risk contributor, site-related chemicals that contribute to the majority of risk and should be analyzed for more frequently.
RS = radiation scans.

[b] When the last weekly flow-paced sample of each month is retrieved, a grab sample will be collected for analysis of volatiles.

[c] Storm event samples will be collected on an average of two storms per quarter.

[d] Semiannual baseflow samples at White Oak Dam, White Oak Creek, West Seeps Tributary, all seep monitoring points, and all WAG 6 drainages will be coordinated and completed within 48 h.

[e] Storm event samples will be collected on an average of one storm per quarter.

2. TASK INSTRUCTIONS

This section identifies the specific surface-water-monitoring tasks to be performed to meet the objectives of the EMP. In all cases, fieldwork will be accomplished according to this SAP. 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 during inspections will be documented on the WAG 6—Surface Water Site Inspection Form (SW-02) and in the field logbook.

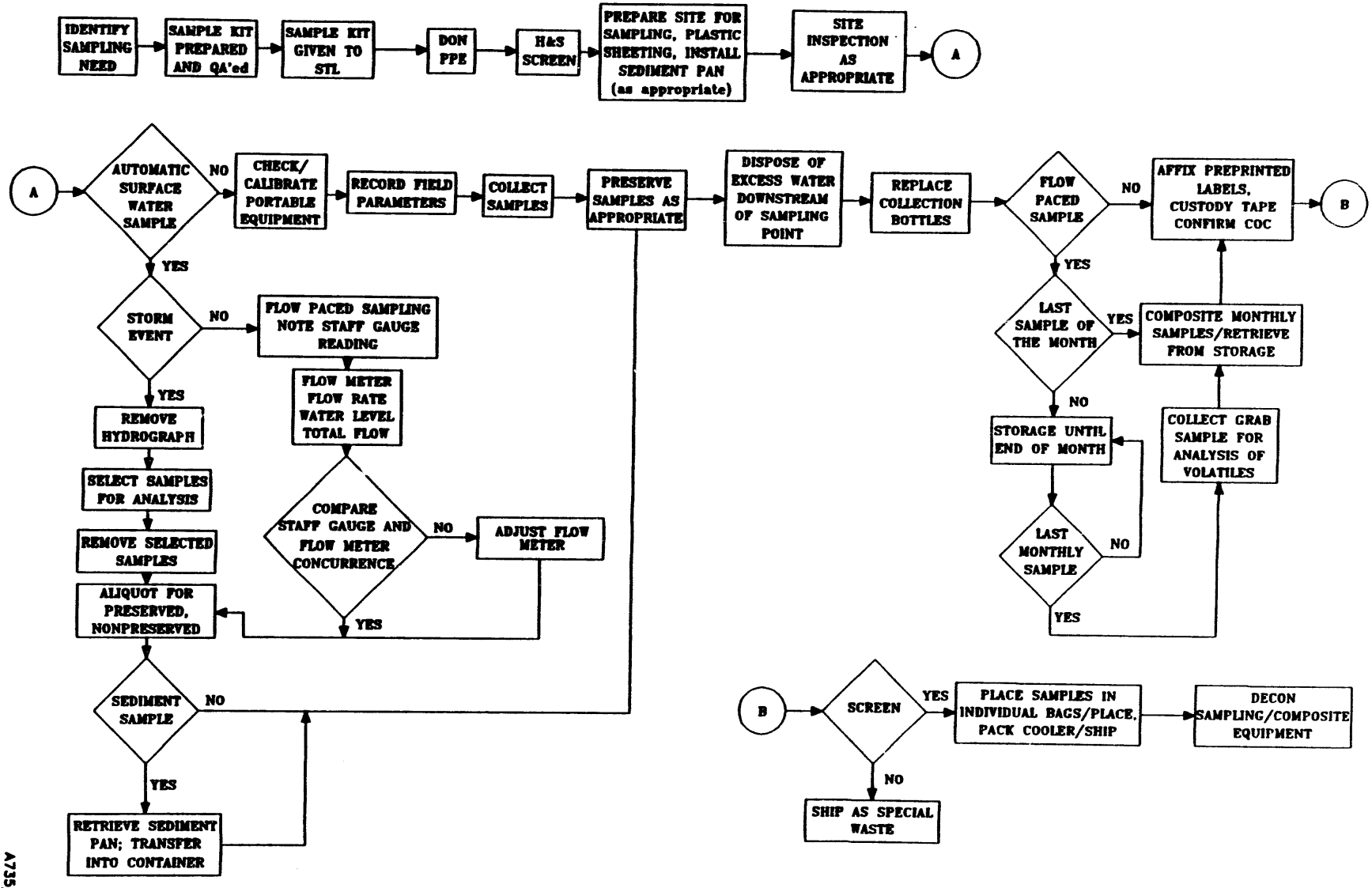
Surface water samples will be collected from the monitoring sites at the frequencies and for the analytes specified in the tables in Appendix B. These tables are organized on a monthly basis and specify the analytical parameters for each site. End-of-month collection of flow-paced samples will be completed on the same day as the Energy Systems Environmental Surveillance and Protection sample collection at WOD in order to have a uniform time period for reporting purposes. Beginning with the first monthly sampling round, the field crew should proceed from site to site collecting necessary data and samples (flow measurements, flow-paced samples, and baseflow samples). It is estimated that all sites can be completed in one to two days. Storm event sampling will be performed when conditions are appropriate. Bedload samples will be collected when storm event samples are retrieved. Once each monthly round of sampling has been completed, the field crew should wait until the beginning of the next month to initiate the next monthly sampling round.

A flowchart of the tasks to be conducted as part of this activity is displayed in Fig. 2.1. 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.

Manually collected surface water samples may be collected by dipping sample containers directly into the source, when possible. Although this is a variance from Environmental Surveillance Procedures (ESPs), it is the accepted and preferred method for U.S. Environmental Protection Agency (EPA) Region IV. This method eliminates the possibility of cross-contamination from additional sampling equipment, eliminates the need for some decontamination of sampling equipment, and reduces the number of required QC rinseate samples.

All manual sampling equipment, collection bottles, and compositing bottles will be decontaminated according to ESP-901. The following decontamination guidelines will be followed.

- Rinse the item in tap water to remove any visible dirt or dust.
- Wash the item with tap water and Liquinox.
- Rinse the item with tap water.
- Rinse the item twice with deionized water.
- Allow the item to air dry.



SURFACE WATER SAMPLING ANALYSIS ACTIVITY FLOWCHART

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FIGURE No. 2.1

A735/20DEC93/7913

2.1 WATER LEVEL AND FLOW MONITORING

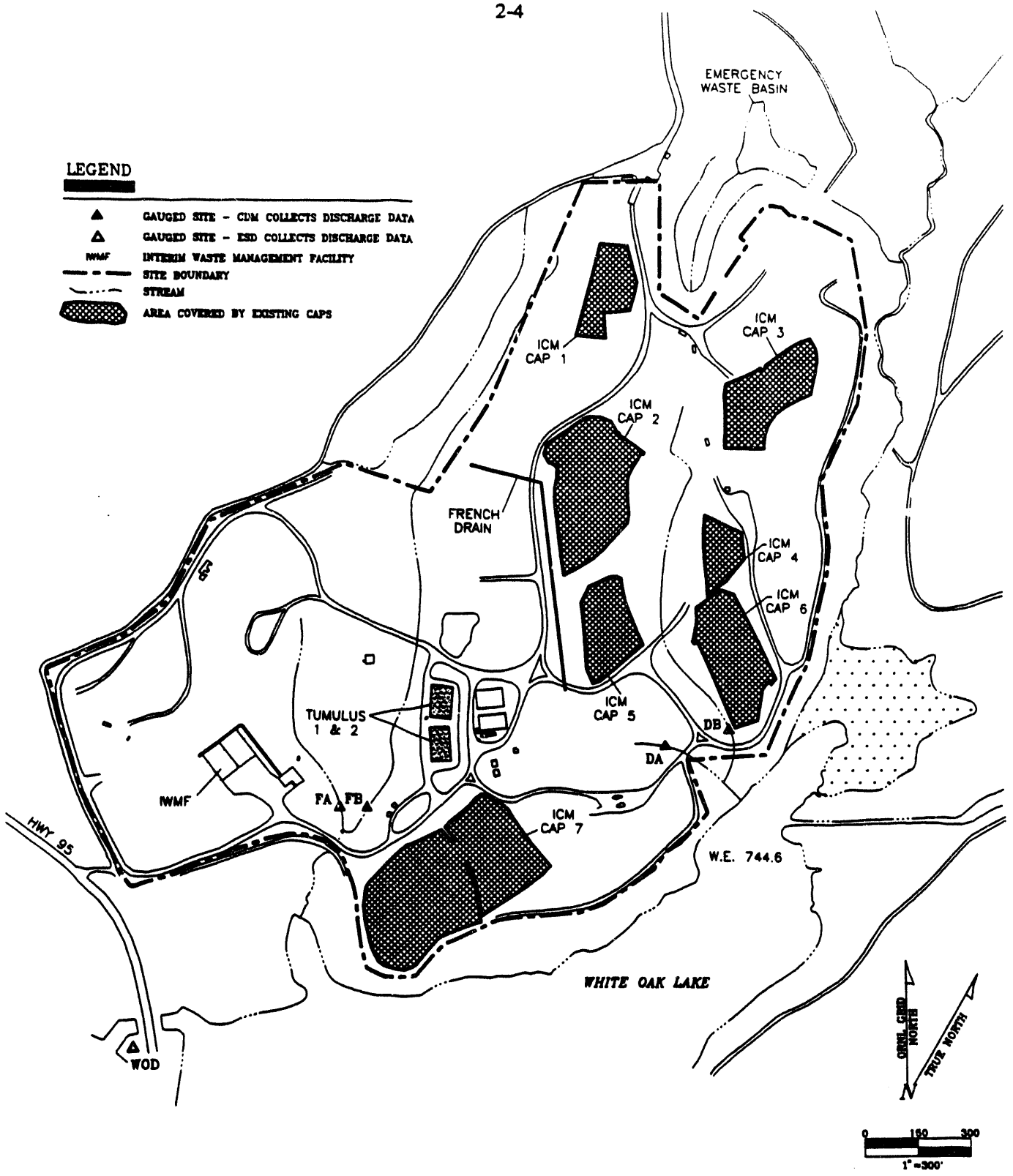
Water level and flow monitoring will be performed on a continuous basis at the sites shown in Fig. 2.2. Environmental Sciences Division, via the WAG 2 Site Investigation Program, will collect and process WOD flow data. The objective for obtaining water level and flow measurements is to identify both short-term (current condition) characteristics and long-term (seasonal) trends in WAG 6 hydrology. These data will then be combined with water quality data to determine the flux of contaminants through the WAG 6 surface water system, to establish long-term trends in the flux data, and to establish concentration (C) versus discharge (Q) relationships for the COCs.

The following equipment will be needed to collect and retrieve continuous water level and flow measurement data.

- personal protective equipment (PPE) as specified by the Site H&S Officer (SHSO) and/or Site Health Physicist,
- one ISCO 3230 Flow Meter per site,
- laptop computer with FLOWLINK software,
- flow meter interrogator cable with mating connector,
- serial port cable with 4-pin connector to flow meter interrogator cable,
- extra electronic diskettes,
- bar code reader, and
- WAG 6—Surface Water Site Inspection Form (SW-02).

Water level and flow measurement data will be collected during the weekly site inspection. Initially, sites will be checked twice weekly and documented in the field logbook to ensure that equipment is operating properly. WAG 6—FOP 3 provides the procedure for downloading and/or viewing data recorded on ISCO 3230 Flow Meters. The following guidelines should be followed when downloading data from the ISCO Flow Meter.

- Don PPE as required before beginning work.
- Connect the laptop computer to the flow meter.
- Select **LAPCOMM** from the FLOWLINK menu.
- Select **Connect** from the Base Menu. View the information given for each partition of the flowmeter and record on the WAG 6—Surface Water Site Inspection Form (SW-02).
- Select **Interrogate** from the Connect Menu.
- Select **All** from the Interrogate Menu to download all data contained in the flow meter.



SURFACE WATER LEVEL AND FLOW MEASUREMENT SITES

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ORNL WAG 6

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FIGURE No. 2.2

- When LAPCOMM completes the interrogation, it will return to the **Connect** Menu. Exit LAPCOMM and verify that all necessary data (*.DAT) and flow conversion (*.FCS) files have been updated or created.

- Copy all three files to electronic diskette.

- Record the date and time the data were retrieved and the names of the files created or updated on the WAG 6—Surface Water Site Inspection Form (SW-02) and record the bar code number of the form in the field logbook.

2.2 FLOW-PACED SAMPLING

Flow-paced sampling will be performed on a continuous basis at the sites shown in Fig. 2.3. The objective of flow-paced sampling is to collect data that will determine the concentrations of COCs at specified sites within WAG 6. The flux of contaminant that passes a given site while a sampling container is in place can then be determined from the concentration data and from the total volume of water that passed the site. Therefore, it follows that the annual flux of contaminant can be computed by adding up all fluxes determined throughout the year.

The following equipment will be needed to collect and retrieve flow-paced samples:

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

- one ISCO 3700 Sampler per site (installed in the composite setup),

- one ISCO 3230 Flow Meter per site,

- plastic sheeting,

- keys to the ISCO Flow Meter and ISCO Sampler,

- bar code reader,

- one clean, 4-gal polyethylene sample container permanently marked with the station location,

- one clean, 4-gal container cap,

- one clean, 500-mL polyethylene sample bottle with cap,

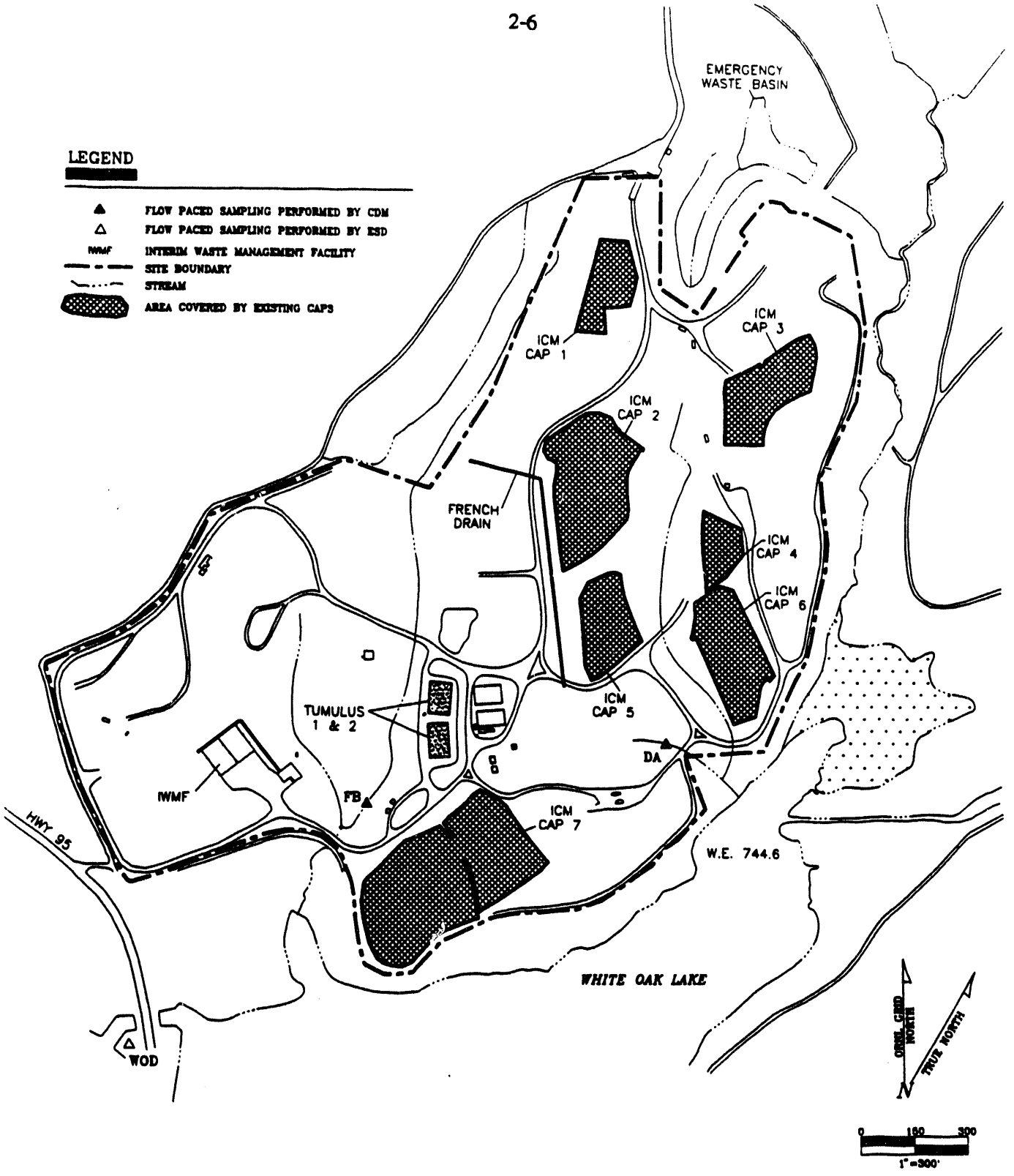
- funnel,

- decontamination equipment,

- sample preservatives,

- ISCO instruction manuals,

- field logbook,



FLOW PACED SAMPLING SITES

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FIGURE No. 2.3

- WAG 6—Flow-Paced Sample Collection Form (SW-04), and
- chain-of-custody form (for submittal of monthly composite).

Flow-paced sampling will be performed automatically by the ISCO 3700 Sampler. Aliquot collection by the sampler will be driven by electronic signals sent from the ISCO 3230 Flow Meter. WAG 6—FOP 4 addresses programming the ISCO 3230 Flow Meter to drive the flow-paced sampler. WAG 6—FOP 5 provides the procedure for programming the composite sampler.

Flow-paced samples will be retrieved during the weekly site inspection according to WAG—FOP 2 after flow data have been downloaded according to WAG 6—FOP 3. However, since the time required to fill a sample bottle will vary based upon recent hydrologic conditions (e.g., rainfall, baseflow volumes), the sampler should be checked every few days and especially after storm events when aliquots are collected more frequently. At the end of each month, a monthly composite sample will be created by taking aliquots from each of the samples taken during the month. WAG 6—FOP 7 provides the procedure for compositing the weekly samples. The following guidelines should be followed when retrieving the flow-paced samples.

- Don PPE as required before beginning work.
- Prepare the site by laying out plastic sheeting.
- Take a staff gauge reading and record it on the WAG 6—Flow-Paced Sample Collection Form (SW-04).
- Open the ISCO 3230 Flow Meter case and look at the liquid crystal display window. Record the total flow volume, flow rate, and water level on the WAG 6—Flow-paced Sample Collection Form (SW-04).
- Compare the staff gauge reading and the water level taken from the flow meter. If they differ, adjust the flow meter water level by pressing the "GO TO PROGRAM STEP" key and selecting program step number 9.
- Remove the cover from the ISCO 3700 Sampler, pull out the composite collection bottle, and fill the 500-mL, polyethylene, prelabeled bottle. This sample will be composited and analyzed for tritium and total suspended solids.
- Preserve the remaining water in the 4-gal container according to Table 2.1 (HNO_3 to $pH < 2$). Use a pipet and litmus paper to ensure $pH < 2$. This water will be used to create a composite sample at the end of the month. The composite sample will be decanted and analyzed for Contract Laboratory Procedure (CLP) metals, gross alpha, gamma, and strontium.
- Insert the clean composite collection bottle into the sampler and replace the sample cover.
- Request the SHSO to screen the outside of the filled sample containers.
- Place the samples collected in storage until the end of the month. The 500-mL sample should be refrigerated.

Table 2.1. Sample analytical methods, containers, preservatives, and holding times for surface water

Parameter[a]	Matrix	Analytical method	Container type[b]	Container volume	Number of containers per site	Preservation	Maximum holding time
CLP volatiles	Water	CLP	G-vial, T-lined	40 mL	2	HCl<2 pH, 4°C	14 d
CLP semivolatiles	Water	CLP	Amber-G	1 L	1	4°C	7 d
CLP pesticides/PCBs	Water	CLP	Amber-G	1 L	1	4°C	7 d
Herbicides	Water	CLP	Amber-G	1 L	1	4°C	7 d
CLP metals	Water	CLP	P	500 mL	1	HNO_3<2 pH	180 d
Gross alpha	Water	900	Q	4 L[c]	1	HNO_3<2 pH	180 d
	Sediment	RL-2302	P	120 mL	1	NA	180 d
Gamma scan	Water	901.1	Q	4 L[d]	1	HNO_3<2 pH	180 d
	Sediment	RL-4303/4304	Q	4 L (2000 g)	1	NA	180 d
Tritium	Water	906	P	250 mL	1	NA	180 d
Strontium-90	Water	905	P	1 L	1	HNO_3<2 pH	180 d
TSS	Water	160.2	P	250 mL	1	4°C	7 d

[a] CLP = Contract Laboratory Program; PCB = polychlorinated biphenyl; TSS = total suspended solids.
[b] G = Glass; T = Teflon; P = High density polyethylene; Q = Cubitainer.
[c] At least 2 L should be obtained.
[d] At least 1 L should be obtained.

- After the last set of weekly samples has been collected for compositing, a grab sample should be collected in accordance with WAG 6—FOP 6 for analysis of volatiles.

- Retrieve all the weekly samples collected and create a monthly composite sample according to WAG 6—FOP 7. It is important that all samples be vigorously shaken before decanting subsamples in order to yield representative concentrations of suspended solids. Complete the WAG 6—Flow-paced Monthly Composite Form (SW-08).

- Label the sample containers in accordance with WAG 6—FOP 9.

- Affix sample labels and preprinted bar code labels, and seal containers with custody tape.

- Ask the SHSO to screen the outside of the filled sample bottles.

- Place the samples in individual containment bags.

- Decontaminate compositing equipment according to ESP-900.

- Pack samples with ice in sample containment coolers.

- Ask Health Physics (HP) to screen the containment cooler.

- Ship to laboratory for analysis.

2.3 BASEFLOW SAMPLING

Baseflow sampling will be performed at the sites shown in Fig. 2.4. The objective of baseflow sampling is to collect data that will determine the release of COCs from WAG 6. The utility of the data generated through the baseflow sampling program to this objective is twofold. First, the baseflow samples will provide the low-flow flux data for the establishment of C-Q relationships. Second, this data will be used to estimate the off-WAG flux of COCs during dry conditions, which is assumed to be representative of contaminant transport characteristics of the mobile shallow groundwater.

The following equipment is needed to collect baseflow samples:

- surgical gloves and other appropriate PPE as specified in the task instructions;

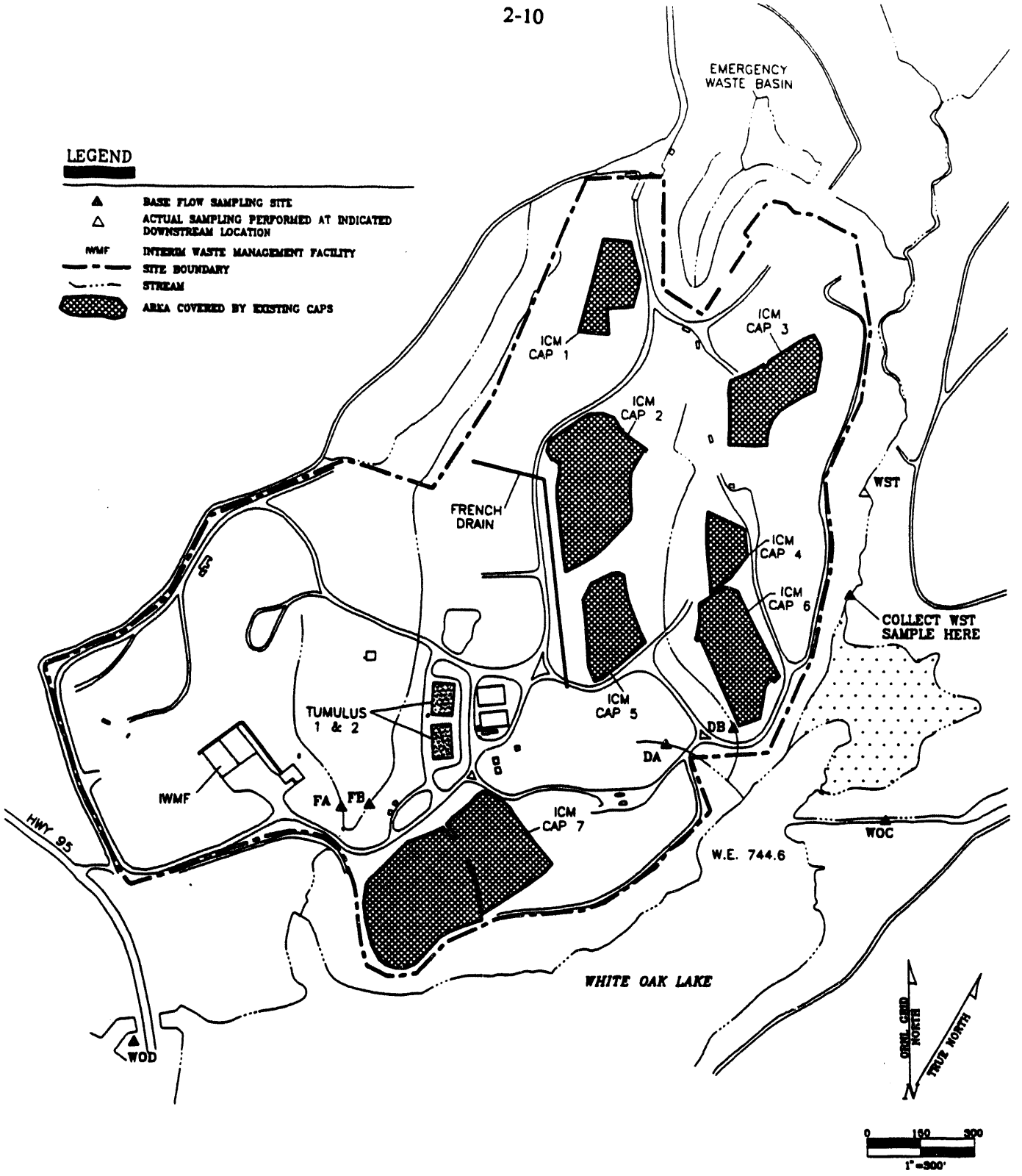
- plastic sheeting;

- sample dipper cup, clamp, and extension handles;

- calibrated parameter-measurement equipment (i.e., HORIBA system);

- sample containers, prewashed;

- sample labels;



BASEFLOW SAMPLING SITES

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FIGURE No. 2.4

- decontamination equipment;
- bar code reader;
- sample containment cooler;
- sample preservatives;
- field logbook;
- WAG 6—Baseflow Sample Collection Form (SW-03); and
- chain-of-custody form.

All baseflow samples will be collected manually (i.e., using grab sampling methods) in accordance with WAG 6—FOP 6. The following requirements must be met for appropriate representation of desired sampling conditions:

- at least 72 h have passed with less than 0.1 in. of rainfall, and
- stream flow at the sample site is generally at baseflow levels (i.e., consistent with previous observations during periods of no rainfall).

The following guidelines should be followed when collecting baseflow samples.

- Don PPE as required before beginning work.
- Prepare the site by laying out plastic sheeting.
- For sites where ISCO flow meters are installed, record the water level and flow rate displayed in the liquid crystal display window on the WAG 6—Baseflow Sample Collection Form (SW-03). For other sites, record the staff gauge reading (if present). Write "NA" in blanks for information that cannot be determined.
- Check the calibration of the HORIBA meter and recalibrate if necessary. Obtain measurements of temperature, pH, specific conductance, and dissolved oxygen directly from the stream. Record measurements on the WAG 6—Baseflow Sample Collection Form (SW-03).
- If wading is required, approach the sampling area from downstream.
- Fill all sample bottles directly from the stream, if possible. If sufficient water depth is not present, a dipper should be used to collect the samples.
- Preserve samples as appropriate (Table 2.1).
- Label the sample containers in accordance with WAG 6—FOP 9.
- Affix sample labels and preprinted bar code labels; seal containers with custody tape.

- Ask the SHSO to screen the outside of the filled sample bottles.

- Place all samples to be analyzed for volatiles, semivolatiles, pesticides/ polychlorinated biphenyls (PCBs), and herbicides in individual containment bags. Pack them with ice in sample containment coolers, complete a chain-of-custody form, and ship them to the laboratory for analysis. HP screens coolers prior to shipping.

- Decontaminate the sample dipper (if used).

- Place all samples to be analyzed for CLP metals, gross alpha, gamma, tritium, and strontium in storage until the end of the month, and then ship them to the laboratory for analysis. HP screens coolers prior to shipping.

2.4 STORM EVENT SAMPLING

The portion of this subsection pertaining to automatic storm event sampling will be reviewed before implementation in order to derive a more economical means of accomplishing the task.

Storm event sampling will be performed at the sites shown in Fig. 2.5. The objective of storm event sampling is to collect data that will provide mid-range and high flow concentration data required for establishment of C-Q relationships. This data can also be used, along with flow-paced data, to estimate the off-WAG contaminant flux during the storm event. Examination of the hydrographs and sequential contaminant data generated through this program will indicate whether contaminants are moving by shallow pathways or deeper groundwater pathways during stormflow conditions.

Because one operational objective of C-Q analysis is the collection of samples at high rates of stream discharge, samples collected during an early storm will be stored and other storm samples will be collected. Data from the largest storms will be submitted for analysis. As stated in the EMP, an average of two storms per quarter will be sampled during the baseline phase.

The following equipment is needed to collect and retrieve automatic storm event samples.

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

- one ISCO 3230 Flow Meter (with all necessary accessories) per site,

- two ISCO 3700 Portable Samplers (in master-slave configuration) per site,

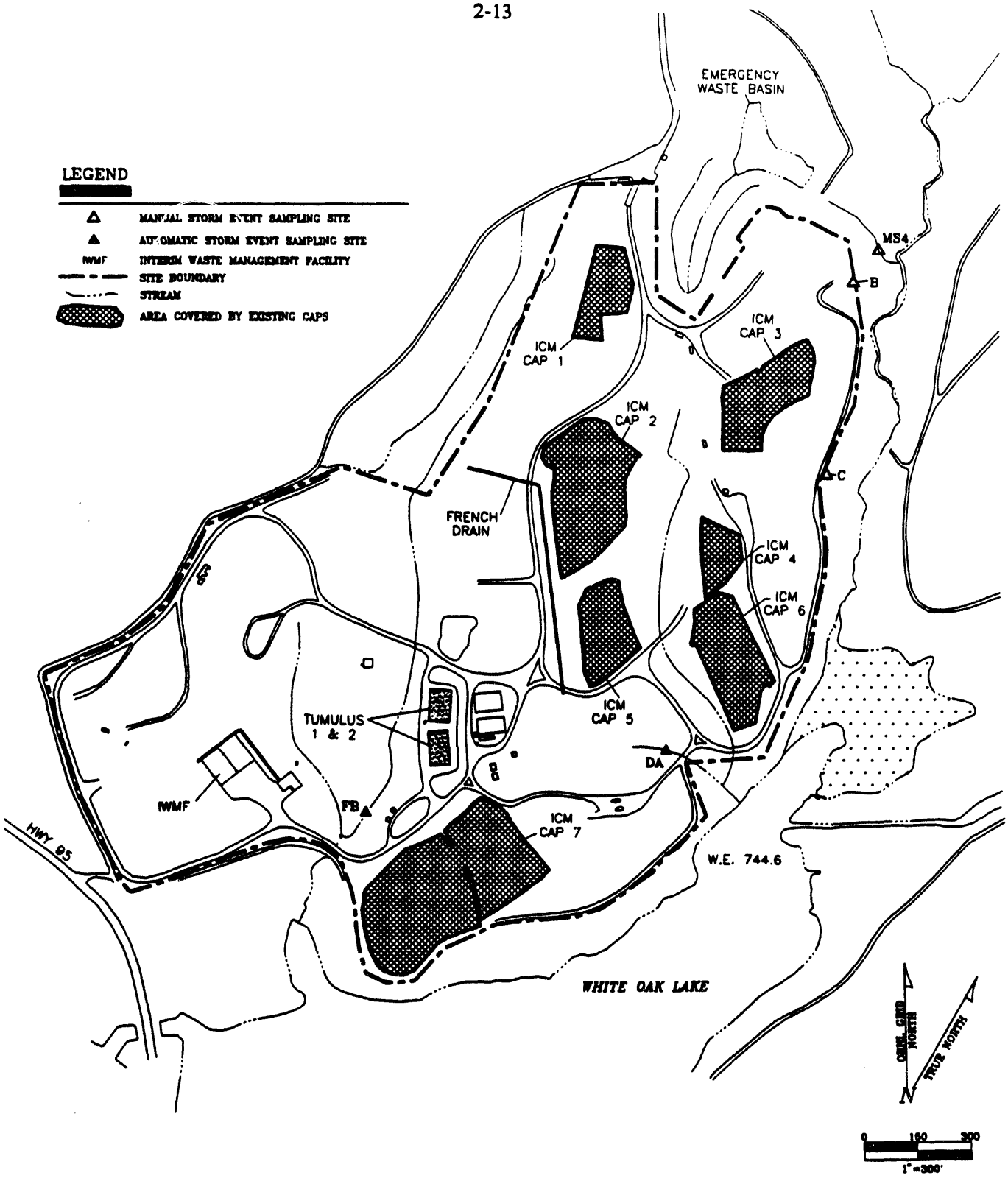
- keys to the ISCO Flow Meter and ISCO Samplers,

- plastic sheeting,

- 48 clean 1000-mL polyethylene sample bottles with caps,

- 10 clean 250-mL polyethylene sample bottles with caps,

- plastic sample bottle containment bags,



STORM EVENT SAMPLING SITES

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FIGURE No. 2.5

- sample labels,
- sample containment cooler,
- sample preservatives,
- decontamination equipment,
- bar code reader,
- field logbook,
- WAG 6—Automatic Storm Event Sample Collection Form (SW-05), and
- WAG 6—Automatic Storm Event Sample Selection Form (SW-06).

WAG 6—FOP 4 provides the procedure for programming the flow meter to activate the storm event samplers. Storm event samples will be collected when the water flowing through the hydraulic structure reaches a programmed activation level. Table 2.2 presents the activation levels for specific monitoring sites that should be initially programmed into the flowmeters. These values may change as more information is determined about the sites. WAG 6—FOP 5 provides the procedure for configuring and programming the storm event samplers. The following sample collection time intervals are suggested for use during baseline monitoring:

- wet season (November to March)—30 to 60 min and
- dry season (April to October)—10 min.

Table 2.2. Initial automatic-storm-event sampling activation levels

Monitoring site	Month	Water level (ft)
DA	November to March	0.20
	April to October	0.15
FB	November to March	0.25
	April to October	0.15

It is anticipated that these time intervals may require refinement as more knowledge of the hydrologic response is obtained.

Storm event samples will be collected in 1000-mL pairs. These samples must be retrieved within 24 h from the time that the last sample pair was collected. This requires that field personnel check all storm event samplers, even after very slight storm events, to make sure that any samples collected during runoff are retrieved or disposed, as necessary, and that the samplers are reset for the next event. During periods of lengthy storm activity (i.e., the winter wet season

when runoff durations are on the order of days), sample retrieval must be coordinated so that sampling is as continuous as possible throughout the entire runoff hydrograph. WAG 6—FOP 1 describes the standard procedure for retrieving automatic storm event sample pairs and for preparing the sampler for the next event. The following guidelines should be followed when collecting automatic storm event samples.

- When a large storm is forecast within the next 12 to 24 h, manually trigger the automatic sampler to collect a single sample to characterize antecedent conditions. Discard sample if the actual storm was not sufficiently large for sample collection.

- Don PPE as required before beginning work.

- Prepare site by laying out plastic sheeting.

- Open the flow meter case and remove the chart containing the record of the storm event and sample collection information.

- Remove the covers from the master and slave samplers.

- Use the WAG 6—Automatic Storm Event Sample Selection Form (SW-06) in conjunction with the storm hydrograph and WAG 6—FOP 8 to choose the collection pairs to be analyzed.

- Take out the selected collection pairs.

- Remove the selected pairs from the samplers.

- Label one-half of each pair and the 250-mL bottles that will be used for the tritium samples in accordance with WAG 6—FOP 9. Record the field and bar code sample IDs on the WAG 6—Automatic Storm Event Sample Selection Form (SW-06).

- Decant the desired amount from the half of the collected pairs that were not labeled.

- Preserve the 1-L samples as appropriate (Table 2.1)

- Top off the strontium samples (1000 mL) with the excess water that remained after the corresponding tritium samples were decanted.

- Dispose of excess water downstream of the hydraulic structure.

- For each storm, after samples have been collected, manually trigger the sampler to collect two sequential samples, mix them in a single 2-L bottle, divide them, and submit them as field duplicates for QC. Generate eight to ten field duplicate pairs each year. Apply QC standards for field duplicate agreement for use of data.

- Insert the clean collection bottles into the samplers at the place from which filled bottles were removed, and replace the sampler covers.

- Seal sample containers with custody tape, ask the SHSO to screen the samples, and put them in storage until the end of the month.

Manual storm event sampling will be performed at sites MS4, B, and C. The following equipment is needed to collect manual storm event samples:

- surgical gloves and appropriate PPE;
- plastic sheeting;
- sample dipper (Teflon or stainless steel), clamp, and extension handles;
- appropriate sample bottles;
- extra sample bottles as needed for QC samples;
- plastic sample bottle containment bags;
- sample labels;
- sample containment cooler;
- bar code reader;
- sample preservatives;
- calibrated parameter-measurement equipment (i.e., HORIBA System);
- ruler/staff gauge (if permanent gauge is not at site);
- decontamination equipment;
- field logbook;
- WAG 6—Manual Storm Event Sample Collection Form (SW-07); and
- chain-of-custody form.

Manual storm event samples will be collected according to WAG 6—FOP 6. The following guidelines should be followed when obtaining manual storm event samples.

- Don PPE as required before beginning work.

- Prepare the site by laying out plastic sheeting.

- Sampling should be performed when storm runoff is detected (or when the water level is above normal baseflow conditions).

- Check the calibration of the HORIBA meter and recalibrate if necessary. Obtain measurements of temperature, pH, specific conductivity, and dissolved oxygen directly from the stream. Record measurements on the WAG 6—Manual Storm Event Sample Collection Form (SW-07).

- If wading is required, approach the sampling area from downstream.

- Fill all sample bottles directly from the stream if possible. If sufficient water depth is not present, a dipper should be used to collect the samples.

- Preserve samples as appropriate (Table 2.1).

- Label the sample containers in accordance with WAG 6—FOP 9.

- Request the SHSO to screen the outside of the filled sample bottles.

- Place all samples to be analyzed for volatiles, semivolatiles, pesticides/PCBs, and herbicides in individual containment bags. Pack them with ice in sample containment coolers and ship them to the laboratory for analysis. HP must screen containment coolers before shipping.

- Decontaminate the sample dipper (if used) according to ESP-900.

- Place all samples from manual and automatic collectors to be analyzed for CLP metals, gross alpha, gamma, tritium, and strontium in storage until the end of the month, and then ship them to the laboratory for analysis. HP must screen containers before shipping.

2.5 BEDLOAD SEDIMENT SAMPLING

Bedload sediment sampling will be performed at the sites shown in Fig. 2.6. The objective of bedload sediment sampling is to collect data that will help estimate the offsite contaminant flux in the bedload portion of sediment transport.

The following equipment is needed to collect bedload sediment samples:

- surgical gloves and appropriate PPE,
- plastic sheeting,
- pan sampler,
- stainless-steel or Teflon-lined scoop,
- sample containment cooler,
- sample containers (prewashed or precleaned),
- sample labels,
- bar code reader,
- decontamination equipment,
- field logbook,
- WAG 6—Automatic Storm Event Sample Selection Form (SW-06), and
- chain-of-custody form.

All bedload sediment sampling will be performed on a semiannual basis. Bedload sediment samples will be collected after storm events when samples are retrieved from the automatic samplers. The following guidelines should be followed when collecting bedload sediment samples.

- Don PPE as required before beginning work.

- Submerge the pan sampler in the stream upstream of the hydraulic structure before a forecasted storm event and leave it in for the duration of the storm water runoff event.

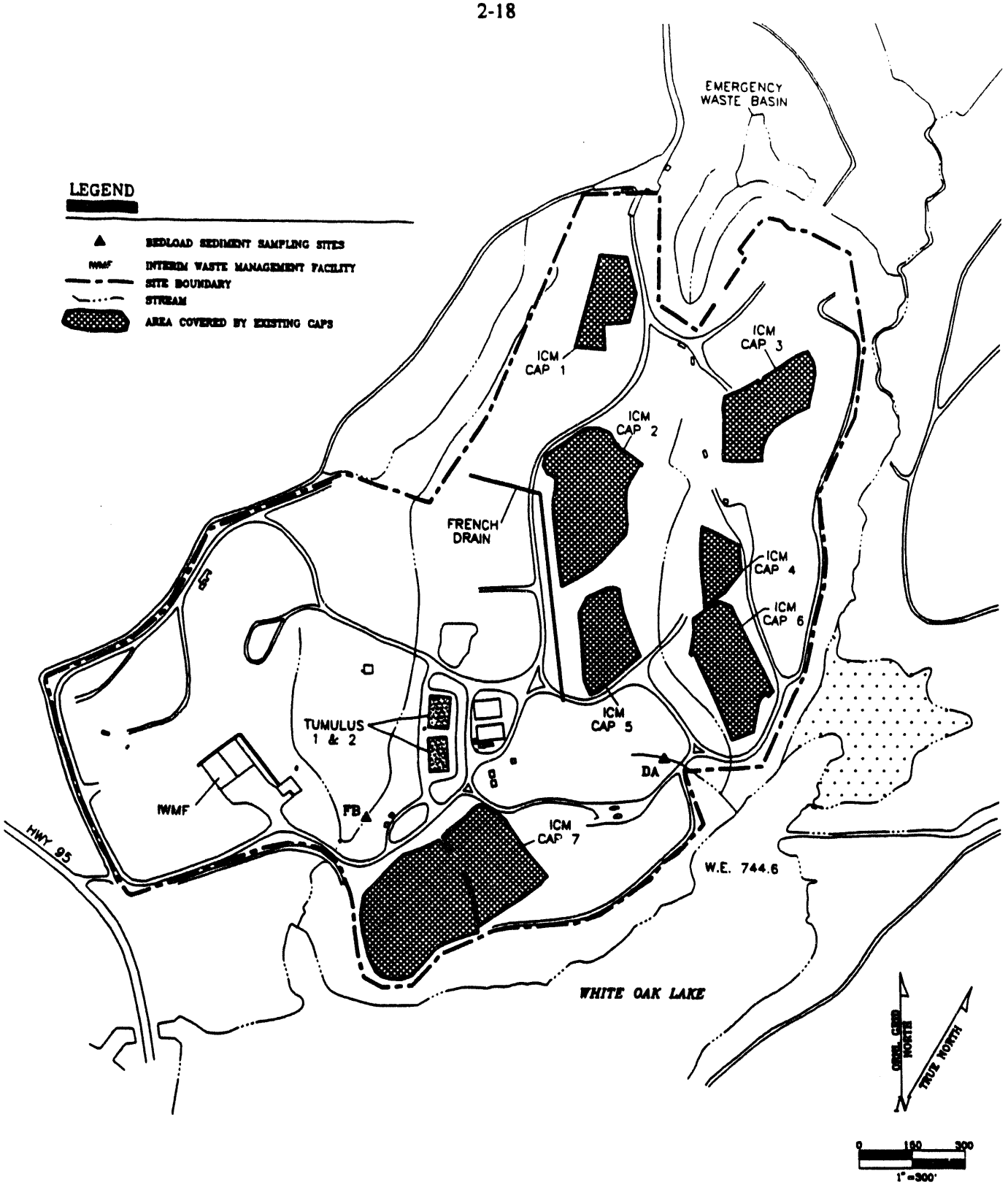
- After the storm event, return to the site and retrieve the pan sampler. Use the scoop to transfer the sediment samples into the appropriate containers.

- Label the sample containers in accordance with WAG 6—FOP 9.

- Affix sample labels and preprinted bar code labels, and seal containers with custody tape.

- Complete the bedload sediment portion of the WAG 6—Automatic Storm Event Sample Selection Form (SW-06).

- Request the SHSO to screen the outside of the filled sample bottles.



BEDLOAD SEDIMENT SAMPLING SITES

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FIGURE No. 2.6

- Decontaminate the pan and scoop according to ESP-900.

2.6 EQUIPMENT INSTALLATION AND OPERATION

The monitoring equipment that must be initially installed includes flow meters and samplers (Table 2.3). A discussion of how each device will be installed, programmed, calibrated, and serviced is provided in this section.

Table 2.3. Initial on-site equipment needs

Monitoring site	Equipment	Number per site	Equipment purpose
DA, FB[a]	ISCO 3230 Flow Meter	1	Record stage, Q
	ISCO 3700 Sampler, Composite Setup	1	Collect flow-paced samples
DB, FA	ISCO 3230 Flow Meter	1	Record stage, Q

[a] Additional ISCO 3700 samplers will be installed at these sites by January 1994 for C-Q sample collection.

2.6.1 Equipment Installation

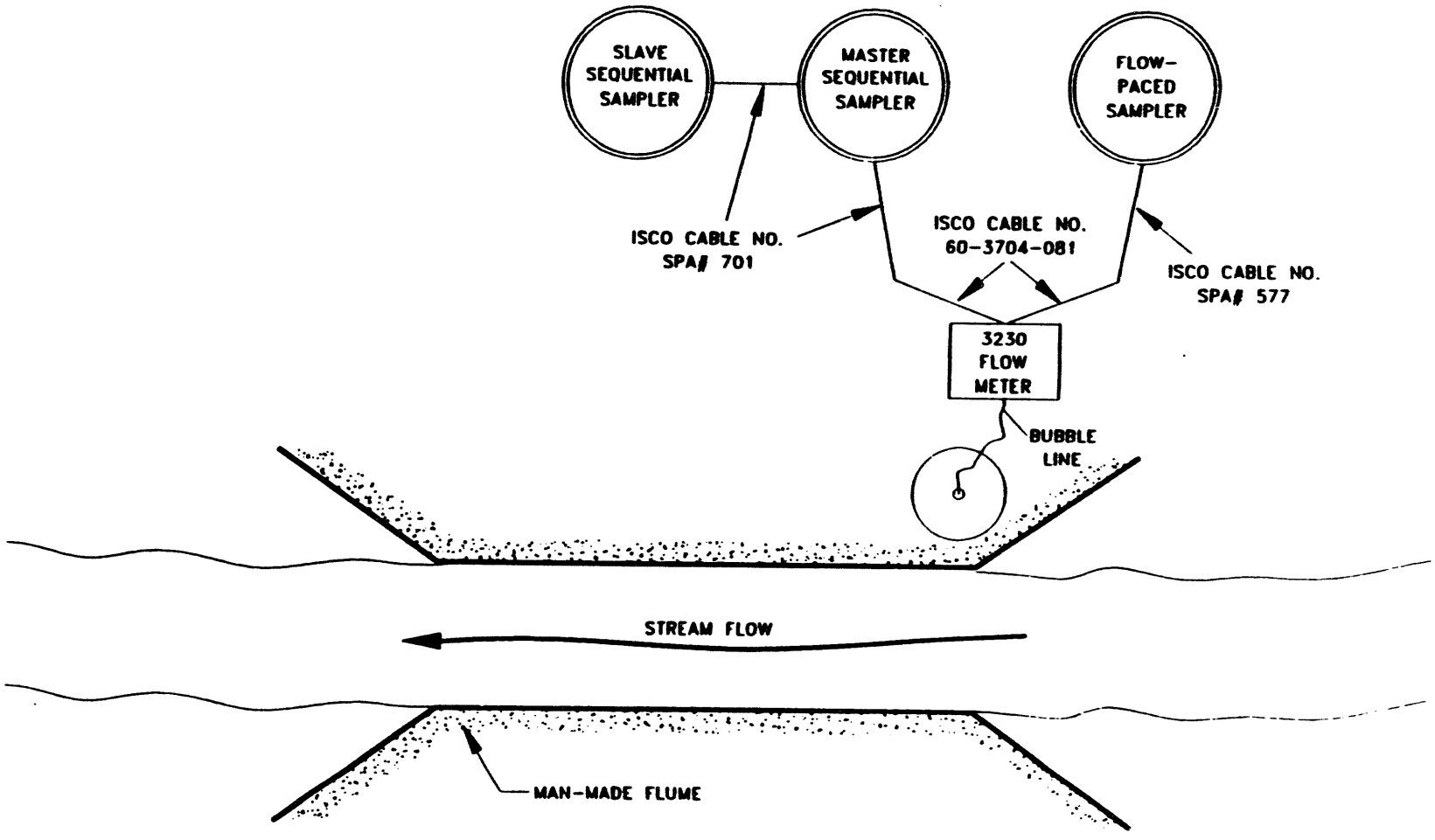
There is no formal operating procedure addressing the installation of surface water monitoring equipment. Field personnel must adhere to the instructions given in the equipment instruction manual and the following guidelines when installing new or replacement equipment.

- The installation of flow and sampling equipment will require that field personnel 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).

- Flow and sampling equipment should be installed such that samples are collected in the main flow of the stream, in a well-mixed area either upstream or downstream of the hydraulic structure. Samples must never be collected in an eddy or at the edge of the flow.

- On-site equipment should be set up in a systematic manner at all sites (Fig. 2.7). Note the layout of the sampler and flowmeter connection cables, identified by name and part number.

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



EQUIPMENT LAYOUT FOR THE MAJOR DRAINAGES

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ORNL WAG 6

FIGURE No. 2.7

A448/3100T93/ASG

- The flow meter bubble lines and sampler suction lines must be securely fastened at the point of monitoring 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—Surface Water Initialization Form (SW-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, data loggers and samplers;
  - 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 site logbook.

2.6.2 Equipment Configuration and Programming

Because of the complexity of several features of the ISCO 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 along with the ISCO equipment instruction manuals.

Note that the ISCO equipment FOPs were developed specifically for the WAG 6 surface water monitoring task, and address only those features of these devices that are needed to monitor in the manner specified in this SAP. 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 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.

2.6.3 Equipment Calibration

Surface water monitoring equipment will be calibrated when initially installed on-site and daily or as needed thereafter (Table 2.4). Calibration checks scheduled on a weekly basis will be performed during the weekly site inspection by comparing flow meter stage to staff gauge elevation and will be documented on the WAG 6—Surface Water Site Inspection Form (SW-02). If calibration is performed at any other time, this information must be documented in the field logbook. The calibration of field-parameter- measurement equipment is to be performed before

each day's use by field personnel employing the equipment. Field equipment calibration must be documented on the field documentation form that is to be completed for that day's activities.

Table 2.4. Equipment calibration schedule

Equipment and calibration parameter	Standard	Procedure	Schedule
ISCO 3230 Flow Meter: water level	Level measurements	WAG 6 - FOP 4	As needed
ISCO 3700 Sampler: sample volume	1000-mL graduated cylinder	WAG 6 - FOP 5	As needed
HORIBA Meter:			
pH	Standard pH buffer solutions	ESP-003-011	Daily[a]
conductivity	0.01 M standard KCl solution[b]	ESP-003-011	Daily
DO sensor:			
dissolved oxygen	Winkler Test solutions[b]	ESP-003-011	Daily
Thermometer:			
temperature	NIST-traceable thermometer	ESP-003-011	Daily

[a]Before the day's use.
[b]NIST-traceable autocalibration standard solutions are unavailable, but meter will be checked against NIST standard solutions.

2.6.4 Equipment Maintenance and Servicing

Periodic maintenance activities are required to keep the on-site equipment in proper working order (Table 2.5). If problems are encountered with any of the on-site equipment, servicing must be done immediately and recorded on the WAG 6—Record of Repair Form (RF-01). To maintain the continuity of the equipment used, servicing should be done on-site. If on-site repair is not possible, 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 following 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 in the appropriate field documentation form and field logbook. Each equipment service entry on the field documentation form must be initialed by the person performing the service. Surface water personnel are also referred to equipment instructions manuals for additional calibration and maintenance information.

Table 2.5. 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
ISCO 3700 Sampler	Clean the case (top cover, bottle base)	Weekly
	Replace the sample pump tube	As needed
	Inspect the control box for leaks	Quarterly
	Replace the sample suction tube	Quarterly
	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);
- *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 Activities 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 Procedure Manual* (CDM Federal, in progress).

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 Data Quality Objectives can be found in the EMP.

3.2 MONITORING PROGRAM ORGANIZATION

The EMP personnel comprise a sub-task team of the Monitoring and Laboratory Analysis Group, identified in the WAG 6 EMP (DOE 1993a). The principal contractor personnel assigned to conduct the WAG 6 EMP field activities are:

- Charles Callis (Project Manager)
- David Johnson (QA Specialist)
- Donnie McCurry (Field Task Manager)
- Doug Hopper (Surface Water Sample Task Leader)
- Michael Charko (Field Technician)
- Richard Stout (Field QC Coordinator)

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,
- an activity-specific field logbook,
- a telephone logbook,
- project- and activity-specific field forms (Appendix A),
- chain-of-custody forms,
- sample labels, and
- bar code labels.

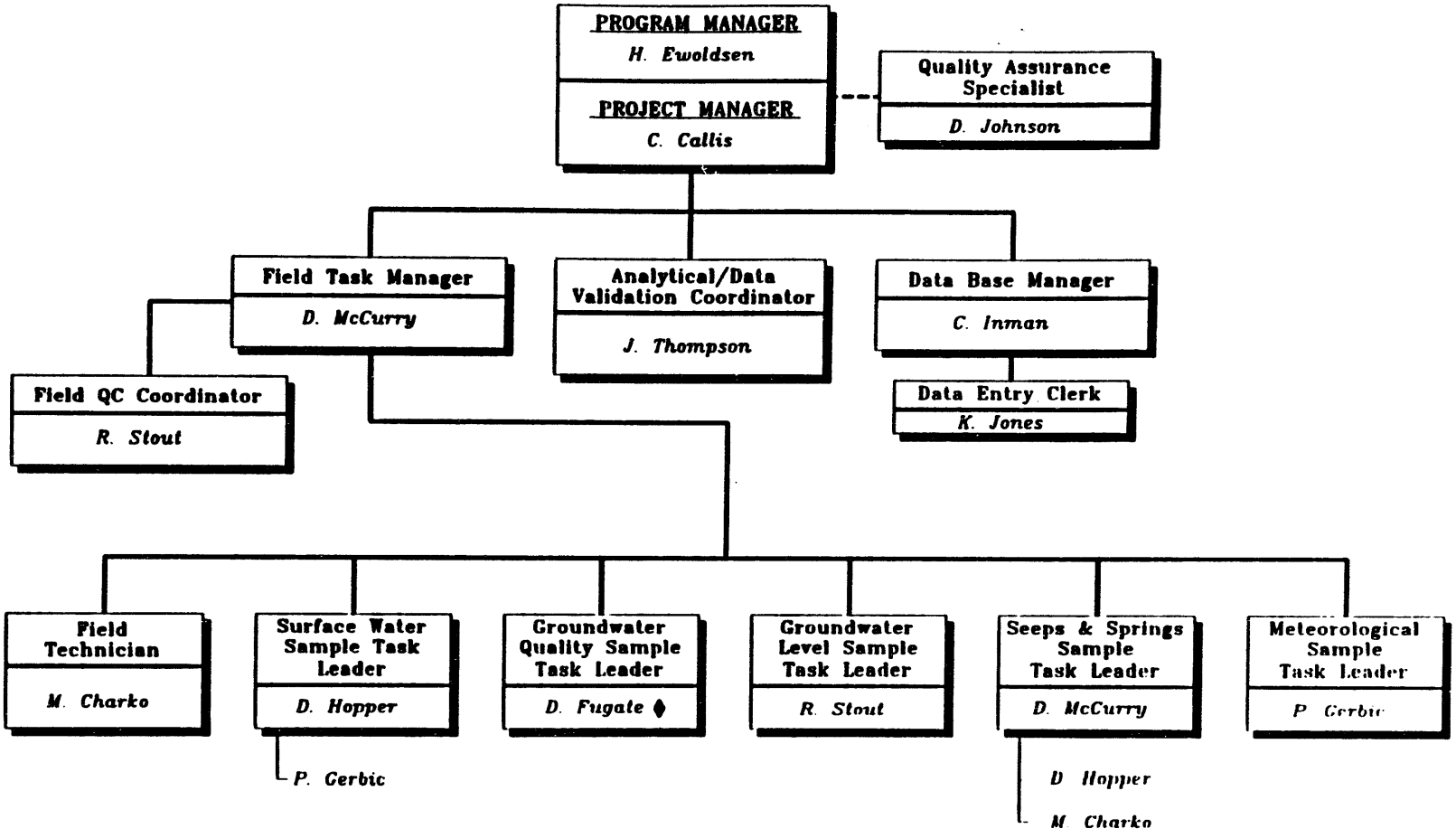
All documentation must be completed in waterproof black ink, and corrections must be marked through with a single line, dated, and initialed. Handwritten documents must be legible. Table 3.2 displays where, and what kind of, information must be recorded.

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—Surface Water Initialization Form (SW-01).
- WAG 6—Surface Water Site Inspection Form (SW-02).
- WAG 6—Baseflow Sample Collection Form (SW-03).
- WAG 6—Flow-paced Sample Collection Form (SW-04).
- WAG 6—Automatic Storm Event Sample Collection Form (SW-05).
- WAG 6—Automatic Storm Event Sample Selection Form (SW-06).
- WAG 6—Manual Storm Event Sample Collection Form (SW-07).
- WAG 6—Flow-paced Monthly Composite Form (SW-08).
- WAG 6—Monitoring Variance Request Form (MV-01).
- WAG 6—Record of Repair Form (RF-01).
- WAG 6—Chain-of-Custody Form (COC-01).
- WAG 6—Weekly Activity Schedule (WAS-01).
- WAG 6—Field Collection Task Map (FCTM-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 attached to the corresponding field documentation form. The form number of the corresponding field



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

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CDM FEDERAL WAG 6 ENVIRONMENTAL MONITORING PLAN IMPLEMENTATION ORGANIZATION CHART

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FIGURE No. 3.1

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

Position	Responsibilities
Project Manager	• 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 an adequate number of properly trained personnel for implementation of the surface water monitoring activities; • ensuring that all equipment (including backup equipment) necessary for surface water 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 surface water 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 activities, and ensuring that all such activities are performed and documented in accordance with QA protocols and approved procedures; • maintaining custody of all samples collected at the site until submitted to laboratory personnel; • submitting all field documentation and electronic site data to the Project Manager for review; and

Table 3.1 (continued)

Position	Responsibilities
	• keeping the Project Manager informed of all site activities and quality-related problems.
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, • QC review of environmental and QC samples, and • verification of proper FOP usage.
Field Technician	• Maintenance and calibration of portable equipment, • inventory of supplies, • sampling 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 the information required for each

Field documentation	Information
Site Logbook	• A list of all field logbooks; • daily temperature, weather conditions, and names and titles of personnel present; • name, title, organization, and purpose of site visitors; • outline of daily 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.

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 DM 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 Technician 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 individual 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 the activity-specific QC samples and collection numbers for Level III and IV analyses. An analytical quality Level II will be used for automatic storm event samples taken to address the concentration-discharge (C-Q) relationship.

Table 3.3. Quality control sample types and frequencies for surface water sampling and analysis

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/10 samples
Matrix Spike/Matrix Spike Duplicates are samples (one sample and a duplicate) collected in the field, labeled as an MS and an MSD.	1 MS/MSD/20 samples
Field Blanks are collected from the tap water and the deionized water used during decontamination of sampling and monitoring equipment.	1 field blank from tap water/month and 1 field blank from deionized water/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/10 samples
Trip Blanks consist of 40-mL vials filled with organic-free distilled/deionized water. Trip blanks are made at the laboratory, and must be included in each cooler containing samples to be analyzed for volatile organic compounds.	1/cooler containing samples to be analyzed for volatile organic compounds

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

Analyte[a]	Total number of samples collected	QC samples per period[b]
CLP volatiles	3 to 10 samples/month	1 field duplicate 1 MS/MSD 1 to 3 trip blanks
CLP semivolatiles	7 samples	1 field duplicate 1 MS/MSD
CLP pesticides/PCBs	7 samples	1 field duplicates 1 MS/MSD
Herbicides	7 samples	1 field duplicate 1 MS/MSD
CLP metals	3 to 10 samples/month	1 field duplicate 1 MS/MSD
Gross alpha	3 to 10 samples/month for water	1 field duplicate 1 MS/MSD
	4 samples for soil	2 field duplicates 2 MS/MD
Gamma scan	3 to 10 samples/month for water	1 field duplicates 1 MS/MSD
	4 samples for soil	2 field duplicates 2 MS/MSD
Tritium	7 to 12 samples/month	1 to 2 field duplicates 1 MS/MSD
Strontium	7 to 12 samples/month	1 to 2 field duplicates 1 MS/MSD
Total suspended solids	3 samples/month	1 field duplicate 1 MS/MSD

[a] CLP = Contract Laboratory Program; PCB = polychlorinated biphenyl.

[b] MS/MSD = Matrix spike/matrix spike duplicate. Rinsate blanks will be collected at a rate of 1/10 samples if a dipper is needed to collect grab samples (see Appendix B).

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 H&S 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 the Occupational Safety and Health Administration (OSHA) 40-h hazardous waste worker training.

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 any muddy monitoring area, all personnel and conveyed equipment will be checked by HP 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 H&S 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 H&S issues.

5. WASTE MANAGEMENT

The WAG 6 EMP WMP states that CDM Federal, as waste generator, will perform waste segregation, packaging, labeling, and transportation 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 surface water sampling activities include decontamination fluids, PPE, sample residuals, and various other trash items such as used paper towels and plastic sheeting. No soils or purge water waste will be generated during this activity.

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 Generator Certification Official has the following responsibilities:

- serving as interface between the project, the ORNL Laboratory Certifcation 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 Field Task Manager has the following responsibilities:

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

Sample Task Leader

As the generator, the Sample Task Leader has the following responsibilities:

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

- interfacing 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

HP and IH personnel are responsible to conduct surveys as necessary to determine if waste contains Resource Conservation and Recovery Act- (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.
- *Management of Investigation-derived Waste During Site Investigations* (EPA 1991).

5.3 WASTE CHARACTERIZATION/SEGREGATION

When waste is generated, it will be put into a plastic bag. Table 5.1 shows the various categories into which waste will be segregated for this project, the criteria for segregation, and packaging requirements.

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]
Returned sample water[c]	22	Sample analytical results	55-gal drums/carboys	Diked area by entrance or GCO-designated area	Process waste treatment plant
	24	Sample analytical results	55-gal drums/carboys	Diked area by entrance or GCO-designated area	Nonradiological process waste treatment plant
Used sample bottles[c]	-	-	-	-	Cleaned by laboratory and returned for reuse
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 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 LGWOD[d]	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] Liquid and Gaseous Waste Operations Group

5.3.1 Solid Waste

At the end of each day, HP personnel will use portable alpha and beta/gamma detectors to monitor the material removed for the presence of radioactivity. They will designate waste as being "Clean," "Very Low Activity," or "Low Level Waste."

HP personnel will be responsible for scanning all waste entering and 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.

5.3.2 Liquid Waste

Liquid waste from decontamination activities is accumulated in a container, then consolidated at a central location. For ease of transportation, 26-L carboys may be substituted for 55-gal drums at the GCO 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, following WMO procedures, 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.

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 pre-attached 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 by the STL entering it into the bar code reader for uploading to the data base when using 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 use on another day.

The form bar code numbers must be used in sequence for record keeping purposes. The form bar code numbers will serve as identifiers for location of the forms in the files. When the STL returns to the trailer at the end of the day, the forms will be forwarded to the FTM for review. The DM will receive all completed forms and the data diskette will be downloaded from the bar code reader on a daily basis. The electronic-data-downloading diskettes downloaded from the monitoring equipment will be forwarded to the DM by the FTM on a monthly basis (and more frequently if necessary).

6.2 DATA DOWNLOADING

Field data collected during the WAG 6 Surface Water 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 will also be completed and used by the sampling team as a quality check against the data base. Electronic data will be collected by ISCO flow meters, and will be downloaded, edited, and analyzed by the sampling team.

6.2.1 Manual Data

Manual data generated for surface water monitoring will consist of reference flow rates and water levels, manual sample collection information, and in situ parameter measurements. 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

Raw electronic data generated for surface water monitoring will consist of continuous records of water levels and brief records of flow-proportional and storm event automatic-sample-collection information. Electronic data 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. Any estimation of missing or erroneous streamflow data or verification of summarized streamflow data will be done according to HYD-T-SW-D003/R1 and HYD-Q-03/R1, respectively. The following guidelines should be followed when manipulating electronic data.

- Download water level and sample collection data collected by the ISCO 3230 Flow Meter 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 Bernoulli and to the archival Bernoulli. Use the working Bernoulli to "clean up" data. Attach the Disk Label to the archival Bernoulli and place in temporary storage. Attach a second label on the working Bernoulli 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 and create monthly summary tables and charts.

- When all data have been processed for all sites for the month, assemble a transfer package of the archival Bernoullis and corresponding working Bernoullis. Log these Bernoullis to 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 SURFACE WATER (SW) FORMS

The WAG 6 surface water sampling team will be using a bar code reader in the field 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 SW forms. Since the container type and preservative are always the same dependent upon analyte, the sampler will not be prompted for this information.

SW-01: WAG 6—SURFACE WATER INITIALIZATION FORM

Before leaving the trailer, the STL will pull one form SW-01 for the site where equipment will be installed and initialized. Upon arrival at the site, the STL will scan the project task code and the monitoring location from a menu card, the STL Badge Number, the field logbook number, and the form bar code label. The STL will scan the equipment bar code ID of each piece of equipment to be installed. The bar code reader will prompt the STL to specify the type of initialization (i.e., new or replacement). If replacement event is chosen, the STL will complete form RF-01 in accordance with form RF-01 procedures. The "Comments" field is optional and will not be captured in the reader. If there is anything concerning the event that the SL wants tracked in the data base, the STL will note that information in the "Comments" field of the form. The DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-02: WAG 6—SURFACE WATER SITE INSPECTION FORM

Before leaving the trailer, the STL will pull one form SW-02 for each site to be inspected. Upon arrival at the site, the STL will then scan the project task code and monitoring location from a menu card, the sample team's badges by role, the Field Logbook Number, and the form bar code label. He will also scan the equipment bar code ID for each piece of equipment installed. The "Comments" field is optional and will not be captured in the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-03: WAG 6—BASEFLOW SAMPLE COLLECTION FORM

Before leaving the trailer, the STL will pull one form SW-03. Upon arrival at the site, the STL will scan the project task code and the monitoring location from the menu card, the sample team badges by role, the field logbook number, and the form bar code label. The reader will then prompt the STL to perform the following procedure:

- input the flow rate;
- scan the HORIBA bar code ID;
- observe that the reader has captured the date and time of measurement;
- input the temperature, pH, conductivity, and dissolved oxygen levels.
- 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 and will not be captured in the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-04: WAG 6—FLOW-PACED SAMPLE COLLECTION FORM

Under normal conditions this form will follow the SW-02 form; it is not necessary to record the monitoring location, team badges, and field logbook number in the bar code reader for this event. Before leaving the trailer, the STL will pull one form SW-04. Upon arrival at the site, the STL will scan the project task code from a menu card; then he will remove the old 4-gal container. He will then position the new container. The STL will then fill the 500-mL bottle. The bar code reader will prompt the STL for "Total Flow Volume" to be manually input. He will scan the bar code sample ID of both filled sample bottles, and the form bar code label. The STL will then input whether grab samples for volatiles were collected. If so, the STL will be prompted to enter the grab sample bar code ID, types of samples, and analytes. The "Comments" field is optional and will not be captured in the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-05: WAG 6—AUTOMATIC STORM EVENT SAMPLE COLLECTION FORM

Before leaving the trailer the STL will retrieve one form SW-05. Upon arriving at the site the STL will scan the project task code and monitoring location from a menu card, the field logbook number, the sample team badge numbers, the form bar code number, the date will be captured by the bar code reader. This information provides a record in the data base that the collection occurred. The "Comments" field is optional and will not be captured in the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-06: WAG 6—AUTOMATIC STORM EVENT SAMPLE SELECTION FORM

Before leaving the trailer, the STL will retrieve one form SW-06. If there are sufficient samples for selection, the STL will complete the form process as described below:

- Scan the project task code and the monitoring location from the menu card.
- Scan the STL badge number, the field logbook number, and the form bar code label.
- Scan the sample label for each sample bottle selected.

The "Comments" field is optional and will not be captured in the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-07: WAG 6—MANUAL STORM EVENT SAMPLE COLLECTION FORM

The manual storm event sample kits will be preassembled by the Field Technician and shelved for immediate use during a storm event. The necessary forms and sample bottles will be preassembled with bar code labels attached. Nothing will be scanned into the bar code reader until the event. When a storm event sampling occurs, the STL will pull the kit and scan the project task code, sample team badges by field, field logbook number, and form bar code label. Upon arriving at the site, the STL will scan the monitoring location from a menu card and the HORIBA equipment ID. The reader will then prompt the STL to input the temperature, pH, conductivity, and dissolved oxygen level. The STL will then scan the bar code sample ID, sample type, and analyte from a menu card. The "Comments" field is optional and will not be captured by the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

SW-08: WAG 6—FLOW-PACED MONTHLY COMPOSITE FORM

1. Before leaving the trailer, the compositors will obtain as many SW-08 forms as will be used. The Field Technician attach bar code sample labels on the form SW-08 in the sections for both nonpreserved- and preserved-sampling compositing containers. The Field Technician will provide sample containers that will be decanted from the monthly composites with bar code labels attached.

2. Upon arriving at the sea-land the compositors will scan the monitoring location from a menu card, the badge numbers of each compositor, and the form bar code label for the form that is to be used for that monitoring location.

3. They will then scan the bar code sample IDs of the weekly nonpreserved sample containers together with the compositing container bar code located on form SW-08. The compositors will start the bar code reader program to scan in the bar code sample IDs of the containers that were filled with the monthly composite, the sample type, and analyte from a menu card.

4. They will repeat step 3 for the preserved composite samples.

5. They will then begin the process for the next monitoring location, starting at step 2.

The "Comments" field is optional and will not be captured by the reader. 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 DM will manually enter the information once the form has been submitted and the field data have been added to the data base.

6.4 PROCEDURES FOR COMPLETING SAMPLE COLLECTION FORMS

All sampling events will be scheduled by the FTM on a WAG 6—Weekly Activity Schedule (WAS-01). The FTM will provide the DM with a copy of the WAS-01 in order to have the WAG 6—Field Collection Task Map (FCTM-01) printed. The Field Technician will use form FCTM-01 to assemble the sample kits and record the sample numbers used.

Once the kits are assembled, the STL will initiate the sampling event by notifying the DM to print the WAG 6—Field Activity Sheet (FAS-01). Form FAS-01 will be used in the field by the sampling team to collect all samples. Any incorrect or additional information will be noted on the form by the STL and returned to the FTM for review and forwarded to the DM for update of the data base.

When the samples are ready for shipment, the STL will note on the FAS which samples are to be shipped and a WAG 6—Chain of Custody Form (COC-01) will be printed by the DM and signed by the Field Technician. Form COC-01 will accompany the samples to the analytical laboratory. A copy of the form will be retained in the project files.

7. REFERENCES

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APPENDIX A

FIELD FORMS

WAG 6 - SURFACE WATER INITIALIZATION FORM
(SW-01)

Monitoring Location: _____ Field Logbook Number: _____

STL Badge No.: _____ Date: _____

Time: _____

Weather: _____

_____

ISCO FLOW METER

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

Old Instrument ID Number: _____ Comments: _____

Clock Synchronization: _____ _____

Recording Interval: _____ _____

Flow Pace Interval: _____

Sampler Activation Level: _____

ISCO STORM EVENT SAMPLER

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

Old Instrument ID Number: _____ Comments: _____

Sample Volume: _____ _____

_____

ISCO FLOW-PACED SAMPLER

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

Old Instrument ID Number: _____ Comments: _____

Sample Volume: _____ _____

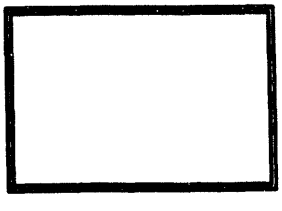
_____

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

Form Bar Code Label



WAG 6 - SURFACE WATER SITE INSPECTION FORM (SW-02)

Monitoring Location: _____ Field Logbook No.: _____

STL Badge No.: _____ Date: _____

Time: _____

Weather: _____

_____

Comments: _____

_____

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		

WAG 6 - SURFACE WATER SITE INSPECTION FORM (SW-02)

ISCO STORM SAMPLER INSPECTION FORM
EQUIPMENT BAR CODE ID: _____

Current Display Message:		
Inspection Item	Initials	Inspection Comments, Problems, Service Performed, etc.
Program and Configuration Clock synchronization Sample volume Sample activation		
Control Box		
Exterior Case Interior Case		
Pump Tube		
Suction Tube		
Connections to Tube, Battery and Samplers		
Battery Voltage		
Tampering, Water Seepage, or Damage		
Other		

ISCO FLOW PACED SAMPLER INSPECTION FORM
EQUIPMENT BAR CODE ID: _____

Current Display Message:		
Inspection Item	Initials	Inspection Comments, Problems, Service Performed, etc.
Program and Configuration Clock synchronization Sample volume Sample activation		
Control Box		
Exterior Case Interior Case		
Pump Tube		
Suction Tube		
Connections to Tube, Battery and Samplers		
Battery Voltage		
Tampering, Water Seepage, or Damage		
Other		

WAG 6 - SURFACE WATER SITE INSPECTION FORM

COLLECTION OF SITE FLOW AND WATER LEVEL DATA (SW-02)

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:

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

Form Bar Code Label

WAG 6 - BASEFLOW SAMPLE COLLECTION FORM
(SW-03)

Monitoring Location: _____ Field Logbook No.: _____

STL Badge No.: _____ Date: _____

Time: _____

Weather: _____

_____

Comments: _____

_____

_____

Water Level (ft) _____ Number of days since last significant

Flow Rate (cfs)[1] _____ precipitation_____ (must be ≥ 3 days/72 hours)

HORIBA ID No. _____ Time of Calibration Check: _____ Recalibrate: Yes/No ____

Date/Time of Measurement:_____

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

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 - FLOW-PACED SAMPLE COLLECTION FORM
(SW-04)

Monitoring Location: _____ Field Logbook No.: _____

STL Badge No.: _____ Date: _____

Time: _____

Sample Flow Pulse Interval (gal): _____

Weather: _____

_____

Comments: _____

_____

_____

Staff Gauge Reading (ft): _____ Flow Rate (cfs): _____

Water Level (ft): _____

Total Flow Volume (gal): _____

Flow Meter Water Level Adjusted? Yes / No

Old 4-gal Container Bar Code ID: _____

Replacement 4-gal Container Bar Code ID: _____

500-mL Bottle Bar Code ID: _____

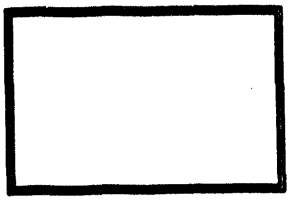
Grab Samples for Volatiles To Be Taken? Yes/No

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

Form Bar Code Label



WAG 6 - AUTOMATIC STORM EVENT SAMPLE COLLECTION FORM (SW-05)

Monitoring Location: _____ Field Logbook Number: _____

STL Badge No.: _____ Date: _____

Time: _____

Weather: _____

Comments: _____

_____

Sampler activation level for this storm (ft): _____

Sample collection interval for this storm (minutes): _____

Duration of runoff as indicated on flow meter chart (hours:minutes): _____

Number of samples collected by ISCO sampler: _____

Will samples from this storm be stored for analysis? Yes / No

If no, explain (attach ISCO Flow Meter strip chart and any other pertinent information):

_____

_____

_____

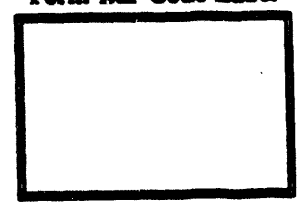
If yes, use the WAG 6 - Automatic Storm Event Sample Selection Form (SW-06) and the flow meter's plot of flow and sample collection times to select storm event samples to be analyzed. Attach both to this form.

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

Form Bar Code Label



WAG 6 - AUTOMATIC STORM EVENT SAMPLE SELECTION FORM (SW-06)

Monitoring Location: ____________________ Field Logbook No. ____________________

STL Badge No.: ____________________ Date/Time: ____________________

Weather: ____________________ Comments: ____________________

Position of Sample	Analyte	Bar Code Sample ID	Samples Selected for Analysis
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		
	^{3}H		
	^{90}Sr		

Will bedload sediment samples be collected? Yes/No

Form Bar Code Label

Sample Task Leader Signature/Date: ____________________

Data Entry Signature/Date: ____________________

Data Verification Signature/Date: ____________________

WAG 6 - MANUAL STORM EVENT SAMPLE COLLECTION FORM
(SW-07)

Monitoring Location: _____ Field Logbook No.: _____

STL Badge No.: _____ Date: _____

Time: _____

Weather: _____

Comments: _____

_____

_____

HORIBA Barcode ID: _____ Time of Calibration Check: __ Recalibrate: Yes/No _____

Date/Time of Measurement: _____

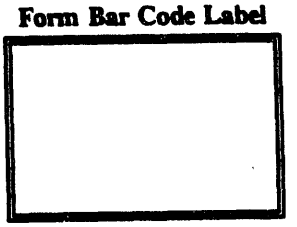
Temperature (°C): _____ pH: _____ Conductivity (mS/cm): _____ DO (mg/L): _____

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date: _____

Data Validation Signature/Date: _____

Form Bar Code Label



WAG 6 - FLOW-PACED MONTHLY COMPOSITE FORM (SW-08)

Monitoring Locations: _____ Field Logbook Number: _____
Badge # of Compositors: _____ Date/Time: _____
Weather: _____

NONPRESERVED SAMPLE COMPOSITING

(A) Total Monthly Composite Volume of Nonpreserved Samples (mL) _____

Weekly Retrieval Number	Date Retrieved	Bar Code Sample ID	(B) Total flow volume since last retrieval (gal)	(C) Percent of total flow volume (B)/(D)	Aliquot amount (mL) (A)*(C)

(D) Total flow volume for month (gal): _____

Bar Code sample ID of compositing container (affix here):

Comments: _____

PRESERVED SAMPLE COMPOSITING

(A) Total Monthly Composite Volume of Preserved Samples (mL) _____

Weekly Retrieval Number	Date Retrieved	Bar Code Sample ID	(B) Total flow volume since last retrieval (gal)	(C) Percent of total flow volume (B)/(D)	Aliquot amount (mL) (A)*(C)

(D) Total flow volume for month (gal): _____

Bar Code sample ID of compositing container (affix here):

Comments: _____

Form Bar Code Label

Sample Task Leader Signature/Date: _____

Data Entry Signature/Date; _____

Data Verification Signature/Date: _____

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

(Once completed, insert this form into site notebook. If more than one site is affected, insert a copy of this form into all appropriate notebooks.)

Matrix:

D of affected site(s):

Name and title 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:
	WAG 6 Project Manager:	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: IN-USE AVAILABLE TEMPORARILY OUT-OF-SERVICE RETIRED
(circle one)

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

WAG 6 - WEEKLY ACTIVITY SCHEDULE (WAS-01)

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

Groundwater Quality				
Activity Period:				
Site IDs		Surplus Bottles		
		Quantity	Type	Volume

Surface Water				
Activity Period:				
Site IDs	Type of Sampling (Task)	Surplus Bottles		
		Quantity	Type	Volume

Seeps and Springs				
Activity Period:				
Site IDs		Surplus Bottles		
		Quantity	Type	Volume

FTM Signature/Date: _____

Data Entry Signature/Date: _____

Data Verification Signature/Date: _____

WAG 6 - FIELD COLLECTION TASK MAP (FCTM-01)

Field Matrix: _____ **Kit Identifier:** _____

Task: _____ **Kit Preparation Date:** _____

Sampling Date: _____ **Field Activity Sheet Number:** _____

Field Logbook Number: _____

Monitoring Location	Sample ID	Collection Device	Collection FOP	Sample Container			Process	Preservative	Analysis Group	Sample Type
				Size	Type	Clean Lot				

Form Bar Code Label

Completed By: _____

Date: _____

WAG 6 PROJECT	SAMPLING DATE:		PAGE OF
TASK:	MATRIX:		KIT CONTAINER ID:
TEAM LEADER	SAMPLING TEAM:		

SAMPLE ID	MONITORING LOCATION	SAMPLE TYPE	CONTAINER		ANALYSIS GROUP	PRESERVATIVE	pH	SAMPLING DEVICE	COLLECTION FOP	REMARKS	SHIPPING CONTAINER NO/DATE
			TYPE	VOLUME							

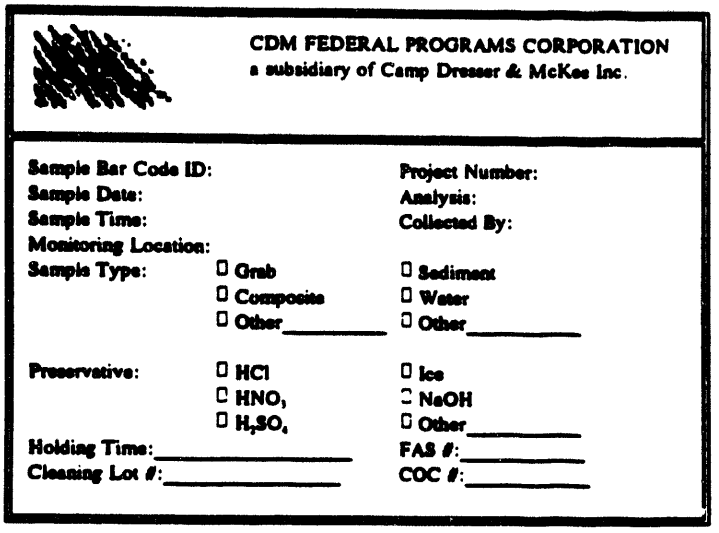
CONTAINER TYPES: P = High Density Polyethylene, G = Glass, T = Teflon

SAMPLE TYPES: RB = Rinse Blank, FB = Field Blank; TB = Trip Blank; FLD = Field Sample; MS/MSD

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)

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

Form Bar Code Label



Sample Label

APPENDIX B

SAMPLING SCHEDULES

1st Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2],(F,M,T)[3]				X	X	X	X	X	X,F,M		
	Baseflow	X,T	X,F,M	X,F,M	X,F,M	X	X	X	X,F,M	X,F			X
	Storm Event								X	X			
FB	Flow-paced	X[2]				X	X	X	X	X	X		
	Baseflow	X	X	X	X	X,F,M	X,F,M	X,F,M	X,F,	X,F,M			X
	Storm Event								X	X			
DB	Baseflow	X	X	X	X	X	X	X	X	X			
FA	Baseflow	X	X	X	X	X	X	X	X	X			
MS4	Storm Event	X	X	X	X	X	X	X	X	X			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		
B	Storm Event	X,T	X	X	X	X	X	X	X	X			X
C	Storm Event	X	X	X	X	X	X	X	X	X			

2nd Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2]				X,F,M	X	X,F,M	X	X	X		
	Baseflow[4]								X,F,M	X,F,M			X
FB	Flow-paced	X[2],F,M,T				X	X,F,M	X	X	X	X,F,M		
	Baseflow[4]								X	X			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		
	Baseflow[4]								X	X			
WOC	Baseflow[4]								X	X			
WST	Baseflow[4]								X	X			

3rd Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^{3}H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2],F,M,T				X,F,M	X,M	X	X	X	X		
	Baseflow								X	X,F,M			
	Storm Event								X	X			
FB	Flow-paced	X[2]				X	X,F	X,F,M	X	X	X,F,M		
	Baseflow								X,F,M	X			X
	Storm Event								X	X			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		

4th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^{3}H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2]				X	X	X	X	X	X		
	Baseflow	X,T				X	X	X,F,M	X,F,M	X			
	Storm Event								X	X			
FB	Flow-paced	X[2],F,M,T				X	X	X	X	X	X,F,M		
	Baseflow	X				X,F,M	X,F,M	X	X	X,F,M			X
	Storm Event								X	X			
DB	Baseflow	X				X	X	X	X,F	X			
FA	Baseflow	X				X	X	X	X	X,F			
MS4	Storm Event	X				X	X	X	X	X			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		
B	Storm Event	X,T				X	X	X	X	X			
C	Storm Event	X				X	X	X	X	X			X

5th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2]				X	X,F	X,F,M	X	X	X,F,M		
	Baseflow								X,F,M	X,F,M			X
FB	Flow-paced	X[2],F,M,T				X	X,M	X	X	X	X		
	Baseflow								X	X			
WOD	Flow-paced	X2				X	X	X	X	X	X		

6th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2],F,M,T				X,M	X,M	X	X	X	X		
	Baseflow								X	X,F,M			
	Storm Event								X	X			
	Bedload						X,F,M	X,F,M					X
FB	Flow-paced	X[2]				X,F	X,F	X,F,M	X	X	X,F,M		
	Baseflow								X,F,M	X			
	Storm Event								X	X			
	Bedload						X	X					
WOD	Flow-paced	X[2]				X	X	X	X	X	X		

7th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2],T				X	X	X	X	X	X,F,M		
	Baseflow	X,F,M,T				X	X	X,F,M	X,F,M	X			
	Storm Event								X	X			
FB	Flow-paced	X[2]				X	X	X	X	X	X		
	Baseflow	X				X,F,M	X,F,M	X	X	X,F,M			X
	Storm Event								X	X			
DB	Baseflow	X				X	X	X	X,F	X			
FA	Baseflow	X				X	X	X	X	X,F			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		
B	Storm Event	X,T				X	X	X	X	X			
C	Storm Event	X				X	X	X	X	X			X
MS4	Storm Event	X				X	X	X	X	X			

8th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2]				X,F	X,F	X,F,M	X	X	X,F,M		
	Baseflow[4]								X,F,M	X,F,M			
FB	Flow-paced	X[2],F,M,T				X,M	X,M	X	X	X	X		
	Baseflow								X	X			X
WOD	Flow-paced	X[2]				X	X	X	X	X	X		
	Baseflow[4]								X	X			
WOC	Baseflow[4]								X	X			
WST	Baseflow[4]								X	X			

9th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2],F,M,T				X,F,M	X,M	X	X	X	X		
	Baseflow								X	X,F,M			X
	Storm Event								X	X			
FB	Flow-paced	X[2]				X	X,F	X,F,M	X	X	X,F,M		
	Baseflow								X,F,M	X			
	Storm Event								X	X			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		

10th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^3H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2]				X	X	X	X	X	X,F,M		
	Baseflow	X,F,M,T				X,F,M	X,F,M	X	X,F,M	X			
	Storm Event								X	X			
FB	Flow-paced	X[2]				X	X	X,F,M	X	X	X		
	Baseflow	X				X	X	X	X	X,F,M			X
	Storm Event								X	X			
DB	Baseflow	X				X	X	X	X	X,F			
FA	Baseflow	X				X	X	X	X,F	X			
MS4	Storm Event	X				X	X	X	X	X			
WOD	Flow-paced	X[2]				X	X	X	X	X	X		
B	Storm Event	X,T				X	X	X	X	X			X
C	Storm Event	X				X	X	X	X	X			

11th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^{3}H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2]				X,F	X,F	X,F,M	X	X	X,F,M		
	Baseflow								X,F,M	X,F,M			
FB	Flow-paced	X[2],F,M,T				X,M	X,M	X	X	X	X		
	Baseflow								X	X			X
WOD	Flow-paced	X[2]				X	X	X	X	X	X		

12th Month List of Samples

Site ID	Type of Sampling	CLP VOLs	CLP SVOLs	CLP Pest/PCBs	Herbicides	CLP Metals	Gross Alpha	Gamma Scan (Cs, CO, Eu)	Tritium (^{3}H)	Strontium (^{90}Sr)	TSS		Rinseate[1]
DA	Flow-paced	X[2],F,M,T				X,M	X,M	X	X	X	X		X
	Baseflow								X	X,F,M			
	Storm Event								X	X			
	Bedload						X	X					
FB	Flow-paced	X[2]				X,F	X,F	X,F,M	X	X	X,F,M		
	Baseflow								X,F,M	X			
	Storm Event								X	X			
	Bedload						X,F,M	X,F,M					X
WOD	Flow-paced	X[2]				X	X	X	X	X	X		

[1]This sampling schedule assumes that a dipper will be needed to collect grab samples 50% 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.
[2]When the last weekly flow-paced sample is retrieved, a grab sample will be collected for analysis of volatiles.
[3]F = Field duplicate; M = matrix spike/matrix spike duplicate; T = trip blank. QC samples will be taken from an alternate site if sufficient water is not present at the scheduled site.
[4]Semiannual baseflow samples at WOD, WOC, WST, all seep monitoring points, and all WAG 6 drainages will be coordinated and completed within 48 h.

APPENDIX C

SITE-SPECIFIC HAZARD EVALUATION ADDENDUM FOR WAG 6 SURFACE WATER SAMPLING AND ANALYSIS PLAN

SITE-SPECIFIC HAZARD EVALUATION ADDENDUM FOR WAG 6 SURFACE WATER SAMPLING AND ANALYSIS PLAN

S. D. Van Hoesen 1/10/94
S. D. Van Hoesen
ER WAG 6 Project Manager

B. L. Morgan 1/3/94
B. L. Morgan
ORNL Construction Engineer

A. W. Saulsbury 1-10/94
A. W. Saulsbury * See comments marked on text
ORNL HAZWOPER Program Coordinator

S. N. Burman 12/28/93
S. N. Burman
Site Safety and Health Manager

W. C. Hayes 12/28/93
W. C. Hayes
ORNL Applied Health Physicist

K. Wilson 12/28/93
K. Wilson
WAG 6 Facility Manager

J. D. Miller * See note on C-7 12/28/93
J. D. Miller
ORNL Industrial Safety

M. M. Slater 1-10-94
M. M. Slater
ORNL IH Construction Oversight

J. S. Abercrombie 1/3/94
J. S. Abercrombie
Laboratory Protection

C. Clark, Jr. 1/21/94
C. Clark, Jr.
Environmental Restoration Office

J. Sweeney
J. Sweeney
DOE ERD Project Manager

SITE-SPECIFIC HAZARD EVALUATION ADDENDUM FOR WAG 6 SURFACE WATER SAMPLING AND ANALYSIS PLAN

This Site-Specific Hazard Evaluation Addendum is for the performance of the Waste Area Grouping (WAG) 6 surface water 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, WAG 6 Site Health and Safety Plan (HASP), Martin Marietta Energy Systems, Inc. (Energy Systems), and U.S. Department of Energy (DOE) policies and procedures. The WAG 6 Site HASP serves as an extension of the ORNL HAZWOPER Program Manual; combined, they fulfill the requirements of 29 CFR 1910.120.

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 Surface Water Sampling and Analysis Plan task instructions require sample collection from seven surface water locations in addition to data collection from four flow-rate-monitoring stations. Tasks include flow-paced sampling, baseflow sampling, storm event sampling, and bedload sediment sampling. The task instructions, sample guidelines, data collection guidelines, and sample locations are detailed in Sect. 2 of the Surface Water Sampling and Analysis Plan.

Collection of a flow-paced sample involves donning the appropriate PPE and removing the sample from the ISCO 3700 automatic sampler. A site inspection, equipment check, and sampling documentation will be completed upon sample collection.

Retrieval of baseflow samples will be performed manually during periods of normal flow (i.e., flow periods not influenced by rain events). Before collection of a baseflow sample, don the appropriate PPE (which also may include wading equipment) and collect samples to be analyzed for volatile organic compounds directly from the stream; using a dipper, collect samples that will be analyzed for radionuclides and total suspended solids. A site inspection and equipment decontamination will be performed, and task documentation will be completed upon sample collection.

Storm event samples will be collected by both automatic and manual methods. The collection of automatic samples will require the removal of the sample container in place and its replacement with an empty, decontaminated sample container; a brief site inspection will be performed and the appropriate documentation will be completed upon sample collection. Manual collection of storm event samples requires retrieving the sample using a dipper and pouring it into a empty decontaminated container; equipment decontamination and site inspection will be performed and task documentation will be completed upon sample collection.

Bedload sediment samples will be collected automatically; however, workers may have to wade into the water to place and retrieve sediment collection equipment. After a storm event, transfer the sediment into a sample container by using a stainless steel scoop. Upon sample collection, a brief site inspection will be performed and equipment will be decontaminated.

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 services, including monitoring and oversight.

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

2.1 SITE SAFETY AND HEALTH OFFICER

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. 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 contacted before commencement of site work (1) to notify of intent to begin work, and (2) to schedule SSHO or IH/HP monitoring support, as needed.

14. Conducts daily inspection of the work site.

15. Provides the HPC with a list of personnel participating in site activities to determine the need for inclusion in the hazardous-waste-worker medical surveillance program.

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.

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.

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 be contacted for radiological concerns at the site that cannot be addressed by the SSHO or HP.

2.4 INDUSTRIAL HYGIENE (Margaret Slater)

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.

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.

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

3. PROJECT HAZARD EVALUATION

Task: Surface water sampling and analysis.

Although there are a number of tasks performed during the surface water 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	( ) Manual 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
( ) Personnel decon	( ) Equipment decon	( ) ISU
( ) Drilling	( ) Drum handling	( ) Work in water/boat
(X) Environmental sampling		

3.3 CHEMICAL HAZARDS

(X) Volatile organics	( ) 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: Surface water 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 streams 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 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). An Industrial Hygiene representative may be contacted to assist in completion of this section.

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 of concern at the site is provided in the tables 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 surface water sites

Radiation work permit required? ( ) Yes (X) 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

Additional controls/requirements: None

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

3.7.4 Sanitation

Task: Surface water 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: Surface water 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.

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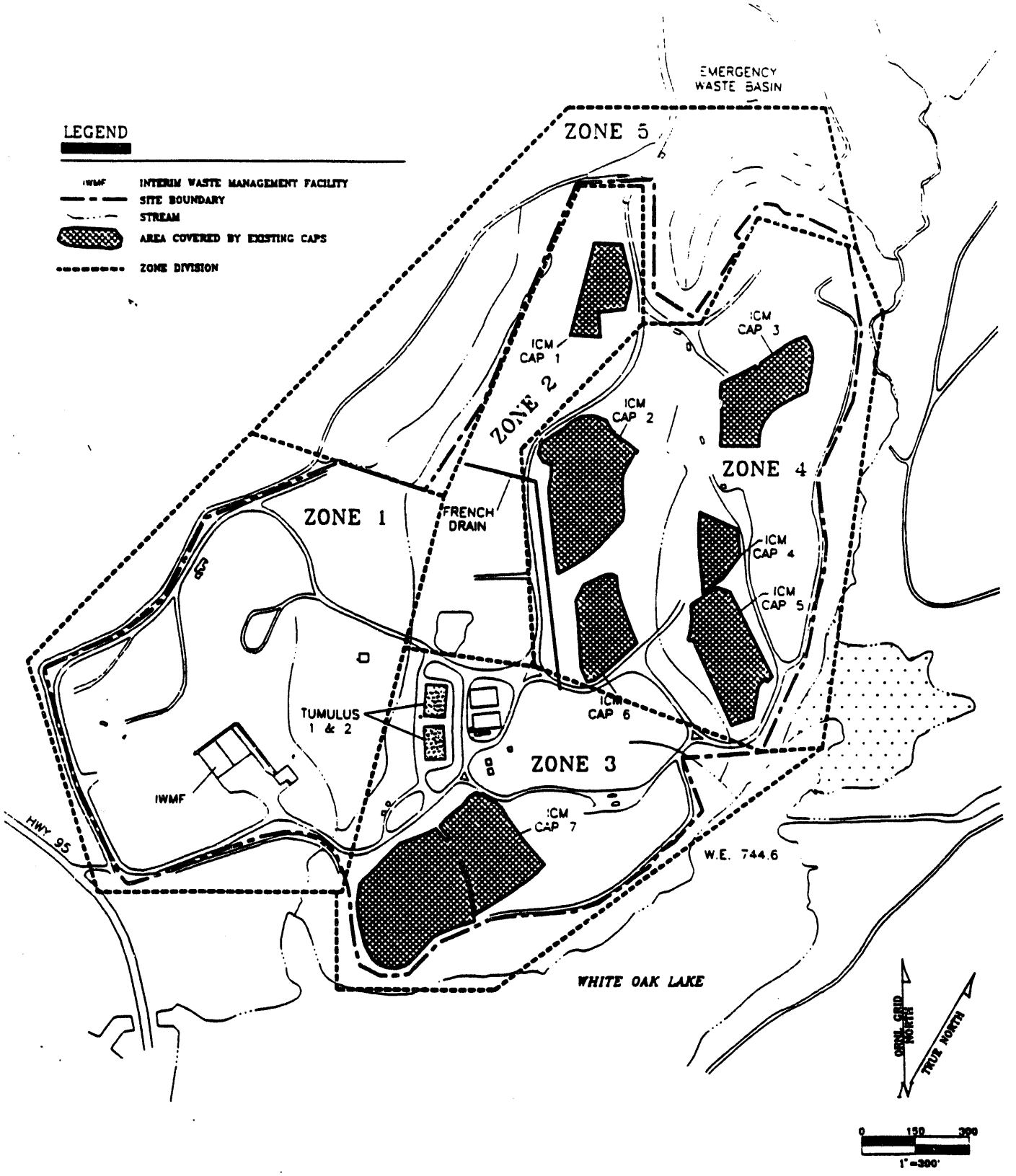
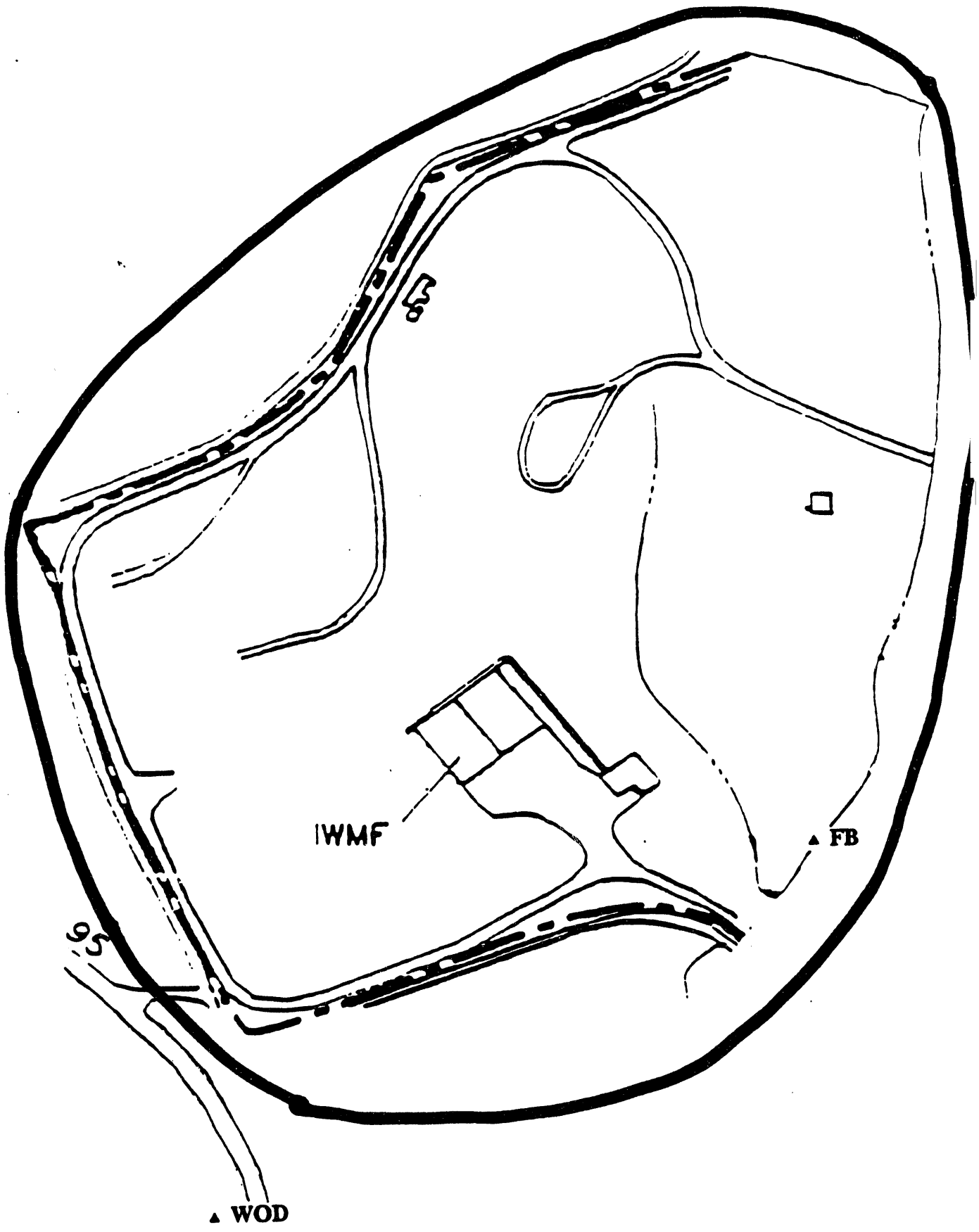


WAG 6 ZONE DIVISION

OAK RIDGE NATIONAL LABORATORY
ORNL WAG 6

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

ZONE 1
Surface Water Monitoring Sites



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Zone 1 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
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	

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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		Heath effects/target organs	Chemical/physical properties
Ethyl benzene Color: colorless O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	100 ppm 100 ppm 100 ppm	STEL: IDLH:	125 ppm 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: IDLH:	NE 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: 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

Legend:

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Zone 1 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
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:

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ZONE 2

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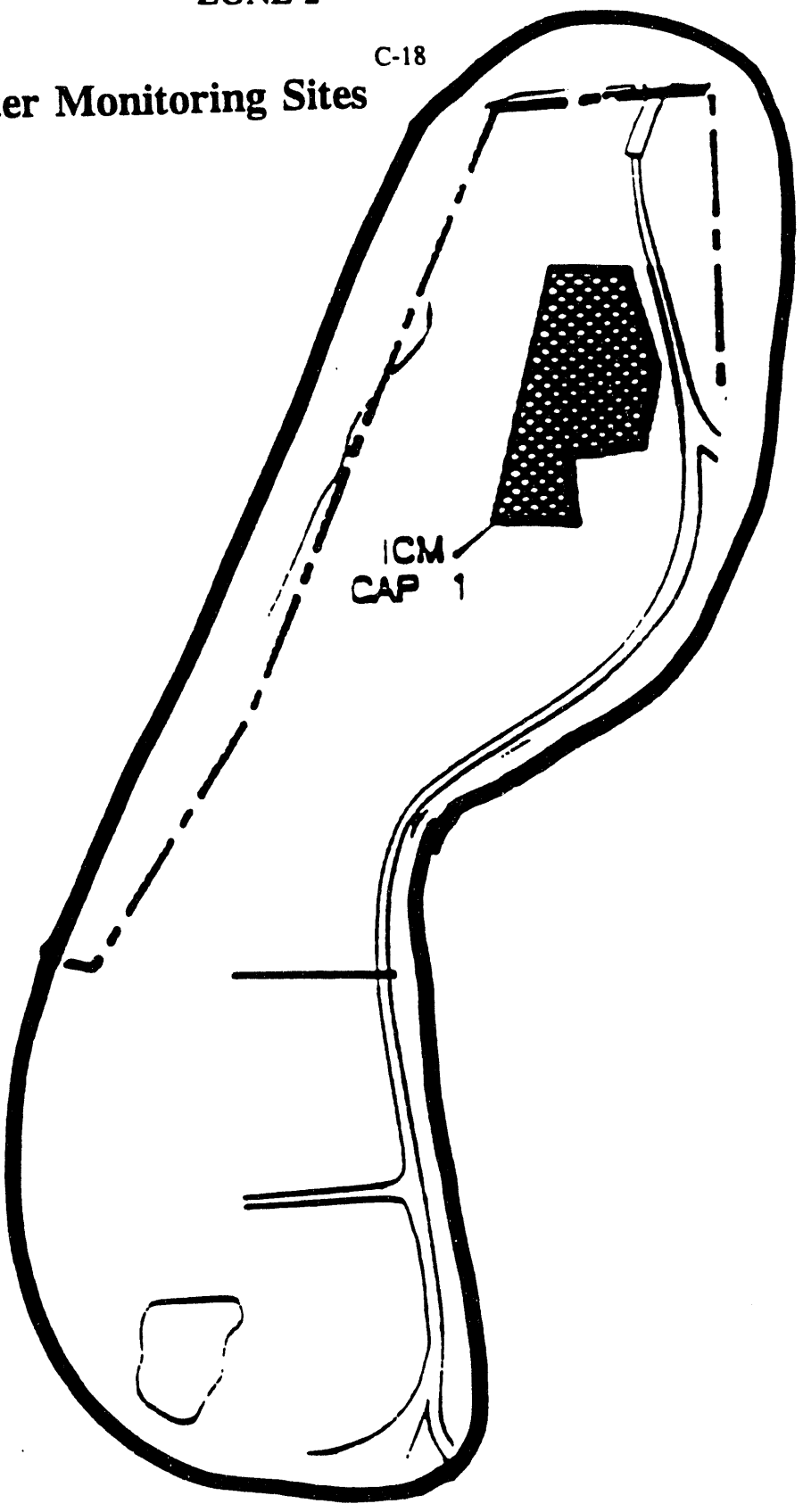
* No Surface Water Monitoring Sites



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Zone 2 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
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

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Zone 2 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
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

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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: 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 O known carcinogen O 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 O 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 O known carcinogen O 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

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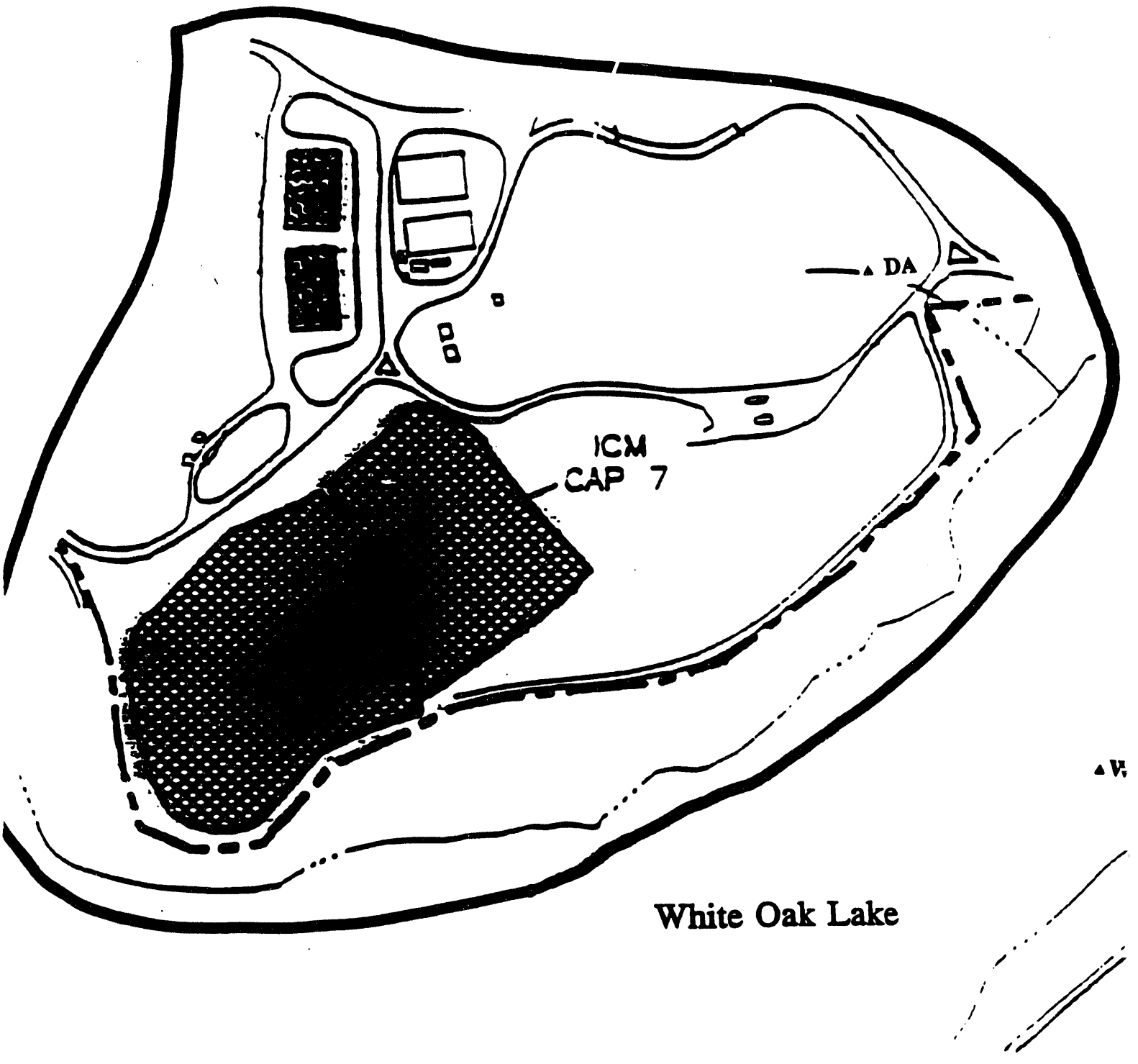
ZONE 3
Surface Water Monitoring Sites



Oak Ridge National Laboratory
WAG - 6

Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-STEL/ TLV-C or IDLH		Heath effects/target organs	Chemical/physical properties
Acetone Color: Colorless O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	750 ppm 750 ppm 250 ppm	STEL: IDLH:	1000 ppm 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: IDLH:	NE NE	GI, Lower large intestine	
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
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; FRPPT: -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

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Zone 3 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
Mercury Color: O known carcinogen O suspect carcinogen	TLV: 0.01 mg/m3 PEL: 0.01 mg/m3 REL: 0.01 mg/m3 DAC:	STEL: 0.03 mg/m3 IDLH: 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: NE IDLH: NE	Skeletal system, respiratory system	Variable
Thorium Color: O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	STEL: NE IDLH: NE	Respiratory system	Variable
Trichloroethene Color: Colorless ● known carcinogen O suspect carcinogen	TLV: 50 ppm PEL: 50 ppm REL: 25 ppm DAC:	STEL: 200 ppm IDLH: 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
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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: 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
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NF: nonflammable

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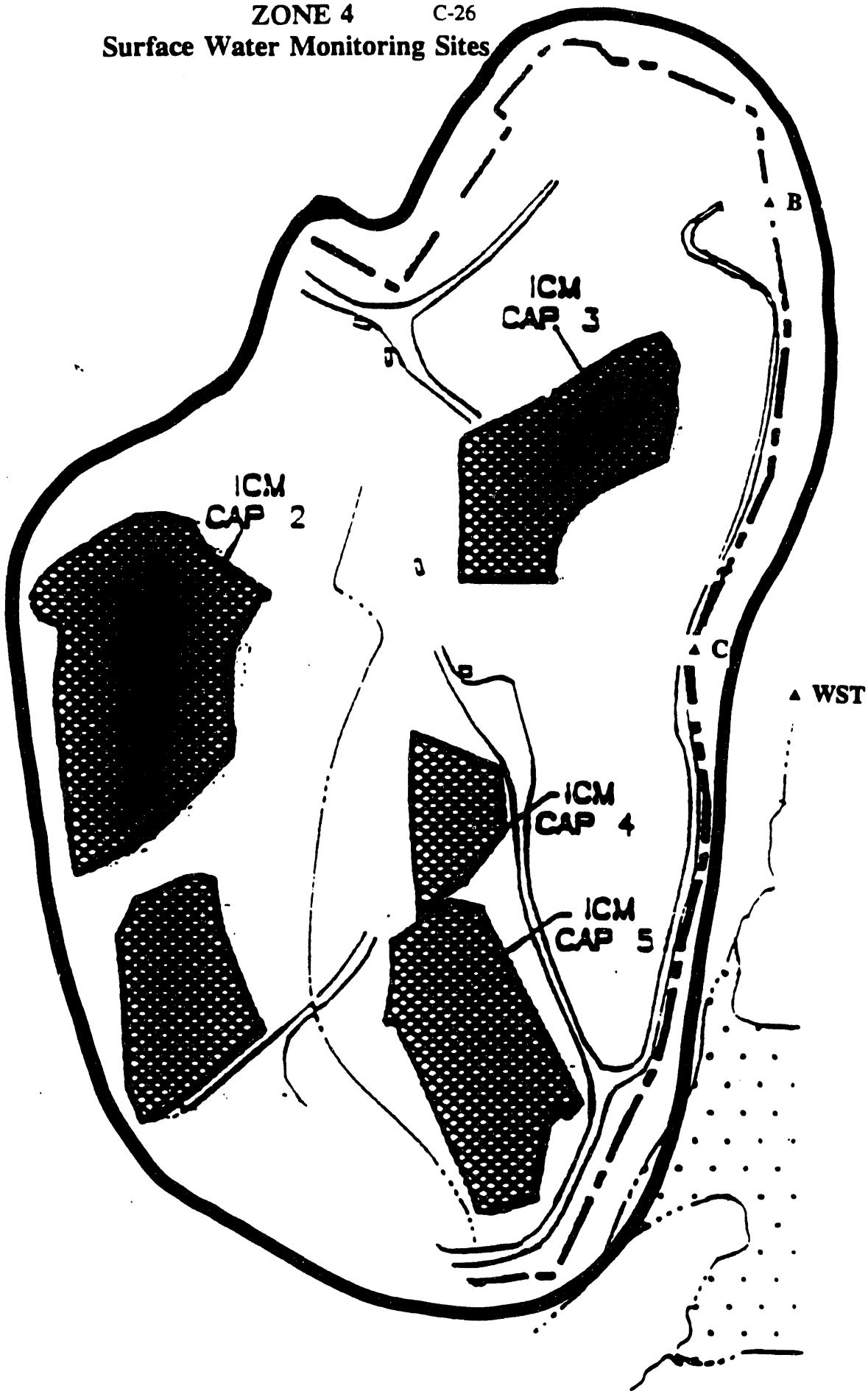
ZONE 4 C-26

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	Heath 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 choloform-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.

Zone 4 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
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.

Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Heath effects/target organs	Chemical/physical properties
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
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
Cobalt-60 Color: NA O known carcinogen O suspect carcinogen	DAC: 6e-8 µCi/mL	STEL: NE IDLH: 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

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
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

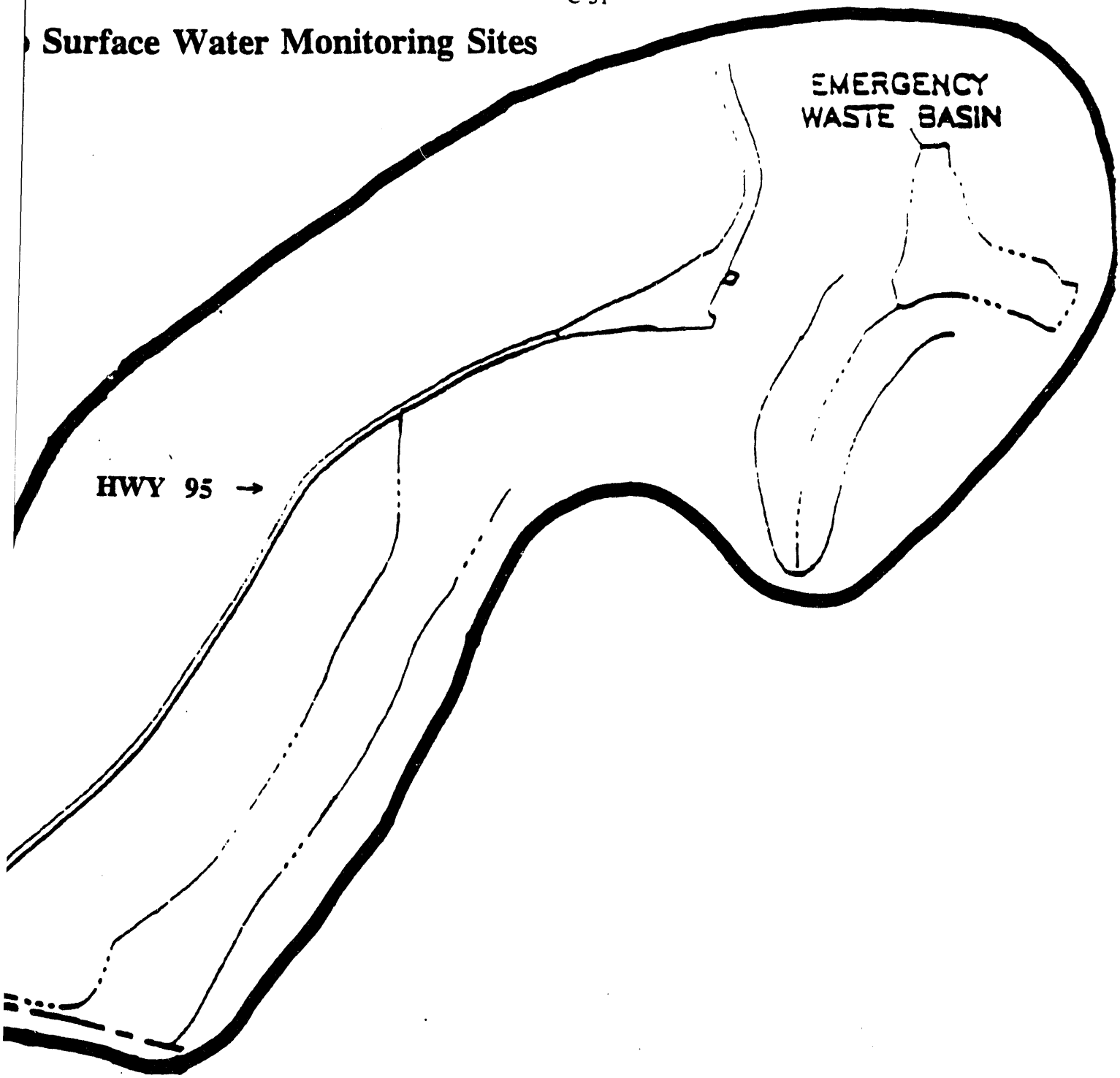
Legend:

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

Surface Water Monitoring Sites



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
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
Benzene Color: Colorless O known carcinogen O 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

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Contaminant	TLV-TWA/PEL-TWA or REL-TWA		TLV-STEL/PEL-STEL/ TLV-C or IDLH		Health effects/target organs	Chemical/physical properties
Benzyl Alcohol **Color:** Colorless O known carcinogen O suspect carcinogen	TLV: PEL: REL: DAC:	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	

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
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IP: ionization potential
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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
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
Cobalt-60 Color: NA O known carcinogen O suspect carcinogen	DAC: 6e-8 µCi/mL	STEL: NE IDLH: NE	Respiratory, liver, skeletal	Variable
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%
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 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
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Zone 5 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
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%
Stronium-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
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Zone 5 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
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
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Contaminant	TLV-TWA/PEL-TWA or REL-TWA	TLV-STEL/PEL-STEL/ TLV-C or IDLH	Health 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
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STEL: short-term exposure limit
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4. TASK BREAKDOWN

4.1 TASK DESCRIPTION

Task: Surface water 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 (X-OE-703, Rev. 0) and the WAG 6 HASP.

4.2 INITIAL LEVEL OF PERSONAL PROTECTIVE EQUIPMENT

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

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

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

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

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

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

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

DONNING LEVEL D (Modified)

1. Don inner plastic boots.
2. Don cotton liners.
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.
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.

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. Perform personnel frisking before exiting the controlled access zone.

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

A baseline exposure rate for the work site will be measured by Site HP before commencement of work activities. Site exposure rates will be updated on a 6-month cycle.

5.1 DIRECT READING INSTRUMENTS

	Task(s)	Monitoring Frequency	Action Levels	Action Guidelines
LEL meter	NA		10%LEL	
O_2 meter	NA		>22% O_2	
Colorimetric indicator tubes	NA		1/2 PEL	
Photoionization detector (PID)	NA		5 ppm*	Halt work; contact IH
Flame ionization detector (FID)	NA		5 ppm*	Halt work; 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			

*Action level is 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	SW	Continuous	Contact HP
Extremity dosimetry	NA		
Whole-body count	SW	Yearly	Contact HP
Urinalysis/bioassay	SW	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.

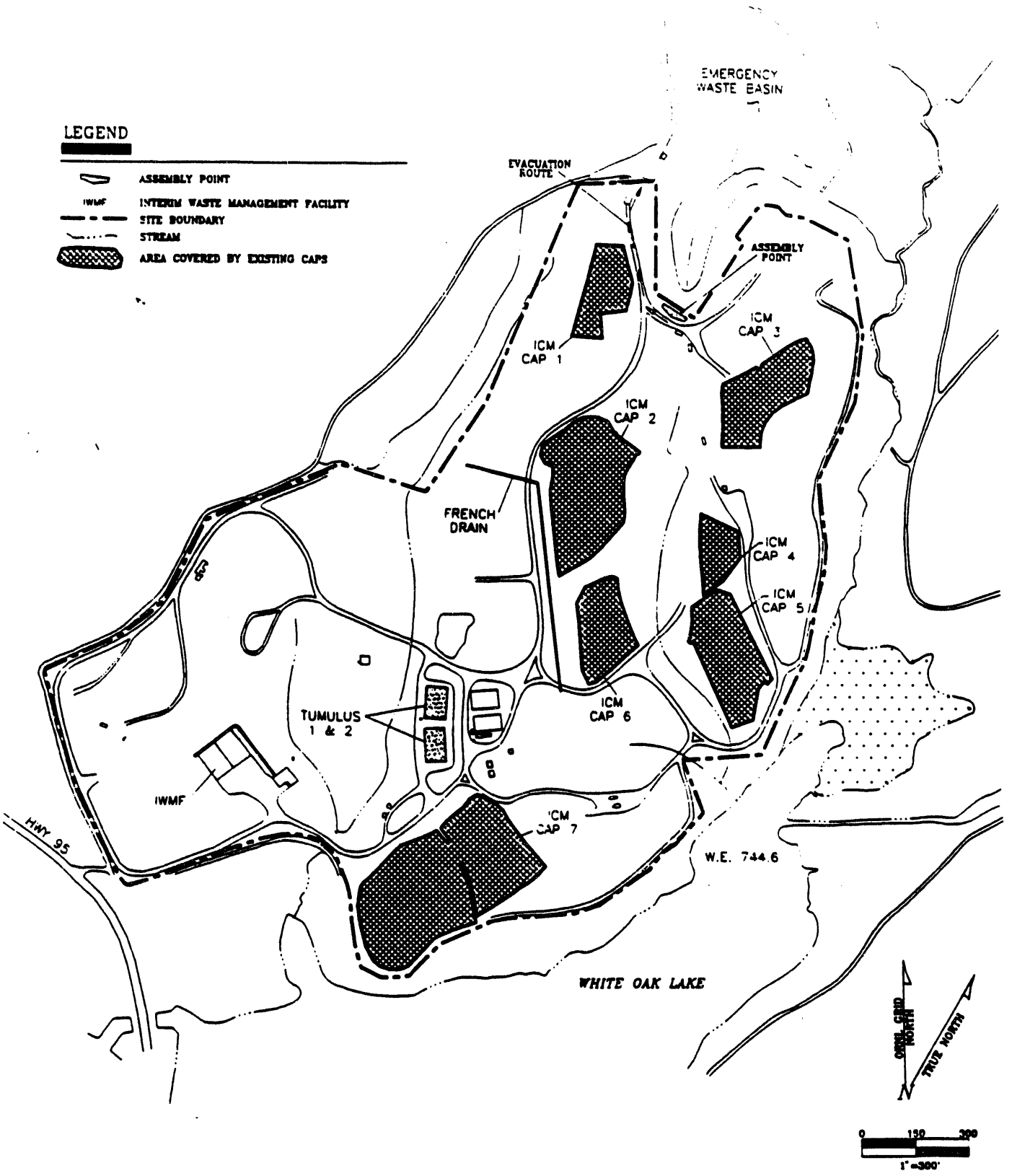
Site monitoring requirements may change based on site conditions. All changes must be documented in the site logbook.

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. Perimeter monitoring of the zone will be conducted periodically to ensure correct placement of the zone. 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.

A001/23AW04/303

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. The steps for doffing and disposal of PPE can be found in Sect. 5 of the WAG 6 HASP.

Materials needed for decontamination for this project include (1) liquinox and (2) deionized water.

Equipment decontamination procedures can be found in Sect. 2 of the Surface Water 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	576-7059	
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
- _____ 24/40-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
- 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 individuals 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.

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: Surface water sample task leader

	YES	NO	DATE
General Employee Training:	(X)	( )	9/93
24-h training:	( )	( )	NA
40-h training:	(X)	( )	5/93
Annual Refresher Training:	( )	( )	NA
Supervisor Training:	(X)	( )	10/93

	YES	NO	DATE
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: Patrick Gerbic Badge number: 626002

Assigned tasks: Assistant to surface water sample task leader

	YES	NO	DATE
General Employee Training:	(X)	( )	9/93
24-h training:	( )	( )	NA
40-h training:	(X)	( )	8/93
Annual Refresher Training:	( )	( )	NA
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)	( )	9/94
Bioassay (in vitro):	(X)	( )	9/94
Specialized Equipment Training:	( )	( )	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.

E 1.—ALTERNATIVE TREATMENT STANDARDS

	Regulated hazardous constituent	CAS No. for regulated hazardous constituent	Non-wastewaters concentration (mg/1) TCLP
n 268.43	Antiomony	7440-36-0	2.1
	Arsenic	7440-38-2	0.055
	Barium	7440-39-3	7.6
	Beryllium	7440-41-7	0.014
	Cadmium	7440-43-9	0.19
	Chromium (total)	7440-47-32	0.33
	Cyanide (mg/kg) (total)	57-12-5	1.8
	Lead	7439-92-1	0.37
	Mercury	7439-97-6	0.009
	Nickel	7440-02-0	5.0
	Selenium	7782-49-2	0.16
	Silver	7440-22-4	0.30
	Thallium	.....	0.078
	Zinc	7440-66-6	5.3
n 268.43	Antimony	7440-36-0	2.1
	Arsenic	7440-38-2	0.055
	Barium	7440-39-3	7.6
	Beryllium	7440-41-7	0.014
	Cadmium	7440-43-9	0.19
	Chromium (total)	7440-47-32	0.33
	Lead	7439-92-1	0.37
	Mercury	7439-97-6	0.009
	Nickel	7440-02-0	5.0
	Selenium	7782-49-2	0.16
	Silver	7440-22-4	0.30
	Thallium	.....	0.078
	Zinc	7440-66-6	5.3

2) An owner/operator of a hazardous ste treatment, storage, or disposal facil- stores such wastes in tanks, containers, containment buildings solely for the pose of the accumulation of such antities of hazardous waste as neces- to facilitate proper recovery, treat- nt, or disposal and:

58.50(a)(2) introductory text amend- at 57 FR 37263, Aug. 18, 1992]

) Each container is clearly marked to ntify its contents and the date each pe- d of accumulation begins;

i) Each tank is clearly marked with a cription of its contents, the quantity of n hazardous waste received, and the e each period of accumulation begins, such information for each tank is re- ded and maintained in the operating cord at that facility. Regardless of ether the tank itself is marked, an own- operator must comply with the operating record requirements specified in §264.73 or §265.73.

(3) A transporter stores manifested shipments of such wastes at a transfer facility for 10 days or less.

(b) An owner/operator of a treatment, storage or disposal facility may store such wastes for up to one year unless the Agency can demonstrate that such storage was not solely for the purpose of accumulation of such quantities of hazardous waste as are necessary to facilitate proper recovery, treatment, or disposal.

(c) A owner/operator of a treatment, storage or disposal facility may store such wastes beyond one year; however, the owner/operator bears the burden of proving that such storage was solely for the purpose of accumulation of such quantities of hazardous waste as are necessary to facilitate proper recovery, treatment, or disposal.

(d) If a generator's waste is exempt from a prohibition on the type of land

[Sec. 268.50(d)]

Trans-1,4-Dichloro-2-butene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
Trans-1,2-Dichloroethene
1,2-Dichloropropane
Trans-1,3-Dichloropropene
cis-1,3-Dichloropropene
Iodomethane
Methylene chloride
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Tribromomethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichloromonofluoromethane
1,2,3-Trichloropropane
Vinyl chloride

Semivolatiles

Bis(2-chloroethoxy)ethane
Bis(2-chloroethyl)ether
Bis(2-chloroisopropyl) ether
p-Chloroaniline
Chlorobenzilate
p-Chloro-m-cresol
2-Chloronaphthalene
2-Chlorophenol
3-Chloropropionitrile
m-Dichlorobenzene
o-Dichlorobenzene
p-Dichlorobenzene
3,3'-Dichlorobenzidine
2,4-Dichlorophenol
2,6-Dichlorophenol
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Hexachloroprophene
Hexachloropropene
4,4'-Methylenebis(2-chloroaniline)
Pentachlorobenzene
Pentachloroethane
Pentachloronitrobenzene
Pentachlorophenol
Pronamide
1,2,4,5-Tetrachlorobenzene
2,3,4,6-Tetrachlorophenol
1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
Tris(2,3-dibromopropyl)phosphate

Organochlorine Pesticides

Aldrin
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC
Chlordane
DDD
DDE
DDT
Dieldrin
Endosulfan I
Endosulfan II
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
Isodrin
Kepone
Methoxyclor
Toxaphene

Phenoxyacetic Acid Herbicides

2,4-Dichlorophenoxyacetic acid
Silvex
2,4,5-T

PCBs

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
PCBs not otherwise specified

Dioxins and Furans

Hexachlorodibenzo-p-dioxins
Hexachlorodibenzofuran
Pentachlorodibenzo-p-dioxins
Pentachlorodibenzofuran
Tetrachlorodibenzo-p-dioxins
Tetrachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin

APPENDIX IV—ORGANOMETALLIC LAB PACKS

Hazardous waste with the following EPA Hazardous Waste Code No. may be placed in an "organometallic" or "appendix IV lab pack:"

P001, P002, P003, P004, P005, P006, P007, P008, P009, P013, P014, P015, P016, P017, P018, P020, P021, P022, P023, P024, P026, P027, P028, P029, P030, P031, P033, P034, P036, P037, P038, P039, P040, P041, P042, P043, P044, P045, P046, P047, P048, P049, P050, P051, P054, P056, P057, P058, P059, P060, P062, P063, P064, P065, P066, P067, P068, P069, P070, P071, P072, P073, P074, P075, P077, P081, P082, P084, P085, P087, P088, P089, P092, P093, P094, P095, P096, P097, P098, P099, P101, P102, P103, P104, P105, P106, P108, P109, P110, P111, P112, P113, P114, P115, P116, P118, P119, P120, P121, P122, P123

U001, U002, U003, U004, U005, U006, U007, U008, U009, U010, U011, U012, U014, U015, U016, U017, U018, U019, U020, U021, U022, U023, U024, U025, U026, U027, U028, U029, U030, U031, U032, U033, U034, U035, U036, U037, U038, U039, U041, U042, U043, U044, U045, U046, U047, U048, U049, U050, U051, U052, U053, U055, U056, U057, U058, U059, U060, U061, U062, U063, U064, U066, U067, U068, U069, U070, U071, U072, U073, U074, U075, U076, U077, U078, U079, U080, U081, U082, U083, U084, U085, U086, U087, U088, U089, U090, U091, U092, U093, U094, U095, U096, U097, U098, U099, U101, U102, U103, U105, U106, U107, U108, U109, U110, U111, U112, U113, U114, U115, U116, U117, U118, U119, U120, U121, U122, U123, U124, U125, U126, U127, U128, U129, U130, U131, U132, U133, U136, U137, U138, U140, U141, U142, U143, U144, U145, U146, U147, U148, U149, U150, U152, U153, U154, U155, U156, U157, U158, U159, U160, U161, U162, U163, U164, U165, U166, U167, U168, U169, U170, U171, U172, U173, U174, U176, U177, U178, U179, U180, U181, U182, U183, U184, U185, U186, U187, U188, U189, U190, U191, U192, U193, U194, U196, U197, U200, U201, U202, U203, U204, U205, U206, U207, U208, U209, U210, U211, U213, U214, U215, U216, U217, U218, U219, U220, U221, U222, U223, U225, U226, U227, U228, U234, U235, U236, U237, U238, U239, U240, U243, U244, U246, U247, U248, U249.

F001, F002, F003, F004, F005, F006, F010, F020, F021, F022, F023, F024, F025, F026, F027, F028, F039.

K001, K002, K008, K009, K010, K011, K013, K014, K015, K016, K017, K018, K019, K020, K021, K022, K023, K024, K025, K026, K027, K028, K029, K030, K031.

[Part 268, Appendix IV]

Waste code/subcategory	Nonwastewaters	Wastewaters
D002 Acid Subcategory based on 261.22(a)(1) with pH less than or equal to 2	RCORR	NEUTR
	NEUTR	INCIN
	INCIN	
D002 Alkaline Subcategory based on 261.22(a)(1) with pH greater than or equal to 12.5	NEUTR	NEUTR
	INCIN	INCIN
D002 Other Corrosives based on 261.22(a)(2)	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	INCIN
	STABL	
D003 Water Reactives based on 261.23(a) (2), (3), and (4)	INCIN	n.a
	WTRRX	
	CHOXD	
	CHRED	
D003 Reactive Sulfides based on 261.23(a)(5)	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	BIODG
	STABL	INCIN
D003 Explosives based on 261.23(a) (6), (7), and (8)	INCIN	INCIN
	CHOXD	CHOXD
	CHRED	CHRED
		BIODG
		CARBN
D003 Other Reactives based on 261.23(a)(1)	INCIN	INCIN
	CHOXD	CHOXD
	CHRED	CHRED
		BIODG
		CARBN
K044 Wastewater treatment sludges from the manufacturing and processing of explosives	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	BIODG
		CARBN
		INCIN
K045 Spent carbon from the treatment of wastewaters containing explosives	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	BIODG
		CARBN
		INCIN
K047 Pink/red water from TNT operations	CHOXD	CHOXD
	CHRED	CHRED
	INCIN	BIODG
		CARBN
		INCIN

Note: "n.a." stands for "not applicable"; "fb." stands for "followed by".

APPENDIX VII

TABLE 1.—EFFECTIVE DATES OF SURFACE DISPOSED WASTES (NON-SOIL AND DEBRIS) REGULATED IN THE LDRS [a]—COMPREHENSIVE LIST

Waste code	Waste category	Effective date
California list	Liquid hazardous wastes, including free liquids associated with solid or sludge, containing free cyanides at concentrations greater than or equal to 1,000 mg/l or certain metals or compounds of these metals greater than or equal to the prohibition levels	July 8, 1987.
California list	Liquid (aqueous) hazardous wastes having a pH less than or equal to 2	July 8, 1987.
California list	Dilute HOC wastewaters, defined as HOC-waste mixtures that are primarily water and that contain greater than or equal to 1,000 mg/l but less than 10,000 mg/l	July 8, 1987.
California list	Liquid hazardous waste containing PCBs greater than or equal to 50 ppm	July 8, 1987.
California list	Other liquid and nonliquid hazardous wastes containing HOCs in total concentration greater than or equal to 1,000 mg	Nov. 8, 1988.
D001	All	Aug. 8, 1990.
D002	All	Aug. 8, 1990.
D003	All	Aug. 8, 1990.
D004	Wastewater	Aug. 8, 1990.
D004	Nonwastewater	May 8, 1992.
D005	All	Aug. 8, 1990.
D006	All	Aug. 8, 1990.
D007	All	Aug. 8, 1990.
D008	Lead materials before secondary smelting	May 8, 1992.
D008	All others	Aug. 8, 1990.
D009	Nonwastewater	May 8, 1992.
D009	All others	Aug. 8, 1990.
D010	All	Aug. 8, 1990.
D011	All	Aug. 8, 1990.
D012	All	Aug. 8, 1990.
D013	All	Aug. 8, 1990.
D014	All	Aug. 8, 1990.

[Part 268, Appendix VII]

0013-9211/93/$0+$1.00

TABLE 1.—EFFECTIVE DATES OF SURFACE DISPOSED WASTES (NON-SOIL AND DEBRIS) REGULATED IN THE LDRS [a]—COMPREHENSIVE LIST —Contd.

Waste code	Waste category	Effective date
K024	All	Aug. 8, 1988
K025	Wastewater	Aug. 8, 1990
K025[b]	Nonwastewater	Aug. 8, 1988
K026	All	Aug. 8, 1990
K027	All	June 8, 1989
K028 (metals)	Nonwastewater	Aug. 8, 1990
K028	All others	June 8, 1989
K029	Wastewater	Aug. 8, 1990
K029	Nonwastewater	June 8, 1989
K030	All	Aug. 8, 1988
K031	Wastewater	Aug. 8, 1990
K031	Nonwastewater	May 8, 1992
K032	All	Aug. 8, 1990
K033	All	Aug. 8, 1990
K034	All	Aug. 8, 1990
K035	All	Aug. 8, 1990
K036	Wastewater	June 8, 1989
K036[b]	Nonwastewater	Aug. 8, 1988
K037[b]	Wastewater	Aug. 8, 1988
K037	Nonwastewater	Aug. 8, 1988
K038	All	June 8, 1989
K039	All	June 8, 1989
K040	All	June 8, 1989
K041	All	Aug. 8, 1990
K042	All	Aug. 8, 1990.
K043	All	June 8, 1989.
K044[b]	All	Aug. 8, 1988
K045[b]	All	Aug. 8, 1988
K046 (Nonreactive)	Nonwastewater	Aug. 8, 1988
K046	All others	Aug. 8, 1990.
K047[b]	All	Aug. 8, 1988.
K048	Wastewater	Aug. 8, 1990.
K048	Nonwastewater	Nov. 8, 1990.
K049	Wastewater	Aug. 8, 1990.
K049	Nonwastewater	Nov. 8, 1990.
K050	Wastewater	Aug. 8, 1990.
K050	Nonwastewater	Nov. 8, 1990.
K051	Wastewater	Aug. 8, 1990.
K051	Nonwastewater	Nov. 8, 1990.
K052	Wastewater	Aug. 8, 1990.
K052	Nonwastewater	Nov. 8, 1990.
K060	Wastewater	Aug. 8, 1990.
K060[b]	Nonwastewater	Aug. 8, 1988.
K061	Wastewater	Aug. 8, 1990.
K061 (low zinc) (interim standard for high zinc remains in effect until August 7, 1991)	Nonwastewater	Aug. 8, 1988.
K062	All	Aug. 8, 1988.
K069 (Non-Calcium Sulfate)[b]	Nonwastewater	Aug. 8, 1988.
K069	All others	Aug. 8, 1990.
K071	All	Aug. 8, 1990.
K073	All	Aug. 8, 1990.
K083	All	Aug. 8, 1990.
K084	Wastewater	Aug. 8, 1990.
K084	Nonwastewater	May 8, 1992.
K085	All	Aug. 8, 1990
K086 (organics)[b]	All	Aug. 8, 1988.
K086	All others	Aug. 8, 1988.
K087	All	Aug. 8, 1988.
K093	All	June 8, 1989.
K094	All	June 8, 1989.
K095	Wastewater	Aug. 8, 1990.
K095	Nonwastewater	June 8, 1989.
K096	Wastewater	Aug. 8, 1990.
K096	Nonwastewater	June 8, 1989.
K097	All	Aug. 8, 1990.
K098	All	Aug. 8, 1990.
K099	All	Aug. 8, 1988.
K100	Wastewater	Aug. 8, 1990.
K100[b]	Nonwastewater	Aug. 8, 1988.
K101 (organics)	Wastewater	Aug. 8, 1988.
K101 (metals)	Wastewater	Aug. 8, 1990.
K101 (organics)	Nonwastewater	Aug. 8, 1988.
K101 (metals)	Nonwastewater	May 8, 1992.
K102 (organics)	Wastewater	Aug. 8, 1988.
K102 (metals)	Wastewater	Aug. 8, 1990.
K102 (organics)	Nonwastewater	Aug. 8, 1988.
K102 (metals)	Nonwastewater	May 8, 1992.
K103	All	Aug. 8, 1988.

[Part 268, Appendix VII]

TABLE 1.—EFFECTIVE DATES OF SURFACE DISPOSED WASTES (NON-SOIL AND DEBRIS) REGULATED IN THE LDRs
[a]—COMPREHENSIVE LIST —Contd.

Waste code	Waste category	Effective date
P072	All	Aug. 8, 1990
P073	All	Aug. 8, 1990.
P074	All	June 8, 1989
P075	All	Aug. 8, 1990.
P076	All	Aug. 8, 1990
P077	All	Aug. 8, 1990
P078	All	Aug. 8, 1990
P081	All	Aug. 8, 1990.
P082	All	Aug. 8, 1990.
P084	All	Aug. 8, 1990
P085	All	June 8, 1989.
P087	All	May 8, 1992
P088	All	Aug. 8, 1990.
P089	All	June 8, 1989
P092	Wastewater	Aug. 8, 1990.
P092	Nonwastewater	May 8, 1992.
P093	All	Aug. 8, 1990.
P094	All	June 8, 1989.
P095	All	Aug. 8, 1990.
P096	All	Aug. 8, 1990.
P097	All	June 8, 1989.
P098	All	June 8, 1989
P099 (silver)	Wastewater	Aug. 8, 1990.
P099	All others	June 8, 1989.
P101	All	Aug. 8, 1990.
P102	All	Aug. 8, 1990.
P103	All	Aug. 8, 1990.
P104 (silver)	Wastewater	Aug. 8, 1990.
P104	All others	June 8, 1989.
P105	All	Aug. 8, 1990.
P106	All	June 8, 1989.
P108	All	Aug. 8, 1990.
P109	All	June 8, 1989.
P110	All	Aug. 8, 1990.
P111	All	June 8, 1989.
P112	All	Aug. 8, 1990.
P113	All	Aug. 8, 1990.
P114	All	Aug. 8, 1990.
P115	All	Aug. 8, 1990.
P116	All	Aug. 8, 1990.
P118	All	Aug. 8, 1990.
P119	All	Aug. 8, 1990.
P120	All	Aug. 8, 1990.
P121	All	June 8, 1989.
P122	All	Aug. 8, 1990.
P123	All	Aug. 8, 1990.
U001	All	Aug. 8, 1990.
U002	All	Aug. 8, 1990.
U003	All	Aug. 8, 1990.
U004	All	Aug. 8, 1990.
U005	All	Aug. 8, 1990.
U006	All	Aug. 8, 1990.
U007	All	Aug. 8, 1990.
U008	All	Aug. 8, 1990.
U009	All	Aug. 8, 1990.
U010	All	Aug. 8, 1990.
U011	All	Aug. 8, 1990.
U012	All	Aug. 8, 1990.
U014	All	Aug. 8, 1990.
U015	All	Aug. 8, 1990.
U016	All	Aug. 8, 1990.
U017	All	Aug. 8, 1990.
U018	All	Aug. 8, 1990.
U019	All	Aug. 8, 1990.
U020	All	Aug. 8, 1990.
U021	All	Aug. 8, 1990.
U022	All	Aug. 8, 1990.
U023	All	Aug. 8, 1990.
U024	All	Aug. 8, 1990.
U025	All	Aug. 8, 1990.
U026	All	Aug. 8, 1990.
U027	All	Aug. 8, 1990.
U028	All	June 8, 1989.
U029	All	Aug. 8, 1990.
U030	All	Aug. 8, 1990.
U031	All	Aug. 8, 1990.
U032	All	Aug. 8, 1990.
U033	All	Aug. 8, 1990.

[Part 268, Appendix VII]

TABLE 1.—EFFECTIVE DATES OF SURFACE DISPOSED WASTES (NON-SOIL AND DEBRIS) REGULATED IN THE LDRS [a]—COMPREHENSIVE LIST —Contd.

Waste code	Waste category	Effective date
U117	All	Aug. 8, 1990.
U118	All	Aug. 8, 1990.
U119	All	Aug. 8, 1990.
U120	All	Aug. 8, 1990.
U121	All	Aug. 8, 1990.
U122	All	Aug. 8, 1990.
U123	All	Aug. 8, 1990.
U124	All	Aug. 8, 1990.
U125	All	Aug. 8, 1990.
U126	All	Aug. 8, 1990.
U127	All	Aug. 8, 1990.
U128	All	Aug. 8, 1990.
U129	All	Aug. 8, 1990.
U130	All	Aug. 8, 1990.
U131	All	Aug. 8, 1990.
U132	All	Aug. 8, 1990.
U133	All	Aug. 8, 1990.
U134	All	Aug. 8, 1990.
U135	All	Aug. 8, 1990.
U136	Wastewater	Aug. 8, 1990.
U136	Nonwastewater	May 8, 1992.
U137	All	Aug. 8, 1990.
U138	All	Aug. 8, 1990.
U140	All	Aug. 8, 1990.
U141	All	Aug. 8, 1990.
U142	All	Aug. 8, 1990.
U143	All	Aug. 8, 1990.
U144	All	Aug. 8, 1990.
U145	All	Aug. 8, 1990.
U146	All	Aug. 8, 1990.
U147	All	Aug. 8, 1990.
U148	All	Aug. 8, 1990.
U149	All	Aug. 8, 1990.
U150	All	Aug. 8, 1990.
U151	Wastewater	Aug. 8, 1990.
U151	Nonwastewater	May 8, 1992.
U152	All	Aug. 8, 1990.
U153	All	Aug. 8, 1990.
U154	All	Aug. 8, 1990.
U155	All	Aug. 8, 1990.
U156	All	Aug. 8, 1990.
U157	All	Aug. 8, 1990.
U158	All	Aug. 8, 1990.
U159	All	Aug. 8, 1990.
U160	All	Aug. 8, 1990.
U161	All	Aug. 8, 1990.
U162	All	Aug. 8, 1990.
U163	All	Aug. 8, 1990.
U164	All	Aug. 8, 1990.
U165	All	Aug. 8, 1990.
U166	All	Aug. 8, 1990.
U167	All	Aug. 8, 1990.
U168	All	Aug. 8, 1990.
U169	All	Aug. 8, 1990.
U170	All	Aug. 8, 1990.
U171	All	Aug. 8, 1990.
U172	All	Aug. 8, 1990.
U173	All	Aug. 8, 1990.
U174	All	Aug. 8, 1990.
U176	All	Aug. 8, 1990.
U177	All	Aug. 8, 1990.
U178	All	Aug. 8, 1990.
U179	All	Aug. 8, 1990.
U180	All	Aug. 8, 1990.
U181	All	Aug. 8, 1990.
U182	All	Aug. 8, 1990.
U183	All	Aug. 8, 1990.
U184	All	Aug. 8, 1990.
U185	All	Aug. 8, 1990.
U186	All	Aug. 8, 1990.
U187	All	Aug. 8, 1990.
U188	All	Aug. 8, 1990.
U189	All	Aug. 8, 1990.
U190	All	June 8, 1989.
U191	All	Aug. 8, 1990.
U192	All	Aug. 8, 1990.
U193	All	Aug. 8, 1990.
U194	All	Aug. 8, 1990.

[Part 268, Appendix VII]

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