SUPPORTING DOCUMENT

1. Total Pages 37

2. Title

C-C18H PRE-OPERATIONAL BASELINE SAMPLING PLAN

3. Number

WHC-SD-EN-AP-145

4. Rev No.

0

5. Key Words

boreholes, excavations, field screening

6. Author

Name: S. J. Guzek

Signature

Organization/Charge Code
81353/A2WB6**APPROVED FOR
PUBLIC RELEASE**

8/19/93 D. S. A. D.

7. Abstract

Guzek, S. J., 1993, *Pre-Operational Baseline Sampling Plan*, WHC-SD-EN-AP-145, Rev. 0, Prepared by Kaiser Engineering for Westinghouse Hanford Company, Richland, Washington.

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1.0 SCOPE OF WORK

The objective of this task is to field characterize and sample the soil at selected locations along the proposed effluent line routes for Project C-018H. The overall purpose of this effort is to meet the proposed plan to discontinue the disposal of contaminated liquids into the Hanford soil column as described by DOE (1987). Detailed information describing proposed transport pipeline route and associated Kaiser Engineers Hanford Company (KEH) preliminary drawings (H288746...755) all inclusive, have been prepared by KEH (1992). The information developed from field monitoring and sampling will be utilized to characterize surface and subsurface soil along the proposed C-018H effluent pipeline and it's associated facilities. Potentially existing contaminant levels may be encountered therefore, soil characterization will provide a construction preoperational baseline reference, develop personnel safety requirements, and determine the need for any changes in the proposed routes prior to construction of the pipeline.

2.0 GENERAL REQUIREMENTS

Work associated with this activity will be conducted by Westinghouse Hanford Company (Westinghouse Hanford) and KEH personnel and will be performed in accordance with the following manuals and guidelines:

- Environmental Investigations and Site Characterization Manual, WHC-CM-7-7 (WHC 1988a)
- Environmental Compliance Manual, WHC-CM-7-5 (WHC 1988b)
- WHC Radiological Control Manual, WHC-CM-1-6, (WHC 1993)
- Industrial Safety Manual, WHC-CM-4-3, (WHC 1987)
- Kaiser Administrative Procedures (KAP) for Safety (KAP 20.0), Environmental KAP 21.0) and Radiation Protection (KAP 25.0).

2.1 HEALTH AND SAFETY REQUIREMENTS

Job and site specific activities may be delineated in a Job Safety Analysis (JSA) and Hazardous Waste Operations Plan (HWOP) for the soil sampling program. These documents will provide guidance for appropriate personnel protection equipment, site monitoring, chemical/radiological hazards, and potential safety hazards associated with the field/site environment. A JSA will be required for Phase I activities. A JSA and HWOP will be prepared for Phase II activities. Additionally, a pre-job plan will be developed and a briefing will be conducted prior to Phase I and Phase II tasks.

As the primary means of protecting the health and safety of field personnel, all individuals who enter controlled zones will have received the appropriate training to be qualified as "Hazardous Waste Workers" as outlined in Environmental Investigation Instruction (EII) 1.1, "Hazardous Waste Site Entry Requirements." All safety related documents and sampling plans will be reviewed by field personnel prior to work commencement. A pre-job safety meeting and regular field-safety "tailgate" meetings will be held to review all safety considerations and identify any potential hazards not previously noted.

The site specific information obtained from the field monitoring and soil samples will provide radiological and chemical data for the development of a hazardous waste operation plan prior to the installation of the effluent pipeline to protect the health and safety of construction personnel.

2.2 PREREQUISITES

The following permits will be required prior to initiation of work:

- A Radiation Work Permit (RWP)
- An Excavation Permit
- JSA and Pre-Job Plan
- An HWOP
- A Hanford Environmental Compliance Environmental Assessment of Categorical Exclusion.

3.0 SAMPLING AND FIELD ACTIVITIES

Characterization of the proposed pipeline route will be based on available historical information, ground-surface surveys, soil boring or excavations, and selected site sampling. The primary source of information was a historical review of proposed pipeline routes for the C-018H Project. An assessment of 200 Areas Environmental Protection Group contamination maps was also conducted.

The field activities will be conducted in two parts: a Phase I observational walk-through utilizing field screening instruments, and a Phase II activity wherein surface and subsurface investigations and sampling will be performed.

3.1 PHASE I ACTIVITIES

This task will include an onsite investigation of the proposed pipeline route in the 200 Areas and 600 Area (Figures 1, 2, and 3, and Table 1). The route corridors have been surveyed and staked. Selected areas will be surveyed with hand-held field instruments in order to detect any potential locations of surface contamination. The observers will also be looking for other indicators of potential contamination, such as surface depressions, stained or discolored soils, unusual vegetation growth, etc. Areas that meet these criteria will be marked and designated on the site maps for further investigation.

Additionally, some areas implicated in previous contamination transport incidents, or areas where surface or near-surface contamination from unknown sources has been reported in the past, may require more intensive investigation.

3.2 PHASE II ACTIVITIES

Following the Phase I surface survey, it is anticipated that approximately 10 to 20 sample locations will be designated for surface and subsurface investigations. These sites will be chosen based on detection of surface or near-surface contamination, underground lines and encasements, and areas proximal to diversion boxes, catch tanks, cribs, trenches, and ditches. It is anticipated that 25 to 40% of the soil sampling locations (10 to 20 samples) will be submitted for laboratory analysis. These samples will be submitted to confirm the accuracy of the field screening results and to baseline the sample data as reference background documentation for the C-018H project.

Field conditions will dictate the precise locations of each investigation site. These locations will be identified using standard measuring equipment (such as a fiberglass tape or distance-measuring wheel), recorded in the field logbook, marked with a numbered surveyor's stake, and surveyed at a later date.

All site work will be conducted in accordance with the HWOP, JSA, and RWP. Soil intrusion will be initiated after approval by the Site Safety Officer (SSO) and Health Physics Technician (HPT).

The subsurface investigation may be conducted utilizing either a hollow-stem auger, a split-spoon sampler, or a backhoe. The operation of this equipment will be conducted in accordance with existing Standard Operating Procedures (SOPs). Westinghouse Hanford has provided a detailed "Letter of Instruction" (LOI # 9354501) for equipment operation and support aspects which might be outside of normal operating parameters.

Figure 1. Pipeline Locations in 200 West, 200 East, and 600 Areas.

Figure 2. Pipeline Locations in 200 West Area.

Figure 3. Pipeline Locations in 200 East Area.

Table 1. C-018H Disposal Line Coordinates.

Current Coordinate Listing by Point Range				
Point	Northing	Easting	Elevation	Description
1301	46492.40	-46202.00	585.30	BH-1
1302	45876.00	-45881.00	591.40	BH-2
1303	46910.00	-46373.40	581.00	BH-3
1304	46910.10	-47138.00	581.70	BH-4
1305	46914.80	-53401.90	614.70	BH-5
1306	46917.40	-56358.20	637.40	BH-6
1307	46901.10	-58872.80	656.50	BH-7
1308	46749.90	-59695.70	664.30	BH-8
1309	46669.90	-63177.90	684.20	BH-9
1310	46458.10	-66635.50	700.20	BH-10
1311	46660.90	-73990.20	708.00	BH-11
1312	46720.60	-75984.60	683.60	BH-12
1313	47338.20	-76480.50	676.10	BH-13
1314	47981.40	-76961.10	671.60	BH-14
1315	48078.30	-76878.60	670.40	BH-15

Project: C-018H

Point Statistics:

Starting point number: 1

Max point number used: 1315

Min point number used: 2

Current point number: 1316

All materials brought to the surface will be monitored as described in the HWOP using radiation detectors and photoionization detectors (PID). When radioactive or chemical contamination which exceeds HWOP and RWP action levels is encountered, all excavation will be stopped. (All excavation work should cease immediately if any underground piping or other structures are encountered; contact Decommissioning Engineering before proceeding.) Personnel will leave the control area and the SSO/HPT will evaluate site conditions. Work activities will commence on approval by the KEH SSO.

As excavated soils are brought to the surface and monitored, they will also be observed for staining, discoloration, or other anomalies. "Suspect" soils will be analyzed using a standard procedure for headspace analysis of organic constituents. Headspace analysis will be analyzed with a PID equipped with a 10.5 eV lamp. Colormetric tubes will also be made available to confirm the presence of any ambient PID readings detected during the drilling process, to assess personnel exposures.

Sample collection from selected sites will generally occur when both chemical and radiological contamination is encountered at a single site or where either of these contamination sources appear to represent a "worst case" condition. Since the depth of excavation for the proposed pipeline will be 4 to 5 feet, the depth at which a sample may be collected, if any, is at the discretion of the Field Team Leader with input from the SSO and HPT. Random samples where no contamination is detected on field instruments will also be submitted as verification of instrument reliability and baseline reference documentation.

All samples will be collected in accordance with EII 5.2, "Soil and Sediment Sampling." The disposition of these samples for laboratory analysis is detailed in Section 3.7, "Sample Analysis."

3.3 FIELD SCREENING

Wherever conditions permit, field instruments will be used to identify areas of existing surface contamination as well as borehole cuttings or backhoe excavations for sample collection. Field instruments such as PIDs, an organic vapor analyzer/flame ionization detector, Geiger-Muller counters, and alpha detectors will be used for this purpose as described in EII 3.4, "Field Screening."

3.4 EQUIPMENT AND SUPPLIES

The following materials and equipment may be required to perform the outlined tasks:

- tractor, auger rig, backhoe
- vehicle barricades
- low-level waste drums and associated packaging
- plastic sampling jars
- glass sampling jars
- sample jar labels
- protection gloves
- ice chest with wet or "blue" ice
- absorbent (vermiculite) for shipping
- permanent marking pens

- sampling devices
 - trowels
 - spoons
 - augers
 - shovels
- plastic sealer bags
- evidence tag
- measuring tape
- other items as needed.

3.5 SITE CLEANUP

If contamination is encountered during excavation for this project, all waste material generated will be handled per C-018H project 242-A Evaporator/Purex Plant Process Condensate Treatment Facility Waste Handling Plan. This plan describes all responsibilities and methods in which waste generated by the C-018H project will comply.

3.6 DECONTAMINATION

All hand-held equipment which is used for the direct collection of samples will have been previously cleaned in accordance with EII 5.5, "Decontamination of Equipment for RCRA/CERCLA Sampling." A situation requiring cleaning of the auger or backhoe equipment in the field will conform with or be equivalent to the requirements outlined in EII 5.4, "Field Decontamination of Drilling, Well Equipment, and Sampling Equipment"; all associated activities will be recorded in the field logbook.

3.7 SAMPLE ANALYSIS

EII 5.2 contains general guidance which identifies container and preservation requirements. The contractor laboratory may request modifications to these recommendations as long as the data quality is not compromised. Sample containers are purchased pre-cleaned from a supplier providing certification of internal laboratory procedures.

Samples collected for radionuclide analyses will be transported to the 222-S Laboratory for processing. These samples will be analyzed for Gamma Specification to include Americium-241; additional analyses will include Strontium-90 as well as Total Plutonium and Total Uranium where alpha contamination is suspected. Total activity will also be conducted for off-site sample release.

A number of the remaining samples will be transported to an off-site contractor laboratory for analysis of hazardous wastes to include the target compound list and, where applicable, the target analyte list. Based on the data objectives, these samples will be analyzed using Level III protocols (EPA 1986) (Appendix A) (SAF# 93-232, Appendix B).

3.8 SHIPPING

All shipping requirements will conform with EII 5.11, "Sample Packaging and Shipping." Additional requirements for field preparation of samples are summarized in Section 4.0, Quality Assurance and Quality Control.

4.0 QUALITY ASSURANCE AND QUALITY CONTROL

The Data Quality Objectives of this sampling report will be to ensure that the information developed from field monitoring and sampling will be used to characterize existing contaminant levels for the Preoperational Baseline Survey C-018H Treatment Facility. The analytical laboratories are required to comply with Statement of Work purchase orders MBH-SVV069262-Rev-2 (TMA) and MBA-SVV230655-Rev-2 (Weston) for analytical data packages, develop personnel safety requirements, and determine the need for any changes in the proposed routes prior to construction of the pipeline.

To help ensure that all environmental characterization data collected are of sufficient quality to support decisions, all work on the Hanford Site is subject to the requirements of DOE Order 5700.6C (DOE 1991), which establishes broadly applicable Quality Assurance (QA) program requirements. QA program requirements so defined apply to all types of project activities conducted on the Hanford Site.

To ensure that the objectives of the past practice activities are met in a manner consistent with DOE Order 5700.6C (DOE 1991), all work will be performed in compliance with Westinghouse Hanford's existing QA manual, (WHC 1988d) and with procedures outlined in the QA program Plan (WHC 1990) specific to Comprehensive Environmental Response, Compensation, and Liability Act of 1980 remedial investigation/feasibility study activities. This QA program plan describes the various plans, procedures, and instructions that will be used by Westinghouse Hanford to implement the requirements of DOE 5700.6C.

4.1 FIELD QA/QC

To ensure Quality Assurance/Quality Control measuring, which provides consistent guidance in field work, a set of procedures designated as environmental investigation instructions (EII) have been developed by Westinghouse Hanford (WHC 1988a). A list of EII that may be utilized in this effort follows:

Task	EII
Sampling procedures	5.2
Sample handling	5.2, 5.11
Field documentation	1.5, 5.1, 5.10
Equipment decontamination	5.4, 5.5
Field screening	3.4
Site entry requirements	1.1
Deviation from procedures (EIIs)	1.4
Personnel requirements	1.1, 1.7
Health and safety requirements	1.1, 1.7, 3.2

Additional procedures are contained in the EII manual which may be applicable to specific field situations. Brief summaries of the primary activities involved in the field work for this task are summarized below.

4.2 SAMPLE COLLECTION

When samples have been collected, they will be controlled according to the requirements outlined in EII 5.2, "Soil and Sediment Sampling." All samples will be labeled, sealed, and placed in a container for preservation on ice or another appropriate cooling medium.

4.3 FIELD LOGBOOKS

All field activities will be recorded in a field logbook according to the protocols outlined in EII 1.5, "Field Logbooks." All entries will be made in ink, signed, and dated. Photographs should be taken of each sampling location and at the time and location of any unusual circumstances encountered during the investigation.

4.4 CHAIN OF CUSTODY

Chain-of-custody records will be kept to meet the requirements of EII 5.1, "Chain of Custody". The chain-of-custody form will establish the documentation necessary to ensure the traceability of the sample from time of collection until disposal.

4.5 SAMPLE ANALYSIS REQUEST

An approved laboratory will be selected to conduct all analyses (EII 1.11). The request for appropriate analyses will be included on the Westinghouse Hanford Sample Analysis Request form as provided in EII 5.2, "Soil and Sediment Sampling." Laboratory specific forms may be utilized in lieu of the Westinghouse Hanford form and will be made available by Hanford Analytical Services Management.

4.6 SAMPLING PLAN MODIFICATIONS

Under field conditions, the optimal aspects of preliminary sample design often are not achievable. Factors influencing these efforts can be equipment malfunction or breakdown, weather conditions, improper equipment, soil conditions, physical barriers to sampling equipment, and overly optimistic evaluation of capabilities. Because of unforeseen field conditions, modifications to the planned activity may be necessary as decided by the Field Team Leader (FTL). When conditions are encountered that require modifications in the field, the steps below will be followed.

1. Where routine field decisions are made by the FTL, necessary actions will be recorded in the field logbook along with the circumstances requiring the action.

2. Where modifications require deviation from the *Environmental Investigations and Site Characterization Manual* (WHC 1988a), EII 1.4, "Deviation from Environmental Investigations and Instructions," will be followed.

3. Circumstances may be encountered or objectives changed such that the basic sampling plan requires major modification. The FTL will submit the following information to the project file stating that deviation from the sampling plan is approved by Westinghouse Hanford:

- sampling plan title
- section or subsection to be modified (chapter title, page number) (quote section as given in sampling plan)
- modifications or deviations (quote modified, deleted, or added statement)
- technical summary of change
- impact of changes (cost, schedule)
- approvals (field team leader, field coordinator, ERA coordinator, Level 4 manager).

These procedures will provide an accurate record of modifications and Westinghouse Hanford approval while allowing sampling to proceed safely and maintaining efficient manpower and equipment usage.

5.0 REFERENCES

- DOE, 1991, *Quality Assurance*, Order 5700.6CU.S. Department of Energy, Washington, D.C.
- DOE, 1987, *Plan and Schedule to Discontinue Disposal of Contaminated Liquids Into the Soil Column at the Hanford Site*, DOE-0065, U.S. Department of Energy, Richland, Washington.
- EPA, 1986, *Test Methods for Evaluating Solid Waste (SW-846)*, SW-846, 3rd Edition, EPA/Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.
- WHC, 1987, *Industrial Safety Manual*, WHC-CM-4-3, 3 Vols., Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988a, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington
- WHC, 1988b, *Environmental Compliance*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1993, *Radiological Control Manual*, WHC-CM-1-6, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988d, *Quality Assurance*, WHC-CM-4-2, Westinghouse Hanford Company, Richland, Washington
- WHC, 1990, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383, Westinghouse Hanford Company, Richland, Washington

APPENDIX A
SW-846 METHODS, PRECISION, AND ACCURACY TABLES

REFERENCE:

EPA, 1986, *Test Methods for Evaluating Solid Waste (SW-846)*, 3rd Edition,
EPA/Office of Solid Waste and Emergency Response, U.S. Environmental
Protection Agency, Washington, D.C.

RADIOCHEMICAL ANALYSES PRECISION AND ACCURACY¹

Precision (expressed as Relative Percent Difference [RPD]):

- $\pm 35\%$ for Water and Soil Sample Matrices.

Accuracy (expressed as percent recovery):

- 30 - 105% for Water and Soil Sample Matrices. If sample activity is $> 4x$ the spike activity, recovery limits do not apply.

¹ Precision and Accuracy values are based on acceptance criteria for duplicate and matrix spike/chemical yield analyses contained in the document titled "Data Validation for Radiological Analyses," dated June 18, 1991.

Table 1. GC/MS Volatile Organics Analysis, Reference Number 8240.

ANALYSIS: GC/MS VOLATILE ORGANICS
 REFERENCE NUMBER: 8240
 REFERENCE DOCUMENT: SW-846

ANALYTE	GROUND WATER	LOW SOIL/SEDIMENT
	PRACTICAL QUANTITATION LIMIT ¹ (ug/L)	PRACTICAL QUANTITATION LIMIT ^{1,2} (ug/Kg)
Chloromethane	10	10
Bromomethane	10	10
Vinyl Chloride	10	10
Chloroethane	10	10
Methylene Chloride	5	5
Acetone	100	100
Carbon Disulfide	5	5
1,1 - Dichloroethene	5	5
1,1 - Dichloroethane	5	5
1,2 - Dichloroethane (total)	5	5
Chloroform	5	5
1,2 - Dichloroethane	5	5
2 - Butanone	100	100

Table 1. GC/MS Volatile Organics Analysis, Reference Number 824C. (cont.)

ANALYTE	GROUND WATER	LOW SOIL/SEDIMENT
	PRACTICAL QUANTITATION LIMIT ¹ (ug/L)	PRACTICAL QUANTITATION LIMIT ^{1,2} (ug/Kg)
1,1,1 - Trichloroethane	5	5
Carbon Tetrachloride	5	5
Vinyl Acetate	50	50
Bromodichloromethane	5	5
1,2 - Dichloropropane	5	5
cis - 1,3 - Dichloropropene	5	5
Trichloroethene	5	5
Dibromochloromethane	5	5
1,1,2 - Trichloroethane	5	5
Benzene	5	5
trans - 1,3 Dichloropropene	5	5
Bromoform	5	5
4 -Methyl-2-pentanone	50	50
2-Hexanone	50	50
Tetrachloroethene	5	5
Toluene	5	5
1,1,2,2 - Tetrachloroethane	5	5
Chlorobenzene	5	5
Ethyl Benzene	5	5

Table 1. GC/MS Volatile Organics Analysis, Reference Number 8240 (cont.)

ANALYTE	GROUND WATER	LOW SOIL/SEDIMENT
	PRACTICAL QUANTITATION LIMIT ¹ (uG/L)	PRACTICAL QUANTITATION LIMIT ^{1,2} (uG/Kg)
Styrene	5	5
Xylenes (total)	5	5

1. Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

2. PQLs listed for soil/sediment are based on wet weight. Normally data is reported on a dry weight basis; therefore, PQLs will be higher, based on the % moisture in each sample.

Table 2. Method 8240 Volatile Organics Precision and Accuracy.¹

ANALYTE	WATER		SOIL	
	PRECISION ²	ACCURACY ³	PRECISION ²	ACCURACY ³
1,1 - Dichloroethene	14	61-145	22	59-172
Trichloroethene	14	71-120	24	62-137
Benzene	11	76-127	21	66-142
Toluene	13	76-125	21	59-139
Chlorobenzene	13	75-130	21	60-133

1. The compounds presented in this Table have been selected to be representative of the Volatile Organic TCL. The precision and accuracy values given are advisory control limits only.

2. Expressed as Relative Percent Difference (RPD).

3. Expressed as percent recovery.

Table 3. GC/MS Semi-Volatile Organic Analysis, Reference Number 8270.

ANALYSIS: GC/MS SEMI-VOLATILE ORGANIC
 REFERENCE NUMBER: 8270
 REFERENCE DOCUMENT: SW-846

ANALYTE	GROUND WATER	LOW SOIL/SEDIMENT
	PRACTICAL QUANTITATION LIMIT ¹ (uG/L)	PRACTICAL QUANTITATION LIMIT ^{1,2} (uG/Kg)
Phenol	10	660
bis(2-Chloroethyl) ethyl	10	660
2 - Chlorophenol	10	660
1,3 - Dichlorobenzene	10	660
1,4 - Dichlorobenzene	10	660
Benzyl alcohol	20	1300
1,2 - Dichlorobenzene	10	660
2 - Methylphenol	10	660
bis(2-Chloroisopropyl) ether	10	660
4 - Methylphenol	10	660
N - Nitroso-Di-N-dipropylamine	10	660
Hexachloroethane	10	660
Nitrobenzene	10	660
Isophorone	10	660
2 - Nitrophenol	10	660
2,4 - Dimethylphenol	10	660

Table 3. GC/MS Semi-Volatile Organic Analysis, Reference Number 8270.(cont.)

ANALYTE	GROUND WATER		LOW SOIL/SEDIMENT	
	PRACTICAL QUANTITATION LIMIT ¹ (ug/L)		PRACTICAL QUANTITATION LIMIT ^{1,2} (ug/Kg)	
Benzoic acid	10		660	
bis(2-Chloroethoxy) methane	10		660	
2,4 - Dichlorophenol	10		660	
1,2,4 - Trichlorobenzene	10		660	
Naphthalene	10		660	
4 - Chloroaniline	20		1300	
Hexachlorobutadiene	10		660	
4 - Chloro-3-Methylphenol (para-chloro-meta-cresol)	20		1300	
2 - Methylnaphthalene	10		660	
Hexachlorocyclopentadiene	10		660	
2,4,6 - Trichlorophenol	10		660	
2,4,5 - Trichlorophenol	10		660	
2 - Chloronaphthalene	10		660	
2 - Nitroaniline	50		3300	
Dimethyl phthalate	10		660	
Acenaphthylene	10		660	
2,6 - Dinitrotoluene	10		660	
3 - Nitroaniline	50		3300	
Acenaphthene	10		660	

Table 3. GC/MS Semi-Volatile Organic Analysis, Reference Number 8270 (cont.)

ANALYTE	GROUND WATER	LOW SOIL/SEDIMENT
	PRACTICAL QUANTITATION LIMIT ¹ (ug/L)	PRACTICAL QUANTITATION LIMIT ^{1,2} (ug/Kg)
2,4 - Dinitrophenol	50	3300
4 - Nitrophenol	50	3300
Dibenzofuran	10	660
2,4 - Dinitrotoluene	10	660
Diethylphthalate	10	660
4 - Chlorophenyl phenyl ether	10	660
Fluorene	10	660
4 - Nitroaniline	50	3300
4,6 - Dinitro-2-methylphenol	50	3300
N - nitrosodiphenylamine	10	660
4 - Bromophenyl phenyl ether	10	660
Hexachlorobenzene	10	660
Pentachlorophenol	50	3300
Phenanthrene	10	660
Anthracene	10	660
Di-n-butylphthalate	10	660
Fluoranthene	10	660
Pyrene	10	660
Butyl benzyl phthalate	10	660

Table 3. GC/MS Semi-Volatile Organic Analysis, Reference Number 8270 (cont.)

ANALYTE	GROUND WATER	LOW SOIL/SEDIMENT
	PRACTICAL QUANTITATION LIMIT ¹ (ug/L)	PRACTICAL QUANTITATION LIMIT ^{1,2} (ug/Kg)
3,3' - Dichlorobenzidine	20	1300
Benzo(a)anthracene	10	660
Chrysene	10	660
bis(2-Ethylhexyl) phthalate	10	660
Di-n-octyl phthalate	10	660
Benzo(b)fluoranthene	10	660
Benzo(k)fluoranthene	10	660
Benzo(a)pyrene	10	660
Indeno(1,2,3-cd)pyrene	10	660
Dibenz(a,h)anthracene	10	660
Benzo(g,h,i)perylene	10	660

1. Sample PQLs are highly matrix-dependent. The PQLs listed herein are provided for guidance and may not always be achievable.

2. PQLs listed for soil/sediment are based on wet weight. Normally data is reported on a dry weight basis, therefore, PQLs will be higher based on the % moisture in each sample. This is based on a 30-g sample and gel permeation chromatography cleanup.

Table 4. Method 8270 Semi-Volatile Organics Precision and Accuracy.¹SW-846 METHOD 8270 SEMI-VOLATILE ORGANICS PRECISION AND ACCURACY¹

ANALYTE	WATER		SOIL	
	PRECISION ²	ACCURACY ³	PRECISION ²	ACCURACY ³
Phenol	42	12-89	35	26-90
2 - Chlorophenol	40	27-123	50	25-102
1,4 - Dichlorobenzene	28	36-97	27	28-104
N - Nitroso-di-n-dipropylamine	38	41-116	38	41-126
1,2,4 - Trichlorobenzene	28	39-98	23	38-107
4 - Chloro-3-Methylphenol (para-chloro-meta-cresol)	42	23-97	33	26-103
Acenaphthylene	31	46-118	19	31-137
4 - Nitrophenol	50	10-80	50	11-114
2,4 - Dinitrotoluene	38	24-96	47	28-89
Pentachlorophenol	50	9-103	47	17-109
Pyrene	31	26-127	36	35-142

1. The compounds presented in this Table have been selected to be representative of the Semi-Volatile TCL. The precision and accuracy values given are advisory control limits only.

2. Expressed as Relative Percent Difference (RPD).

3. Expressed as percent recovery.

Table 5. Pesticides/PCB's Analysis, Reference Number 8080.

ANALYSIS: PESTICIDES/PCB'S
 REFERENCE NUMBER: 8080
 REFERENCE DOCUMENT: SW-846

ANALYTE	METHOD DETECTION LIMIT ^{1,2} (ug/L)
alpha-BHC	0.003
beta-BHC	0.006
delta-BHC	0.009
gamma-BHC (Lindane)	0.004
Heptachlor	0.003
Aldrin	0.004
Heptachlor epoxide	0.083
Endosulfan I	0.014
Dieldrin	0.002
4,4' - DDE	0.004
Endrin	0.006
Endosulfan II	0.004
4,4' - DDT	0.012
Methoxychlor	0.176
Endrin aldehyde	0.023
Chlordane (technical)	0.014
Toxaphene	0.24

Table 5. Pesticides/PCB's Analysis, Reference Number 8080.(cont.)

ANALYTE	METHOD DETECTION LIMIT ^{1,2} (ug/L)
PCB-1016	nd
PCB-1221	nd
PCB-1232	nd
PCB-1242	0.065
PCB-1248	nd
PCB-1254	nd
PCB-1260	nd

nd = not determined

1. To determine Practical Quantitation Limits (PQL), multiply the MDL by the following factors (for non-aqueous samples the factor is on a wet weight basis).

Groundwater	10
Low-level soil w/ GPC cleanup	670
High-level soil	10,000

2. Sample PQLs are highly matrix dependent. The PQLs listed are provided for guidance and may not always be achievable.

Table 6. Method 8080 PCB's/Pesticides Precision and Accuracy.¹SW-846 METHOD 8080 PCB'S/PESTICIDES PRECISION AND ACCURACY¹

ANALYTE	WATER		SOIL	
	PRECISION ²	ACCURACY ³	PRECISION ²	ACCURACY ³
gamma-BHC (Lindane)	15	56-123	50	46-127
Heptachlor	20	40-131	31	35-130
Aldrin	22	40-120	43	34-132
Dieldrin	18	52-126	38	31-134
Endrin	21	56-121	45	42-139
4,4' - DDT	27	38-127	50	23-134

1. The compounds presented in this Table have been selected to be representative of the PCB/Pesticide TCL. The precision and accuracy values given are advisory control limits only.

2. Expressed as Relative Percent Difference (RPD).

3. Expressed as percent recovery.

Table 7. TAL Inorganics Analysis.

ANALYTE	REFERENCE NUMBER	ESTIMATED INSTRUMENTAL DETECTION LIMITS ¹ (ug/L)	PRECISION ²	ACCURACY ³
Aluminum	6010	45		75-125
Antimony	6010	32		75-125
Arsenic	7060	1		75-125
Barium	6010	2		75-125
Beryllium	6010	0.3		75-125
Cadmium	6010	4		75-125
Calcium	6010	10		75-125
Chromium	6010	7		75-125
Cobalt	6010	7		75-125
Copper	6010	6		75-125
Iron	6010	7		75-125
Lead	7421	1		75-125
Magnesium	6010	30		75-125
Manganese	6010	2		75-125
Mercury	7470/7471	0.2		75-125
Molybdenum	6010	8		75-125

Table 7. TAL Inorganics Analysis. (cont.)

ANALYTE	REFERENCE NUMBER	ESTIMATED INSTRUMENTAL DETECTION LIMITS ¹ (ug/L)	PRECISION ²	ACCURACY ³
Nickel	6010	15		75-125
Potassium	6010	see note ⁴		75-125
Selenium	7740	2		75-125
Silver	6010	7		75-125
Sodium	6010	29		75-125
Thallium	7841	1		75-125
Vanadium	6010	8		75-125
Zinc	6010	2		75-125

A-17

1. The estimated instrumental detection limits are given as a guide for an instrumental limit. The actual method detection limits are sample dependent and may vary as the sample matrix varies.
2. Control limits: ± 20 (expressed as RPD) for water and $\pm 35\%$ for soil for sample concentrations $> 5X$ CRDL; $\pm$ CRDL for water and $\pm 2X$ for CRDL soil for one or both sample values $< 5X$ CRDL.
3. Accuracy is 75-125% for water and soil. However, control limits do not apply if sample concentration exceeds spike concentration by a factor of 4 or more.
4. Highly dependent on operating conditions and plasma position.

Table 8. General Chemistry Analyses.

Method #	Analyte	Detection Level (mg/L) ¹	Accuracy	Precision
EPA 300.0	chloride	0.25	75-125	± 20
300.0	fluoride	0.50	75-125	± 20
300.0	nitrate	0.25	75-125	± 20
300.0	nitrite	0.25	75-125	± 20
300.0	phosphate	0.25	75-125	± 20
300.0	sulfate	0.25	75-125	± 20
EPA 350.3	ammonia (as N)	0.10	75-125	± 20
SW-846 9010 / CLP	cyanide (tot)	0.01	75-125	± 20

↓ Detection levels are highly matrix dependent and may not always be achievable in all matrices. Detection levels are not specified for non-aqueous and soil matrices and will be higher.

Table 9. Soil and Other Matrices Detection Limits and Units.

ANALYSIS	DETECTION LIMIT	UNITS
SOIL AND OTHER MATRICES		
Gross Alpha	10	pCi/g
Gross Beta	15	pCi/g
GEA - Co-58	0.05	pCi/g
Fe-59	0.05	
Co-60	0.05	
Cs-137	0.1	
Eu-152	0.1	
Eu-154	0.1	
Eu-155	0.1	
Ra-226	0.1	
Ra-228	0.2	
Tritium	400	pCi/g
C-14	50	pCi/g
Ni-63	30	pCi/g
Sr-89	1	pCi/g
Sr-90	1	pCi/g
Tc-99	15	pCi/g
I-129 (TMA only)	2	pCi/g
Pb-210 (Soil only)	5	pCi/g
Total Radium (Weston only)	5	pCi/g
Th-230/232 ¹	1	pCi/g
Uranium Isotopic (U-234, U-235, U-238)	1	pCi/g
Total Uranium (Laser Kenetic Phos.)	1	ug/g
Np-237	1	pCi/g
Pu-239/240	1	pCi/g
Pu-241	15	pCi/g
Am-241	1	pCi/g
Cm-244 ¹	1	pCi/g
¹ Analysis only available from Weston as part of "Specific Radionuclide Identification...." Analyses		

APPENDIX B
SAMPLING AUTHORIZATION FORM
(SAF# 93-232)

WHC-SD-EN-AP-145 REV. 0

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WHC-SD-EN-AP-145, Rev. 0

OFFICE OF SAMPLE MANAGEMENT
SAMPLING AUTHORIZATION FORM
SAF # 93-232

8/11/93

REV. 0

DATE: 08/11/93

PROJECT NUMBER 93-232PROJECT TITLE Effluent Facility BaselineingOSH PROJECT COORDINATOR J. A. LerchOPERABLE UNIT/TSD N/ACUSTOMER NAME S. J. GuzekPHONE # 376-1971MSIN H6-04ORGANIZATION/CODE 81353CHARGE CODE E19973

SAMPLING DATE _____

NUMBER OF SAMPLES 32SAMPLING LOCATION 200E/600 Areas

- SAMPLE PRIORITY: 1. EXPEDITED RESPONSE ACTION
2. TPA RANKING _____
3. ☒ NON-TPA RANKING _____

ANALYTICAL PROTOCOLS: CERCLA ☒ RCRA ☒ OTHER (specify) _____

DATA TURNAROUND REQUIREMENTS: PRIORITY ☒ REGULAR ☒ RADCHEM

SAMPLE MATRIX: ☒ SOIL/SEDIMENT
SLUDGE

WATER
CONCRETE

VEGETATION
OTHER _____

OILS

LABORATORY SERVICES ON-SITE

☒ OFF-SITE

LABORATORY

LABORATORY CONTACT

TELEPHONE

Weston (Main)Not ApplicableN/ATMA (Spillt)Not ApplicableN/A

COMMENTS:

WHC-SD-EN-AP-145, Rev. 0

JF 8/11/93

OFFICE OF SAMPLE MANAGEMENT FIELD SAMPLING REQUIREMENTS

93-132
SAF Number

Requirements are for Weston

REV 0

08/11/93

PARAMETER/ ANALYSIS	ANALYTICAL METHODS	CONTAINER/ VOLUME	PRESERVATION	HOLDING TIME
1. VOA	8240	Gs 125 mL	None	14 Days
2. Semi-VOA	8270	ag 500 mL	None	7 Days ²
3. PCB/Pest	8080	ag 250 mL	None	7 Days ²
4. Organophosphorus Pest	8140	ag 250 mL	None	7 Days ²
5. Herbicides	8150	ag 250 mL	None	7 Days ²
6. ICP Metals	6010			6 Months
Arsenic	7060	P 500 mL	None	6 Months
Lead	7421			6 Months
Selenium	7740			6 Months
Thallium	7841			6 Months
Mercury	7471			28 Days
7. Cyanide	9012	G 250 mL	None	14 Days
8. Anions F, Cl, SO ₄	EPA 300.0	G 250 mL	None	28 Days
9. NO ₂ - NO ₃	EPA 353.1	P/G 125 mL	None	28 Days
10. Sulfide	9030	G 125 mL	None	7 Days
11. Gross Alpha Gross Beta Gamma Spec.	PRO-032-15 PRO-032-15 PRO-042-5	P/G 500 mL	None	6 Months
Sr-90 Pu-239/240 Isotopic Uranium	PRO-032-38, PRO-032-25 PRO-052-32 PRO-052-32			
12. Total Activity	LA-528-111 LA-548-121	G or P small vial (at least 1g)	None	ASAP

¹ Container Types:

- P = Plastic (Polyethylene)
- G = Glass
- Gs = Glass w/septum cap
- Gw = Glass/wide mouth jar
- Gs = Glass w/septum cap --

No head space in container

- Pw = Plastic (Polyethylene)/wide mouth jar
- PP = Polypropylene
- ag = Amber Glass
- T = Fluorocarbon Resins

² 7 Days for Extraction, 40 Days for Analysis

³ Chloride analysis may require a plastic container depending on sample acidity.

WHC-SD-EN-AP-145, Rev. 0

OFFICE OF SAMPLE MANAGEMENT FIELD SAMPLING REQUIREMENTS

93-232
SAF Number

Requirements are for TMA

REV 0

08/11/93

PARAMETER/ ANALYSIS	ANALYTICAL METHODS	CONTAINER ¹ / VOLUME	PRESERVATION	HOLDING TIME
1. VOA	8240	Gs 250 mL	None	14 Days
2. Semi-VOA	8270	ag 250 mL	None	7 Days ²
3. PCB/Pest	8080	ag 250 mL	None	7 Days ²
4. Organophosphorus Pest	8140	ag 250 mL	None	7 Days ²
5. Herbicides	8150	ag 300 mL	None	7 Days ²
6. ICP Metals	6010			6 Months
Arsenic	7060	P 250 mL	None	6 Months
Lead	7421			6 Months
Selenium	7740			6 Months
Thallium	7841			6 Months
Mercury	7471			28 Days
7. Cyanide	9010	G 125 mL	None	14 Days
8. Anions P, Cl, SO ₄	EPA 300.0	G ³ 125 mL	None	28 Days
9. NO ₂ - NO ₃	EPA 353.2	P/G 125 mL	None	28 Days
10. Sulfide	9030	G 250 mL	None	7 Days
11. Gross Alpha Gross Beta Gamma Spec.	EP-10 EP-10 RC-30	P/G 500 mL	None	6 Months
Sr-90 Pu-239/240 Isotopic Uranium	RC-306, RC-303, RC-309, RC-304 EP-80, EP-81, EP-5 EP-70, EP-71, EP-5			
12. Total Activity	LA-528-111 LA-548-121	G or P small vial (at least 1g)	None	ASAP

¹ Container Types:

P = Plastic (Polyethylene)

G = Glass

Gs = Glass w/septum cap

Gu = Glass/wide mouth jar

Gg = Glass w/septum cap --

No head space in container

Pu

= Plastic (Polyethylene)/wide mouth jar

PP

= Polypropylene

ag

= Amber Glass

T

= Fluorocarbon Resins

² 7 Days for Extraction, 40 Days for Analysis³ Chloride analysis may require a plastic container depending on sample acidity.

END

**DATE
FILMED**

11/23/93