ATTACHMENT A
FIELD SAMPLING PLAN

ATTACHMENT A - FIELD SAMPLING PLAN

1.0 INTRODUCTION

This section provides a detailed description of the specific sampling and analysis procedures for data collected during the site characterization work at the old machine shop Everett Mill E site in Everett, Washington. The proposed exploration plan includes soil borings, test pits, and groundwater monitoring wells. The location, depth, and sampling details are presented in the Site Characterization Work Plan. A sampling location plan is shown on Figure 4.

2.0 DRILLING

This section presents the field procedures to be used during soil borings and monitoring well installation at the site.

The equipment and procedures recommended for drilling, sampling, decontamination, groundwater monitoring well installations and developments, and borehole closure are discussed below.

2.1 Auger Drill Rig and Ancillary Equipment

The drill rig and ancillary equipment to be used for the drilling are as follows:

- Hollow-stem auger (HSA) drill rig (e.g., CME 75 or Mobile B-61 drill rig);
- Nominal 4-inch inside diameter hollow-stem auger (HSA) drill sections;
- Standard 1.5-inch inside diameter, split-barrel samplers to be driven by a 140-pound hammer with a 30-inch fall;
- Grout pump capable of mixing bentonite-cement grout to manufacturer's recommended specifications;
- Steam cleaner unit; and
- Service truck with water tank and ancillary equipment.

Standard HSA drilling techniques are to be used. No grease will be used on the HSA section joints or accessory tooling. If heavy soil conditions are encountered and all other standard methods (e.g., spinning the auger, using a plug, etc.) fail to allow proper placement of well screen or advancement of the hole, only then will water be used as to install the screen. Only clean water will be added to the borehole and a sample of this water will be collected for possible analysis.

2.2 *Equipment Decontamination*

Before any work begins, the drill rig, the HSA sections, and the downhole equipment will be steam cleaned. Between each boring the following decontamination procedures will be used on the boring and the downhole soil sampling equipment:

- On-site fire hydrant water or another source of clean water will be used for washing and steam cleaning of the equipment;
- Clean water will be used to wash off soil and borehole cuttings. If gross contamination is present, then the equipment will be washed with an Alconox solution and brushes; and
- Steam water will be used to wash off the equipment as the final decontamination.

All downhole soil sampling equipment will be decontaminated using the following procedures before each sample is taken.

- The sampler will be washed with clean water;
- The sampler will then be washed in an Alconox solution; and
- The sampler will then be rinsed in successive baths of tap water and de-ionized water.

3.0 SOIL SAMPLING

3.1 *Soil Sampling - Borings*

Soil samples will be collected as follows:

- Soil samples will be taken at 2.5-foot-depth intervals using split-barrel sampler as described in ASTM Standard D 1586 "Penetration Test and Split-Barrel Sampling of Soils";

- After the sampler is retrieved, the sampler will be placed on a clean surface;
- The split-barrel will then be opened and the soil sample split longitudinally. One half of the sample will then be placed in the sampling jar supplied by the laboratory (samples could be split longitudinally again if duplicate samples are collected);
- The sample jar will be wiped clean and capped with a Teflon-lined lid, then placed in a cooled ice chest; and
- The remaining half sample will be placed in a clean plastic sample jar and capped for sample jar headspace measurements and soil description.

3.2 Soil Sampling - Test Pits (if required)

Test pits will be excavated to approximately one to two feet below the groundwater table using a backhoe. A stainless-steel spoon will be used to remove sample material from the center of the backhoe bucket. Samples will be composited in a covered stainless-steel bowl before placing in sample jars. Samples collected for headspace and volatile organic analyses will be placed directly from the backhoe bucket into sampling jars.

Sampling equipment and the backhoe bucket will be cleaned before and after each test pit excavation. The backhoe bucket and a portion of the connection boom will be thoroughly cleaned using a hot water pressure washer with a Alconox first stage and a secondary rinse. Sampling equipment will be hand washed using a Alconox solution followed by successive rinses of tap and deionized water.

Test pits will be backfilled with the excavated soil using the backhoe. A stake will be used to mark the test pit location.

3.3 *Sample Jar Headspace Measurement*

Soil samples for sample jar headspace measurements will be collected as described above.

- The sample jar will be placed in a box and allowed to equilibrate with ambient temperature conditions for a nominal standing time of 10 minutes;
- An H-Nu Photoionization Detector, Model PID 101, with a 10.2 eV lamp will be used to take the measurements;
- The sample jar lid is unscrewed and tilted above the top of mouth of jar in a manner to let only tip of H-Nu Detector extension probe into headspace area of sample jar (an alternative method using jars tightly covered with aluminum foil is also acceptable);
- The field headspace measurement for the soil sample is then measured from the H-Nu meter;
- Sample jar is recapped; and
- H-Nu meter measurement is recorded on the field boring log for the appropriate sample. Also recorded is the time of the measurement and the time the jar was capped to allow documentation of the sample equilibration time.

3.4 *Soil Description*

A record of drilling and sampling operations will be maintained on a Field Boring Log form. Soil descriptions will be prepared using the system shown on Figure A-1, Key to Exploration Logs. Other pertinent data to be recorded on the logs include:

- Sample interval, type, and recovery
- Blow count (penetration resistance) from drive samples
- Sample jar headspace measurements
- Drill action

Once the soil from the sample is described, the soil from the field headspace jar will either be stored for subsequent mechanical analysis if specified in the Site Characterization Work Plan or emptied from the jar into the drill cutting container. The empty jar will be rinsed and discarded.

3.5 Hole Abandonment

Boreholes which are not completed as monitoring wells will be closed by grouting with cement-bentonite grout. The surface will be restored with appropriate pavement or surfacing material. Holes will be abandoned in accordance with Chapter 173-160 WAC "Minimum Standards for Construction and Maintenance of Wells."

4.0 GROUNDWATER MONITORING WELL INSTALLATION

Groundwater monitoring wells will be installed in conformance with Chapter 173-160 WAC "Minimum Standards for Construction and Maintenance of Wells."

4.1 Well Installation Procedures

Groundwater monitoring wells will be installed after the borehole is drilled to depth as follows:

- Two-inch inside diameter, flush threaded, schedule 40, PVC screen (0.020-inch slots) and riser pipe will be used;
- The well screen and riser pipe will be cleaned as described in Section 2.2 - *Equipment Decontamination;*
- The PVC screen and riser pipe will be lowered down through the hollow-stem auger;
- As the auger sections are pulled out, silica sand (Number 10 to 20) will be placed around and approximately 3 feet above the screen section. The sand pack around the well screen will be recorded by sounding inside the annular space with a weighted measuring tape;
- A thin (1- to 5-inch-thick) layer of Number 35 sand will be placed on top of the 10 to 20 silica sand;
- A 2-foot-thick bentonite seal is to be placed above the sand pack. Above the groundwater this seal will consist of bentonite pellets moistened with clean water. Below the

groundwater the seal will consist of Volclay bentonite grout. A tremie pipe will be used to place the Volclay bentonite grout;

- The remaining annular space between the PVC riser pipe and the natural soil will be sealed with cement-bentonite grout. The cement-bentonite will extend from the top of the bentonite seal to the base of the surface monument. A tremie pipe will be used to place the cement-bentonite grout;
- A concrete surface seal is then placed above the cement-bentonite grout seal at ground surface;
- A steel flush-to-the-ground water-proof or stick-up monument (depending on the well location), set in concrete, will be placed over the finished groundwater monitoring well installation for security protection;
- If a stick-up type of monument is installed, then three steel posts will be placed around the monitoring well monument for traffic protection; and
- Each well will then be vented and secured with a padlock.

4.2 *Groundwater Monitoring Well Development*

Groundwater monitoring wells will be developed before they are sampled as follows:

- A stainless-steel, bottom filling, bailer will be used to surge and remove the sediment in the screened section of the groundwater monitoring well;
- Hand bailing or pumping (using a ditch pump with new, clean hose, or other type of developing pump) will be continued until the groundwater becomes clear or when the turbidity content significantly decreases;
- At least four casing volumes of groundwater will be removed during development (if well is not bailed or pumped dry first);
- All equipment that goes into the well will be decontaminated before use as described in Section 2.2; and

- A new length of polyethylene rope will be used for the bailer at each well site.

4.3 *Groundwater Monitoring Well Vertical Control Survey*

The top of casing for each of the new groundwater monitoring wells will be surveyed to the same relative vertical elevation datum as the existing wells with an accuracy of 0.01 foot.

5.0 GROUNDWATER SAMPLING

The following sections discuss the equipment and procedures to be used for sampling and handling of groundwater samples.

5.1 *Equipment*

The following equipment will be used for groundwater sampling:

- pH, temperature, EC meter, redox probe;
- Electronic well sounder or steel tape;
- Product well sounder (Flexidip);
- Stainless-steel or Teflon bottom-filling bailer;
- Purging pump (ditch pump or other type of pump with clean hosing);
- Filtering equipment;
- Portable photoionization detector (H-Nu);
- New, clean polyethylene rope;
- Appropriate sampling containers;
- Ice and cooler; and
- Sample Custody Record.

5.2 *Groundwater Sampling Procedure*

In order to reduce potential cross contamination, groundwater samples will be collected first from wells believed to contain little or no contamination. Groundwater samples will be collected using the following procedure:

- The general condition of the well and immediate area will be noted and recorded.

- After the well has been opened, a portable photoionization detector (H-Nu) will be used to screen for the presence of volatile organic compounds in the well headspace. H-Nu measurements will be recorded and used to determine the appropriate health and safety protection required during sampling activities.

- A product well sounder will be lowered into the well to determine if free product is present and measure the depth and thickness of the product (if present). The product and electronic well sounder will be sprayed with water, wiped with a clean towel, and rinsed with deionized water before being lowered into the well. The sampling of wells containing free product is discussed in section 6.0.
- The depth to water level from the top of casing will be measured with an electronic well probe to a precision of 0.05 foot and recorded.
- Prior to sampling, three to five casing volumes of water will be removed from the well using a clean stainless steel bailer or peristaltic pump. Water purged from the wells will be placed into a 55-gallon drum.
- Groundwater samples will be collected with a clean stainless steel bailer. Bailers will be decontaminated by washing with alconox/water solution by successive rinses with tap water, methanol, and deionized water. The bailer will be lowered into the well with clean polypropylene rope.
- Groundwater retrieved from the monitoring well will be poured into clean sampling containers supplied by the analytical laboratory and capped. All sampling containers not containing preservatives will be rinsed with the water to be sampled before collecting the sample. Samples for volatile analysis will be collected first. Volatile sample containers will be slowly filled with water, capped, inverted, and tapped to ensure no air bubbles remain. If samples contain bubbles, the procedure will be repeated. All sample containers will be filled slowly to minimize turbulence. Groundwater samples collected for dissolved metal analysis will be filtered in the field using a peristaltic pump and an in-line 0.45 micron filter before being placed in the appropriate sample containers. Field blanks will be collected in a similar manner.

- Groundwater samples will immediately be placed in a cooled ice chest. Samples collected for volatile analysis will be placed in plastic sealable bags to minimize cross contamination. Samples suspected of containing high concentrations of organic contaminants will be stored in a separate cooler. Chain of custody seals will be placed over all sample containers.

- After samples for chemical analysis have been collected, a sample will be obtained for field measurement of temperature, pH, electrical conductivity, and redox potential.

- Groundwater sampling activities will be documented on Hart Crowser's Field Groundwater Sampling Data Form (Figure A-2).

- Samples collected for chemical analysis will be transported to the analytical laboratory using chain of custody procedures (see Attachment B).

6.0 PRODUCT SAMPLING

If free product is present in any of the monitoring wells, a sample will be collected for chemical analysis. Because free product that has been present in a well for an extended period of time may be degraded through loss of volatiles, the wells will be purged and allowed to stabilize for at least 12 hours prior to sampling. A product sampling bailer will be used to collect floating free product samples. The bailer will be lowered slowly with clean polypropylene rope to just above the free product-water contact. After the sample has been collected, free product will be poured slowly into clean glass containers provided by the laboratory. If free product is encountered which has a density greater than water (sinker), the product will be sampled using a double check valve bailer or a peristaltic pump. Sample containers will be placed in chilled coolers and transported to the laboratory. Product samples will not be stored in the same cooler as groundwater samples.

7.0 SAMPLE PROTOCOL

Appropriate sample containers provided by the receiving analytical laboratory will be used. Each container will be labeled with an indelible marker or pre-applied labels supplied by the analytical laboratory. Time, date, initials of sampler, site location, and well name will be shown on the label. Sampling activities will be recorded on the record form or log. A chain of custody record should be completed (Figure A-3).

Samples will be placed with appropriate packing in transport containers provided by the receiving laboratory immediately after sampling. After sampling is completed and the samples are packed, the container will be sealed and labeled with a custody seal and identification label.

The chain of custody record will be completed when samples are delivered to the analytical or mobile laboratory. At a minimum, the following will be included:

- Client identification information;
- Name of person receiving the samples;
- Condition of transport and sample containers;
- Verification of sample containers and chain of custody record;
- Time and data samples delivered to analytical laboratory;
- Allocation of samples; and
- Required sample analysis.

If any discrepancies between the chain of custody record and the samples delivered to the analytical laboratory exist, these discrepancies will be resolved before any analysis is done. A copy of the chain of custody record is retained and provided to the appropriate QA officer as described in Attachment B.

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

Minor Constituents	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

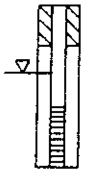
BORING SAMPLES

☒	Split Spoon
⧅	Shelby Tube
▥	Cuttings
◫	Core Run
*	No Sample Recovery
P	Tube Pushed, Not Driven

TEST PIT SAMPLES

☒	Grab (Jar)
⧄	Bag
⧅	Shelby Tube

Ground Water Observations



Surface Seal

Ground Water Level on Date (ATD) At Time of Drilling

Observation Well Tip or Slotted Section

♀ Ground Water Seepage (Test Pits)

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits

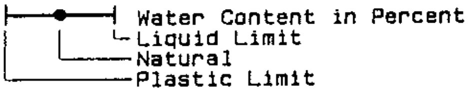


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Figure A-1

Field Groundwater Sampling Data Form

Groundwater Sampling Data

Project ______________________ Job No. __________

Field Rep. ______________________ Date __________

WELL NUMBER	DATE SAMPLED	WELL DEPTH IN FEET	DEPTH TO WATER IN FEET	DEPTH TO SEDIMENT IN FEET	SEDIMENT THICKNESS IN FEET	METHOD OF SAMPLING	TIME SAMPLED	SAMPLER'S INITIALS	T °C	pH	EC IN µMHOS	CASING VOLUME IN GALLONS	PURGE VOLUME IN GALLONS

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Figure A-2

Field Sample Custody Record Form

Sample Custody Record

DATE ________ PAGE ____ OF ____

HARTCROWSER
1910 Fairview Avenue East
Seattle, Washington 98102-3699
206 324 9530

JOB NUMBER ________

PROJECT ________

SAMPLERS (SIGNATURE)

SAMPLE	DATE	TIME	STATION	TESTING										NO. OF CONTAINERS	OBSERVATIONS/ COMMENTS/ COMPOSITING INSTRUCTIONS

RELINQUISHED BY Signature Printed Name Company	**DATE** **TIME**	**RECEIVED BY** Signature Printed Name Company	**DATE** **TIME**	**TOTAL NUMBER OF CONTAINERS**
				METHOD OF SHIPMENT
RELINQUISHED BY Signature Printed Name Company	**DATE** **TIME**	**RECEIVED BY (LAB)** Signature Printed Name Company	**DATE** **TIME**	**SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS**

DISTRIBUTION: WHITE, CANARY TO HART CROWSER • PINK TO LAB

HARTCROWSER
J-2395-02 4/89
Figure A-3

ATTACHMENT B
QUALITY ASSURANCE PLAN

ATTACHMENT B
QUALITY ASSURANCE PLAN

1.0 INTRODUCTION

This plan presents the quality assurance (QA) program which will be used by Hart Crowser, Inc., and our subcontractors conducting the sampling and testing activities at the old machine shop Everett Mill E located in Everett, Washington. The activities covered by this plan include:

- Soil sampling,
- Well installation,
- Measuring water levels,
- Groundwater sampling, and
- Chemical analysis of soil and groundwater samples.

This Quality Assurance Plan supports the Sampling Plans which are presented in the main report text.

2.0 OBJECTIVES

The primary objective of this Quality Assurance (QA) Plan is to present what we will do to assess and document the precision, accuracy, completeness, and representativeness of project data. This plan also provides guidance for documentation of information collected in the field, sample custody, and field quality control samples.

Data Quality Objectives

Data objectives are presented in the Sampling Plans. These include decisions and activities related to data needs. Target goals for specific data quality criteria are presented herein. Sampling and analytical protocols will be conducted in general accordance with appropriate state and federal guidelines and regulations.

2.1 Mobile Laboratory Quality Control

In order to provide quick sample quality data, analytical methods used by mobile laboratories are typically screening methods. These screening methods cannot be evaluated in the same manner as accepted EPA methods. However, the quality of data produced by Hart Crowser's mobile laboratory will be evaluated as follows:

- Field duplicates will be collected from five percent of the soil samples collected and analyzed by the mobile laboratory;
- Split samples obtained from ten percent of the total number of soil samples analyzed by the mobile laboratory will be submitted to a laboratory for verification; and
- At least one laboratory method blank, duplicate and spiked sample will be analyzed for every 20 samples submitted to the mobile laboratory.

Quality control data will be evaluated by an environmental chemist to determine the validity of data produced by the mobile laboratory.

2.2 Laboratory Quality Control

The following factors will be analyzed to determine the quality of data produced by the laboratory.

Precision. Laboratory precision will be evaluated by analysis of matrix spike, and matrix spike duplicates. Specific relative percent differences (RPD) will be used to evaluate duplicate analyses.

Accuracy. Laboratory accuracy will be evaluated by the recoveries of matrix spikes, matrix spike duplicates, analysis of standards, and evaluation of procedural blanks. Acceptable ranges of recoveries will be based on guidelines for data validation, though in some cases, the laboratory has established in-house control limits. In either case the more conservative control limit will be used.

The frequency of sample analyses for analytical precision and accuracy will be covered in the laboratory work order. The ranges for these parameters will be within established guidelines. During analysis of the samples, the laboratory will inform Hart Crowser if there is difficulty in meeting the target guidelines.

Sample results and QA information will be reviewed after receipt from the laboratory.

Data will be reviewed in accordance with Laboratory Data Validation Functional Guidelines published by EPA. A data validation report will be provided based on this review.

3.0 PROJECT QUALITY ASSURANCE ORGANIZATION AND RESPONSIBILITIES

Quality assurance will be the responsibility of several individuals. These individuals and their responsibility are summarized in Table B-1.

Table B-1 - Personnel Responsible for Quality Assurance Activities

Personnel	Responsibilities
Hart Crowser, Inc. Project Manager	Oversee project performance to ensure contract compliance. Implement necessary action and adjustments to accomplish program objectives. Monitor field investigations. Coordinate field and laboratory sample tracking. Act as liaison between technical project team, Weyerhaeuser, and other interested agencies.
Project QA Coordinator	Provide technical QA assistance. Arrange contract or other external procurement packages for QA needs. Coordinate corrective actions. Oversee all contractor QA activities to ensure compliance with contract specifications. Direct implementation of QA contractor plan. Prepare and submit QA project reports to project manager.
Project QA Officers	Document that sample receipt and custody records are properly handled; instruments are calibrated and maintained as specified; internal quality control measures and analytical methods are performed as required; corrective action is taken and QA coordinator is notified when problems occur; and data and QA information are reported.

4.0 FIELD SAMPLING QUALITY CONTROL

The accuracy of data generated for this project depends on sampling procedures that are well conceived and properly implemented. The following sections provide guidance on accurate recording of field sample collection on proper forms and chain of custody requirements.

Sample Handling

Field samples will be collected according to the Sampling Plans. To control the quality of laboratory analysis of samples, established preservation and storage measures will be taken. Table B-2 presents container type, preservation, and storage parameters, and maximum holding times for various chemical analyses for water and soils.

Table B-2 - Sample Handling Requirements

Analyses	Matrix	Container[a]	Preservative and Storage	Maximum Holding Time[b]
Volatile Organics	Water	G, teflon-lined caps	4° C no headspace	7 days until analysis
	Soil	G, teflon-lined caps	4° C no headspace	14 days until analysis
Semivolatile Organics	Water	Amber G,teflon-lined caps	4° C	7 days until extraction; 40 days until analysis
	Soil	G, teflon-lined caps	4° C	14 days until extraction; 40 days until analysis
Metals (c)	Water	Polyethylene	Nitric Acid, pH 2, 4° C	180 days until analysis
	Soil	G	4°C	180 days until analysis
Dibenzo dioxins(DBD) Dibenzo furans(DBF)	Soil	G, teflon-lined caps	4° C no headspace	30 days until extraction; 45 days until analysis
Pentachlorophenol	Soil	G, teflon-lined caps	4° C	14 days until extraction; 40 days until analysis
Polychlorinated Biphenyls (PCBs)	Soil	G, teflon-lined caps	4° C	14 days until extraction; 40 days until analysis

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(a) Appropriate containers will generally be obtained from the laboratory performing analyses and will conform to their specifications. G-glass

(b) Samples should be analyzed as soon as possible after collection. The times listed are the maximum times samples may be held from date of collection until date of extraction or analysis as specified. Holding times specified apply only to first extractions or analysis and not to subsequent re-extraction or re-analysis.

(c) Dissolved metal samples should be filtered immediately on-site before adding of preservative.

4.1 *Sample Collection Documentation*

Boring Logs

As drilling or excavation progresses and subsurface soil samples are obtained, a qualified field representative will describe the drilling or excavation conditions and nature of the samples on a boring log. Soil samples will be described in general accordance with the visual-manual description procedure (Method ASTM D 2488). Samples of other materials encountered such as slag or wood will be described in similar terms but without field particle size assessment. Soil photoionization detector measurements will be recorded on the boring logs.

Well Construction Diagrams

Specific well installation procedures and construction details (as-builts) will be recorded for each well on the Monitoring Well Installation Report. Specific information entered on the form will include well depth, screen interval, screen slot size, sand pack interval, grout type, grout mixture, grout volume, added water, and materials used for installation.

Development and Purge Volume Records

The volume of water removed from monitoring wells during development or purging will be recorded on a well development data form and groundwater sampling data form, respectively. Other specific information entered on the well development data form will include date of development, development method, and general physical characteristics of the developed water such as clarity and odor. Other information to be entered on the groundwater sampling data form is discussed in a subsequent section.

4.2 *Sample Custody Documentation*

This section provides guidance on labeling and custody of samples.

Sample Labeling

Sample labels will clearly indicate sampling locations (boring, well, etc.), sample number and depth, date, sampler's initials and any pertinent comments such as specifics of filtration or preservation. Labels will be filled out at the time of sampling.

Sample Custody

Definition of Custody. After recovery, samples will be maintained in our custody until formally transferred to another party. For purposes of this work, custody will be defined as follows:

- In plain view of our field representatives.
- Inside a cooler which is in plain view of our field representative.
- Inside any locked space such as a cooler, locker, car, or truck to which the field representative has the only immediately available key(s).

Custody Records. Custody records will be maintained for all samples recovered. This record will be signed by the sampler and others who subsequently hold custody of the sample. Specifications for chemical analyses may also be made on the custody record under the header of Testing.

5.0 FIELD EQUIPMENT SPECIFICATIONS

To assure optimum performance of all field equipment, adequate calibration and routine maintenance procedures must be followed. All instrument calibration dates and times will be documented by field personnel.

6.0 ANALYTICAL PROCEDURES

Once samples have been properly collected and documented they will be submitted to the analytical laboratory for analyses. Table B-3 provides specific methods to be used for each analysis by the laboratory. Analytical methods used by the mobile laboratory are presented in Table B-4. Detailed methodologies, detection limits, and quality control performed by Hart Crowser's mobile laboratory are described in section 6.1.

Table B-3 - Specification of Analytical Methods

Soil Analyses	Preparation Method	Analytical Method
Total Solids	NA	SM 209F
Total and EP Toxicity Metals	SW 3550	SW 6010 or SW 7000
GC/MS Semivolatile Organic Compounds	SW 3550	SW 8270
GC/MS Volatile Organic Compounds	SW 5030	SW 8240
Dibenzo dioxins (DBD) and dibenzo furans (DBF)	NA	SW 8280
Polychlorinated Biphenyls (PCBs)	NA	SW 8080
Groundwater Analysis		
Volatile Organic Compounds	SW 5030	SW 8240
Semivolatile Organic Compounds	SW 3510 or 3520	SW 8270
Dissolved Metals	SW 3010	SW 6010 or SW 7000

References

SW = Test Methods for Evaluating Solid Waste (SW 846), U.S. EPA, November 1986.

EP = Methods for Chemical Analysis of Water and Wastes, U.S. EPA, March 1983.

SM = Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, AND WPCF, 16th edition, 1985.

HC = American Standard Testing Method, Group No. 19.06.01.11, Draft No. 2, January 20, 1987.

Quality data will be produced by technically defensible methods and substantiated by QA/QC samples including surrogate spikes, internal standards, laboratory blanks, and laboratory matrix spike and matrix spike duplicates. Specifications for analytical work to be conducted will be covered under a laboratory work order specific to that lab.

Table B-4 - Specification of Analytical Methods (Mobile Laboratory)

Soil Analyses	Preparation Method	Analytical Method
GC-FID Screen	Methylene Chloride Extraction	GC-FID
Total Petroleum Hydrocarbons	Methylene Chloride Extraction	GC-FID
Polynuclear Aromatic Hydrocarbons	Methylene Chloride Extraction	GC-FID
Pentachlorophenol	Methylene Chloride Extraction	GC-ECD
Volatile Organic Compounds	Headspace	GC-PID/ HALL
Polychlorinated Biphenyls (PCBs)	Hexane Extraction	GC-ECD

6.1 Analytical Method Descriptions

VOLATILES SCREEN

Detection Limits

Compound	Routine Detection Limits* ppb in soil	water
Methylene Chloride	20	20
1,1-Dichloroethylene	20	20
1,1-Dichloroethane	20	20
Chloroform	10	10
Carbon Tetrachloride	10	10
1,2-Dichloropropane	20	20
Trichloroethylene	10	10
1,1,2-Trichloroethane	10	10
Dibromochloromethane	20	20
Tetrachloroethylene	10	10
Chlorobenzene	20	20
Trichlorofluoromethane	10	10
trans-1,2-Dichloroethylene	20	20
1,2-Dichloroethane	20	20
1,1,1-Trichloroethane	10	10
Bromodichloromethane	20	20
cis and trans-1,3-Dichloropropene	40	40
Bromoform	40	40
1,1,2,2-Tetrachloroethane	20	20
Benzene	10	10
Toluene	10	10
Ethylbenzene	10	10
Xylenes	10	10

---

* = Wet Weight Basis

Volatiles Screen

Sample Extraction Technique

Fifteen gms of soil or 15 ml of water are placed in a 20 ml headspace vial. Carbon free water saturated with sodium sulfate is added to soil until a set volume of headspace is left in each vial. Sodium sulfate is added to water samples to assist in developing the headspace. Soil samples are shaken after capping. The vials are heated prior to analysis in an automated headspace sampler. The headspace sampler transfers a set volume of the headspace to the chromatograph

Chromatography Equipment

Analysis is performed using a Hewlett Packard 5890A gas chromatograph. The analytical column is a fused silica capillary column. The detectors are a Photoionzation Detector (PID) and an Electrolytic Conductivity Detector (ELCD or Hall) connected in series.

Identification and Quantitation

Identification of the volatiles are made by retention time comparisons to standards run during the analytical sequence. All identifications are tentative. Quantitation of volatiles are made using a single external concentration calibration standard. All quantitations are estimates.

Quality Control

Method blank	One per day or matrix
Matrix spike	One per 20 samples, sample set or matrix
Duplicate	One per 20 samples, sample set or matrix
Target QC Values	Recovery +/- 50% Relative Difference <25%
Confirmation Samples	Recommend 10 to 20% samples split to confirming lab.

FUEL FINGERPRINT\FUEL CONCENTRATION ESTIMATE SCREEN

Detection Limits

Fuel	Routine Detection Limits* (ppm) soil	water
Unleaded Gasoline	25	5
Super Unleaded Gasoline	25	5
Regular Leaded Gasoline	25	5
Aviation Fuel	25	5
Jet A	25	5
Diesel Fuel	25	5
Kerosene	25	5
Heating Oil	25	5
Bunker C	25	5

* = Wet Weight Basis

Sample Extraction Technique

Five gms of soil are placed in a culture tube. Water is added to break the soil. Five mls of 80% hexane/10% methylene chloride are added. The tube is capped and agitated for fifteen minutes. The tube is then placed in a centrifuge to settle particulates and separate phases.

For water samples, 100 mls of water are placed in a volumetric flask. Two mls of 80% hexane/20% methylene chloride are added to the sample. The flask is shaken for 5 minutes.

Chromatography Equipment

Analysis is performed using a Hewlett Packard 5890A gas chromatograph with an autosampler. The analytical column is a fused silica capillary column. The detector is a Flame Ionization Detector (FID). Sample capacity 30 samples per day.

Identification and Quantitation

Identification of the fuels are made by comparison to chromatograms of fuel standards made in our lab. All identifications are tentative. Quantitation of fuels are made using single concentration calibration standard and the area under the peaks found in a time band specific to the fuel type. All quantitations are estimates.

Quality Control

Method blank	One per day or matrix
Matrix spike	One per 20 samples, sample set or matrix
Duplicate	One per 20 samples, sample set or matrix
Target QC Values	Recovery +/- 50% Relative Difference <25%
Confirmation Samples	Recommend 10 to 20% samples split to confirming lab.

POLYNUCLEAR AROMATIC HYDROCARBON (PAH or PNA) - FID SCREEN

Detection Limits

Compound	Routine Detection Limits* (ppb) soil	water
Acenaphthene	500	20
Acenaphthylene	500	20
Anthracene	500	20
Benzo(a)anthracene	500	20
Benzo(a)pyrene	500	20
Benzo(b)fluoranthene	500	20
Benzo(ghi)perylene	500	20
Benzo(k)fluoranthene	500	20
Chrysene	500	20
Dibenzo(ah)anthracene	500	20
Fluoranthene	500	20
Indeno(1,2,3-cd)pyrene	500	20
Naphthalene	500	20
Phenanthrene	500	20
Pyrene	500	20

* = Wet Weight Basis

Sample Extraction Technique

Five gms of soil are placed in a culture tube. Water is added to break the soil. Five mls of 80% hexane/20% methylene chloride are added. The tube is agitated for fifteen minutes. The tube is then placed in a centrifuge to settle particulates and separate phases.

For water samples, 100 mls of water are placed in a volumetric flask. Two mls of 80% hexane/20% methylene chloride are added to the sample. The flask is shaken for 5 minutes.

Chromatography Equipment

Analysis is performed using a Hewlett Packard 5890A gas chromatograph with an autosampler. The analytical column is a fused silica capillary column. The detector is a Flame Ionization Detector (FID). Sample capacity 30 samples per day.

Identification and Quantitation

Identification of the PAHs are made by retention time comparisons to standards run during the analytical sequence. All identifications are tentative. Quantitation of PAHs are made using a single external concentration calibration standard. All quantitations are estimates.

Quality Control

Method blank	One per day or matrix
Matrix spike	One per 20 samples, sample set or matrix
Duplicate	One per 20 samples, sample set or matrix
Target QC Values	Recovery +/- 50% Relative Difference <25%
Confirmation Samples	Recommend 10 to 20% samples split to confirming lab.

PHENOLS SCREEN

Detection Limits

Compound	Routine Detection Limits* (ppb) soil	water
4-Chloro-3-Methylphenol	100	5
2,4-Dinitrophenol	100	5
2-Methyl-4,6-dinitrophenol	100	5
Pentachlorophenol	25	2
Tetrachlorophenol	25	2
2,4,6-Trichlorophenol	50	3
2,3,6-Trichlorophenol	50	3

* = Wet Weight Basis

Sample Extraction Technique

Five gms of soil are placed in a culture tube. Five mls of reagent water, ten drops of concentrated sulfuric acid and two mls of hexane are added. The sampling tube is capped and agitated for 15 minutes. The tube is then placed in a centrifuge to settle particulates. The hexane is transferred to a culture tube with acidified sodium sulfate. A second hexane extraction is performed and the two extracts combined.

For water samples, 100 mls of water are placed in a volumetric flask. Two mls of hexane and five drops of concentrated sulfuric acid are added to the sample. The flask is shaken for 5 minutes. The hexane is transferred to a culture tube with acidified sodium sulfate. A second extraction is performed and the two extracts combined.

Derivitization

One ml of diazomethane reagent is added and the extract is agitated.

Chromatography Equipment

Analysis is performed using a Hewlett Packard 5890A gas chromatograph with an autosampler. The analytical column is a fused silica capillary column. The detector is an Electron Capture Detector (ECD). Sample capacity 35 samples per day.

Identification and Quantitation

Identification of phenols are made by retention time comparisons to standards run during the analytical sequence. All identifications are tentative. Quantitation of phenols are made using a single external concentration calibration standard. All quantitations are estimates.

Quality Control

Method blank	One per day or matrix
Matrix spike	One per 20 samples, sample set or matrix
Duplicate	One per 20 samples, sample set or matrix
Target QC Values	Recovery +/- 50% Relative Difference <25%
Confirmation Samples	Recommend 10 to 20% samples split to confirming lab.

PCBs SCREEN

Hart Crowser's F.A.S.T. laboratory offers a screening method for Polychlorinated Biphenyls (PCBs). Analysis is performed using a gas chromatograph. Approximate concentrations and tentative identifications derived from this screening method should be confirmed using EPA standard laboratory method 8080, 608 or 8120.

Quality Control

Method blank	One pe day or matrix
Matrix spike	One per 20 samples, sample set or matrix
Duplicate	One per 20 samples, sample set or matrix
Target QC Values	Recovery +/- 50% Relative Difference <25%
Confirmation Samples	Recommend 10 to 20% samples split to confirming lab.

7.0 DATA QUALITY CONTROL

Once data are received from the laboratory, a number of QC procedures will be followed to provide a prompt, accurate, and meaningful evaluation of the data. Specific routine procedures will be followed in assessing data precision, accuracy, and completeness.

7.1 Data Validation

Quality control shall be in accordance with Laboratory Data Validation Functional Guidelines (EPA, 1988) when applicable. Advisory limits and requirements set by the EPA will be used to evaluate data quality. Professional judgment will be used to evaluate data generated from analyses not covered under EPA Data Validation Guidelines.

7.2 Data Quality Summary

After laboratory data have been evaluated, a report summarizing the specific QC checks will be written. This summary will also include an evaluation of the QA/QC results reported by the laboratory. This report will be submitted to the project QA Coordinator for final confirmation of the validity of the data.

8.0 REPORTS TO MANAGERS

8.1 Routine QA/QC Report

At the completion of each round of sampling, a report summarizing the performance of the QA plan will be provided to the Hart Crowser project manager. These reports will include evaluation of both sampling and laboratory QC results. They will also address any QA problems encountered and recommended solutions.

8.2 Final QA Report

The final QA report will be included as a separate section of the overall project report and will summarize the information contained in the previous periodic QA/QC reports.

REFERENCES

U.S. Environmental Protection Agency, February 1, 1988, Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analyses.

U.S. Environmental Protection Agency, July 1, 1988, Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses.

ATTACHMENT C
SITE RECONNAISSANCE PHOTOGRAPHS

Photograph Location Plan

Weyerhaeuser Company, Everett, WA

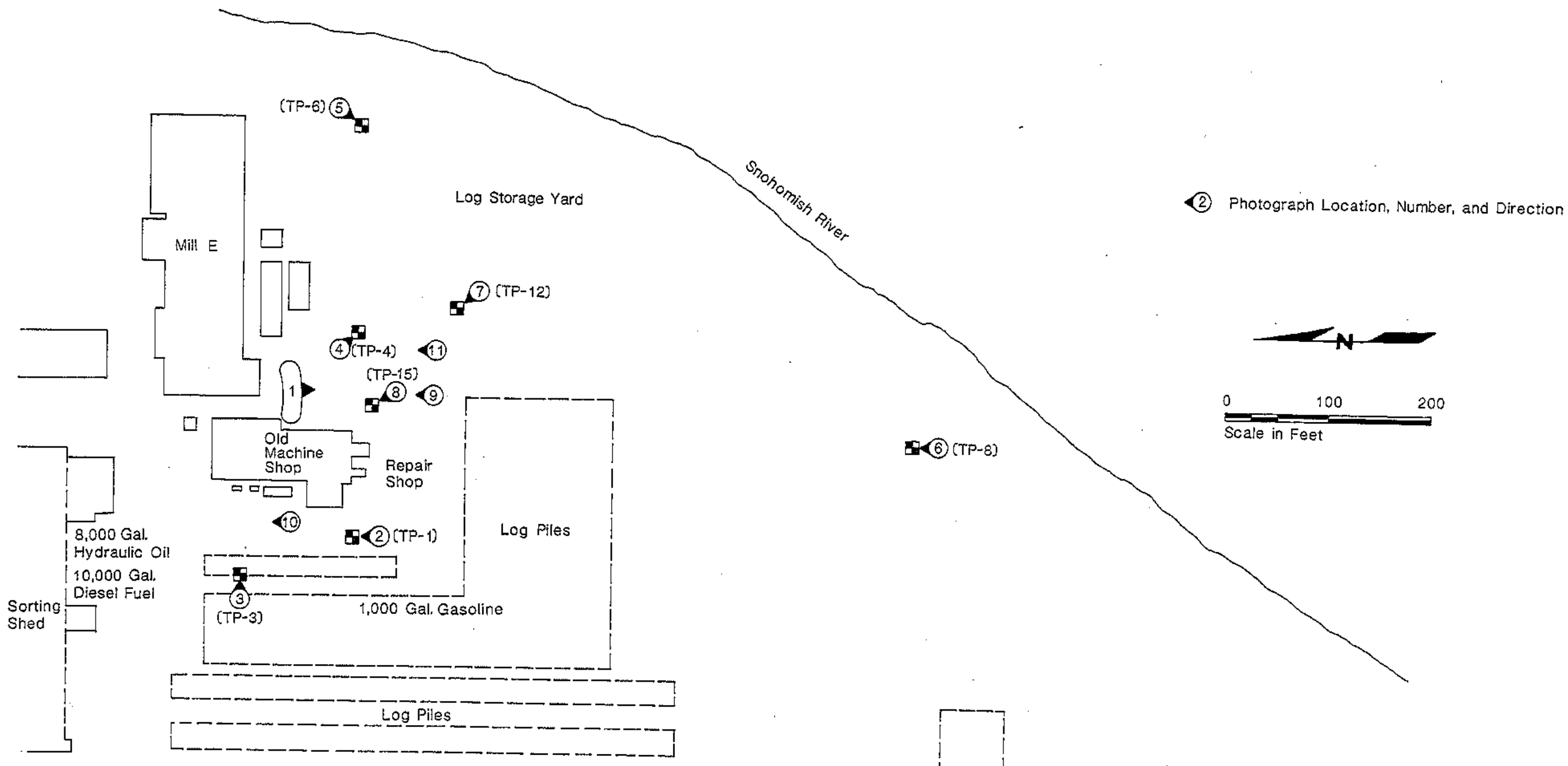

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Figure C-1

ATTACHMENT D
FIELD EXPLORATIONS

ATTACHMENT D
FIELD EXPLORATIONS

The program of subsurface explorations for this project included completion of fifteen test pits. Work was completed on March 10, 1989. The results of our exploration program are presented on the exploration logs within this appendix. The exploration logs are a representation of our interpretation of the excavation, sampling, and testing information. The depth where the soils or characteristics of the soils changed is noted. The change may be gradual. Soil samples recovered in the explorations were visually classified in the field in general accordance with the method presented on Figure D-1. A legend for the field exploration logs defining symbols and abbreviations utilized is also presented on Figure D-1.

The exploration locations are presented on Figure 2. The explorations were located in the field by hand taping from existing physical features. The ground surface of the site is generally flat with local variations of ± 1 foot. The elevation of the area was assumed to be 10 feet based on USGS 7.5-minute topographic map (Marysville Quadrangle). The location and elevation of the explorations should be considered accurate to the degree implied by the method used.

Test Pits

A series of 15 test pits, designated TP-1 through TP-15, were excavated across the site utilizing a tractor-mounted backhoe under subcontract to our firm. Test pits allow direct visual observation of the subgrade soils on the sides of an excavated trench. The test pits were located by an excavated under the direction of an engineering geologist from our firm. Descriptive logs were developed in the field by observation of the soil disclosed in the test pits. Representative samples of soil types encountered were placed in plastic jars and taken to our laboratory for further observation and testing. Groundwater levels or seepage encountered during excavation were also noted. The density/consistency of the soil is based on visual observation and is not measured with a quantitative test during the excavation of the pits. The density/consistency is presented parenthetically on the test pit logs to indicate the value is estimated. The test pit logs are presented on Figures D-2 through D-6.

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot
Very loose	0 - 4
Loose	4 - 10
Medium dense	10 - 30
Dense	30 - 50
Very dense	>50

SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very soft	0 - 2	<0.125
Soft	2 - 4	0.125 - 0.25
Medium stiff	4 - 8	0.25 - 0.5
Stiff	8 - 15	0.5 - 1.0
Very stiff	15 - 30	1.0 - 2.0
Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

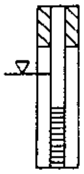
BORING SAMPLES

☒	Split Spoon
⧅	Shelby Tube
▥	Cuttings
◫	Core Run
*	No Sample Recovery
P	Tube Pushed, Not Driven

TEST PIT SAMPLES

☒	Grab (Jar)
⧄	Bag
⧅	Shelby Tube

Ground Water Observations



Surface Seal

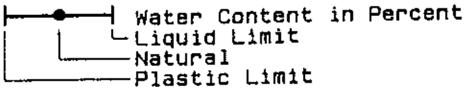
Ground Water Level on Date (ATD) At Time of Drilling

Observation Well Tip or Slotted Section

♀ Ground Water Seepage (Test Pits)

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits
CA	Chemical Analysis



HARTCROWSER
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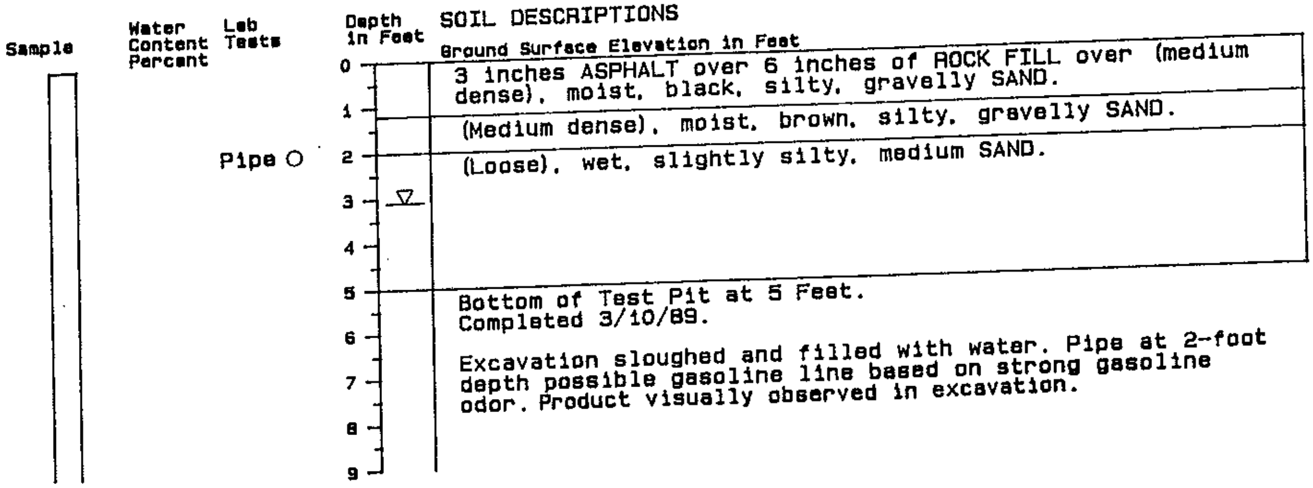
Figure D-1

Test Pit Log TP-1



SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

3 inches ASPHALT over 6 inches of ROCK FILL over (medium dense), moist, black, silty, gravelly SAND.

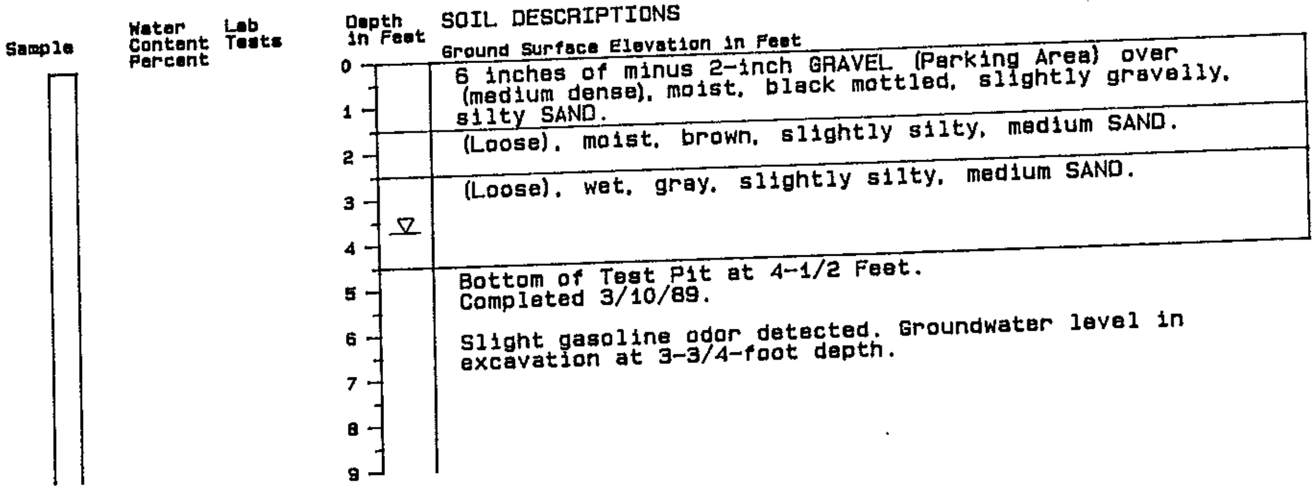
(Medium dense), moist, brown, silty, gravelly SAND.

(Loose), wet, slightly silty, medium SAND.

Bottom of Test Pit at 5 Feet.
Completed 3/10/89.

Excavation sloughed and filled with water. Pipe at 2-foot depth possible gasoline line based on strong gasoline odor. Product visually observed in excavation.

Test Pit Log TP-2



SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

6 inches of minus 2-inch GRAVEL (Parking Area) over (medium dense), moist, black mottled, slightly gravelly, silty SAND.

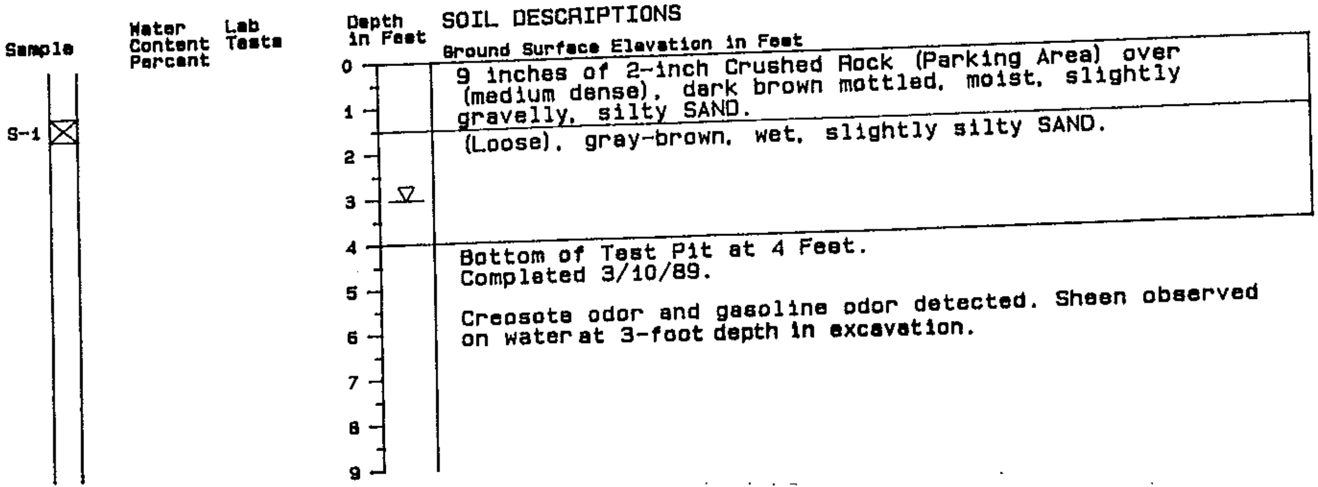
(Loose), moist, brown, slightly silty, medium SAND.

(Loose), wet, gray, slightly silty, medium SAND.

Bottom of Test Pit at 4-1/2 Feet.
Completed 3/10/89.

Slight gasoline odor detected. Groundwater level in excavation at 3-3/4-foot depth.

Test Pit Log TP-3



SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

9 inches of 2-inch Crushed Rock (Parking Area) over (medium dense), dark brown mottled, moist, slightly gravelly, silty SAND.

(Loose), gray-brown, wet, slightly silty SAND.

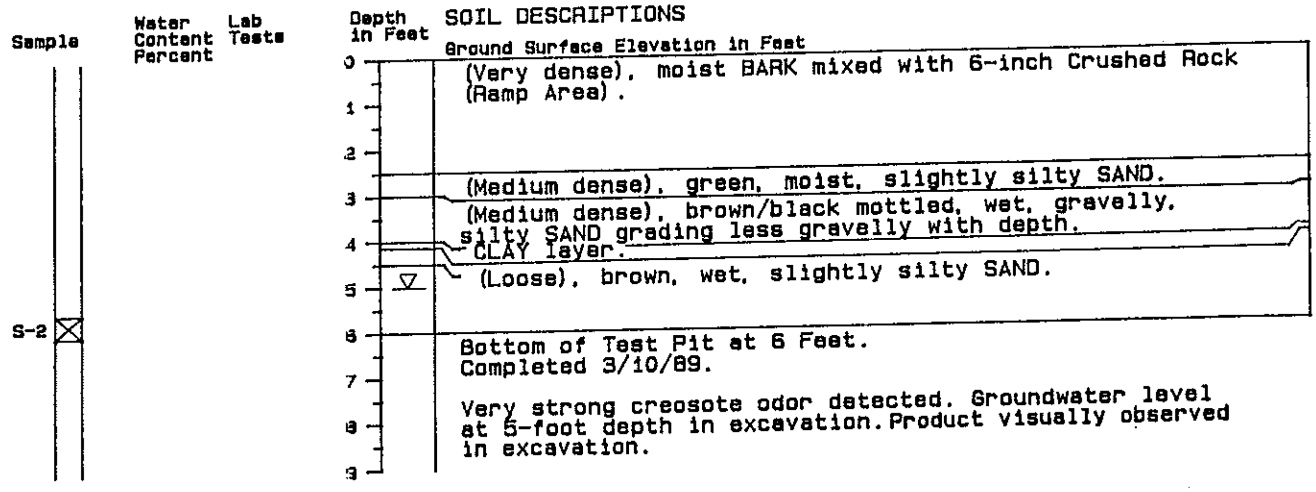
Bottom of Test Pit at 4 Feet.
Completed 3/10/89.

Creosote odor and gasoline odor detected. Sheen observed on water at 3-foot depth in excavation.

1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2395 March 1989
HART-CROWSER & associates, inc.
Figure D-2

Test Pit Log TP-4



(Very dense), moist BARK mixed with 6-inch Crushed Rock (Ramp Area).

(Medium dense), green, moist, slightly silty SAND.

(Medium dense), brown/black mottled, wet, gravelly, silty SAND grading less gravelly with depth.

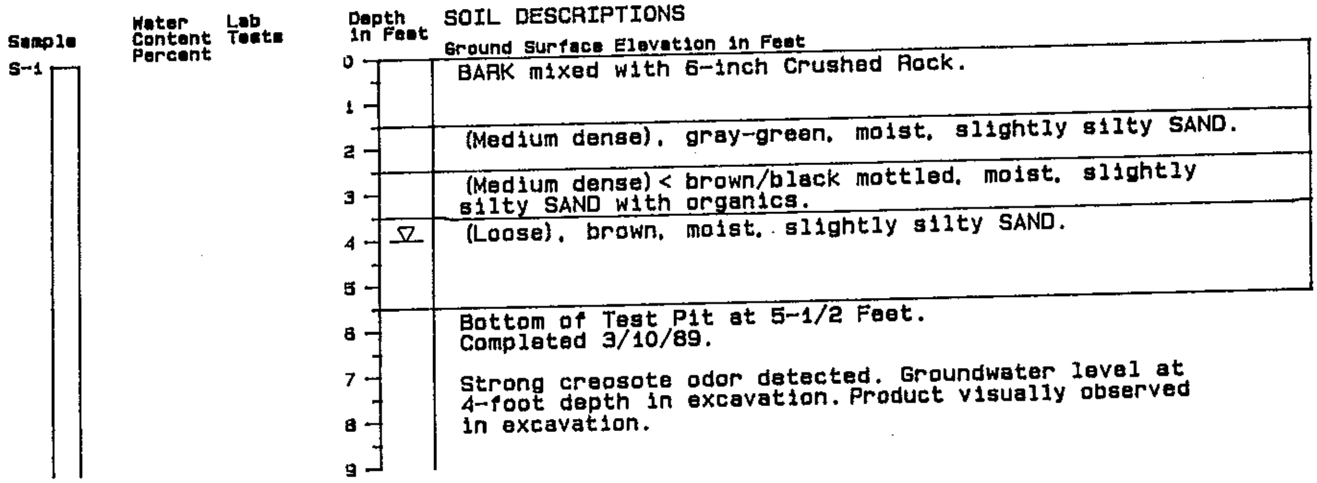
CLAY layer.

(Loose), brown, wet, slightly silty SAND.

Bottom of Test Pit at 6 Feet.
Completed 3/10/89.

Very strong creosote odor detected. Groundwater level at 5-foot depth in excavation. Product visually observed in excavation.

Test Pit Log TP-5



BARK mixed with 6-inch Crushed Rock.

(Medium dense), gray-green, moist, slightly silty SAND.

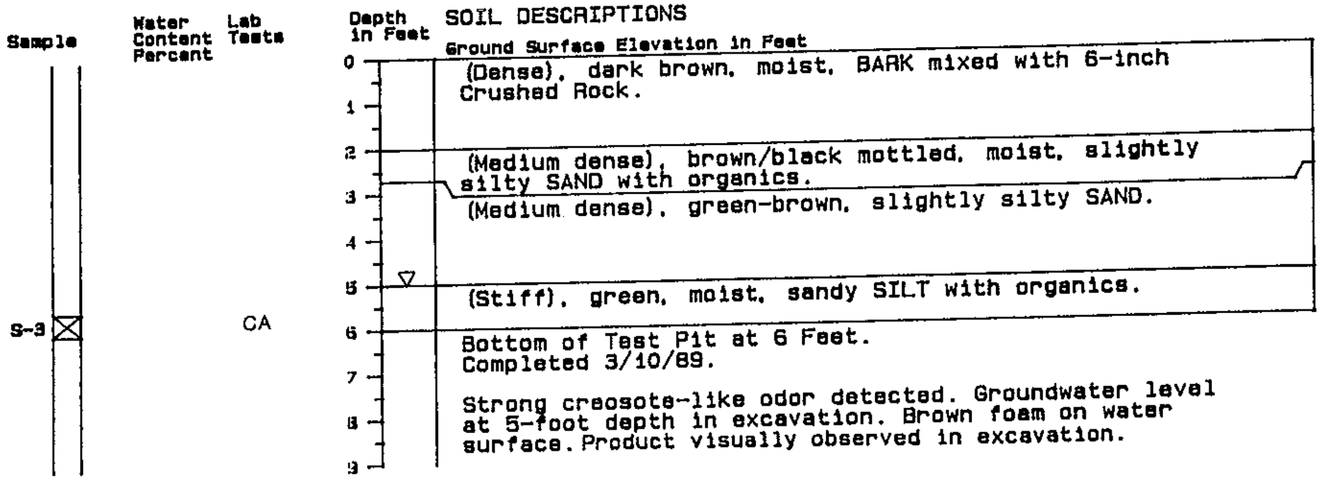
(Medium dense)< brown/black mottled, moist, slightly silty SAND with organics.

(Loose), brown, moist, slightly silty SAND.

Bottom of Test Pit at 5-1/2 Feet.
Completed 3/10/89.

Strong creosote odor detected. Groundwater level at 4-foot depth in excavation. Product visually observed in excavation.

Test Pit Log TP-6



(Dense), dark brown, moist, BARK mixed with 6-inch Crushed Rock.

(Medium dense), brown/black mottled, moist, slightly silty SAND with organics.

(Medium dense), green-brown, slightly silty SAND.

(Stiff), green, moist, sandy SILT with organics.

Bottom of Test Pit at 6 Feet.
Completed 3/10/89.

Strong creosote-like odor detected. Groundwater level at 5-foot depth in excavation. Brown foam on water surface. Product visually observed in excavation.

1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

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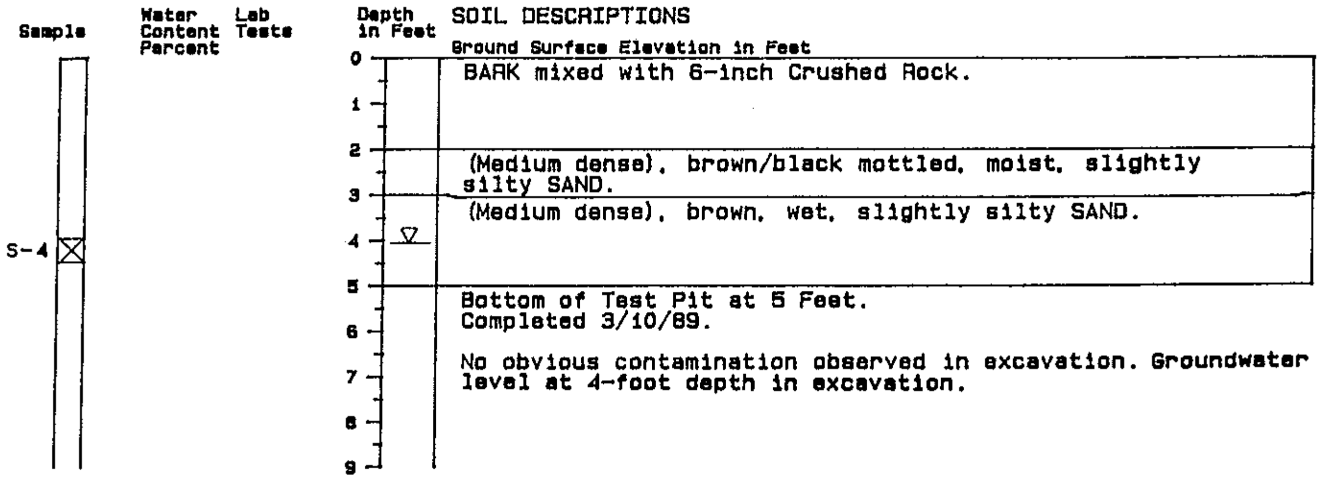
HART-CROWSER & associates, inc.
Figure D-3

Test Pit Log TP-7



BARK mixed with 6-inch Crushed Rock.

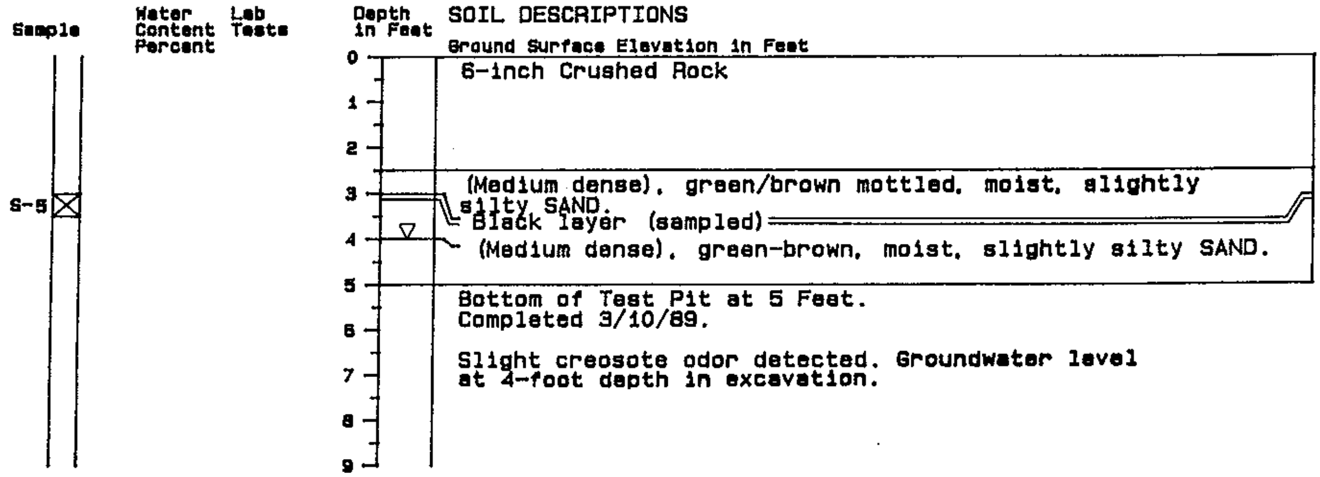
(Medium dense), brown/black mottled, moist, slightly silty SAND.

(Medium dense), brown, wet, slightly silty SAND.

Bottom of Test Pit at 5 Feet.
Completed 3/10/89.

No obvious contamination observed in excavation. Groundwater level at 4-foot depth in excavation.

Test Pit Log TP-8



6-inch Crushed Rock

(Medium dense), green/brown mottled, moist, slightly silty SAND.

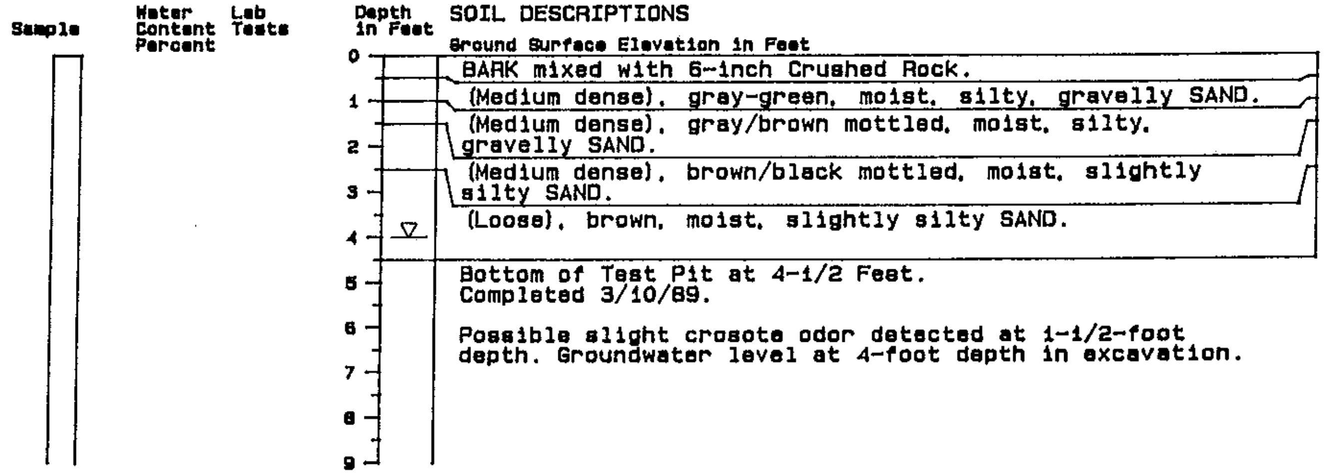
Black layer (sampled)

(Medium dense), green-brown, moist, slightly silty SAND.

Bottom of Test Pit at 5 Feet.
Completed 3/10/89.

Slight creosote odor detected. Groundwater level at 4-foot depth in excavation.

Test Pit Log TP-9



BARK mixed with 6-inch Crushed Rock.

(Medium dense), gray-green, moist, silty, gravelly SAND.

(Medium dense), gray/brown mottled, moist, silty, gravelly SAND.

(Medium dense), brown/black mottled, moist, slightly silty SAND.

(Loose), brown, moist, slightly silty SAND.

Bottom of Test Pit at 4-1/2 Feet.
Completed 3/10/89.

Possible slight crosote odor detected at 1-1/2-foot depth. Groundwater level at 4-foot depth in excavation.

1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

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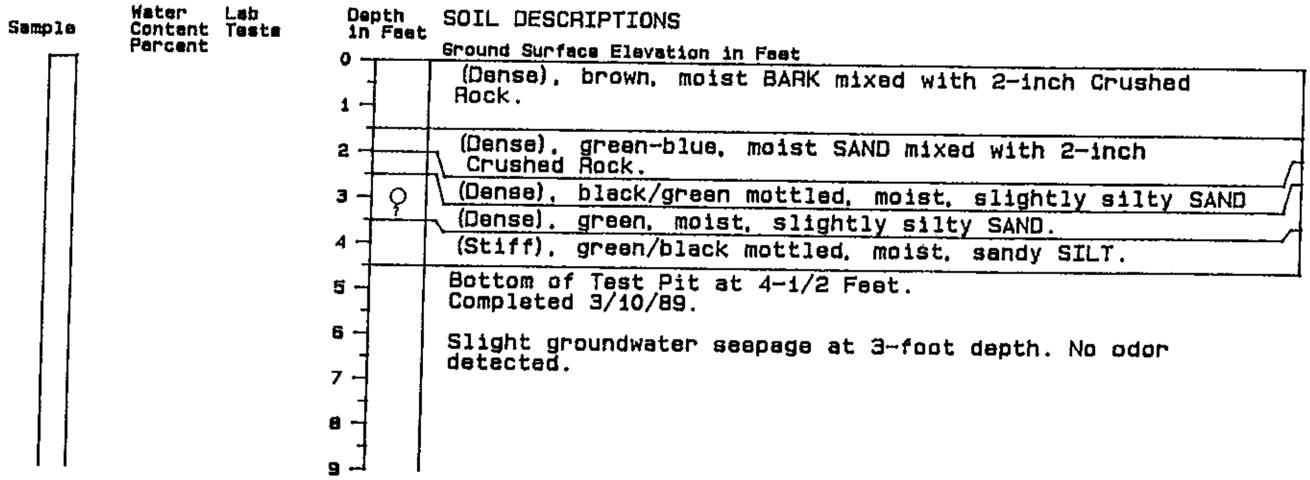
HART-CROWSER & associates, inc.
Figure D-4

Test Pit Log TP-10



SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

(Dense), brown, moist BARK mixed with 2-inch Crushed Rock.

(Dense), green-blue, moist SAND mixed with 2-inch Crushed Rock.

(Dense), black/green mottled, moist, slightly silty SAND

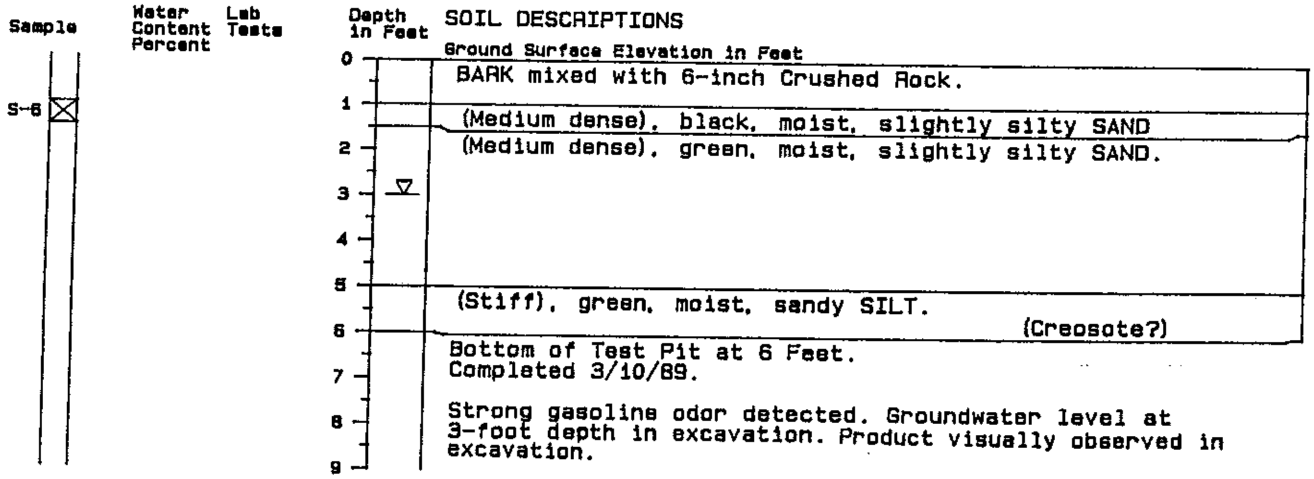
(Dense), green, moist, slightly silty SAND.

(Stiff), green/black mottled, moist, sandy SILT.

Bottom of Test Pit at 4-1/2 Feet.
Completed 3/10/89.

Slight groundwater seepage at 3-foot depth. No odor detected.

Test Pit Log TP-11



SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

BARK mixed with 6-inch Crushed Rock.

(Medium dense), black, moist, slightly silty SAND

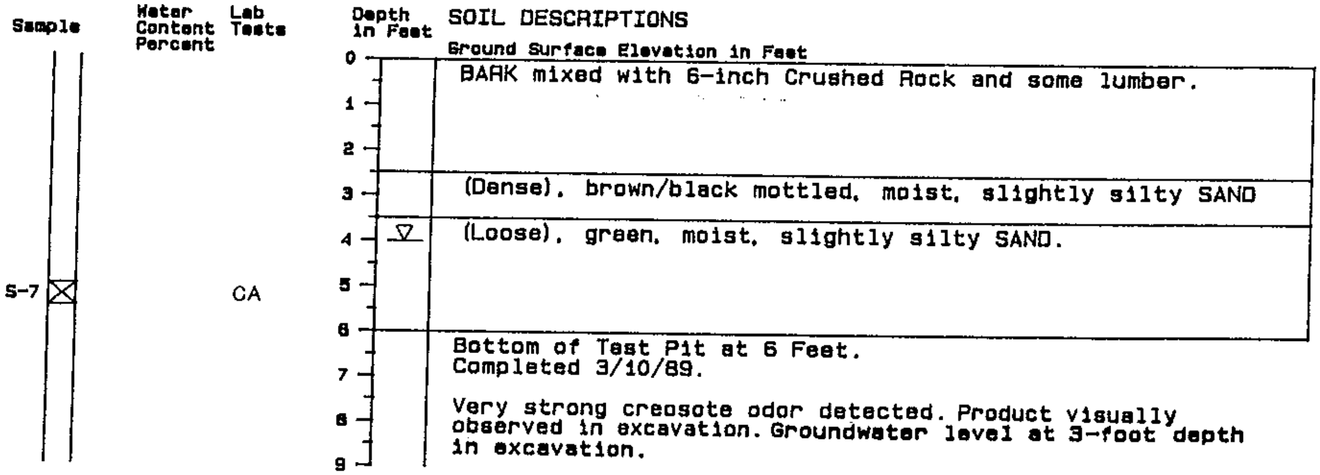
(Medium dense), green, moist, slightly silty SAND.

(Stiff), green, moist, sandy SILT. (Creosote?)

Bottom of Test Pit at 6 Feet.
Completed 3/10/89.

Strong gasoline odor detected. Groundwater level at 3-foot depth in excavation. Product visually observed in excavation.

Test Pit Log TP-12



SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

BARK mixed with 6-inch Crushed Rock and some lumber.

(Dense), brown/black mottled, moist, slightly silty SAND

(Loose), green, moist, slightly silty SAND.

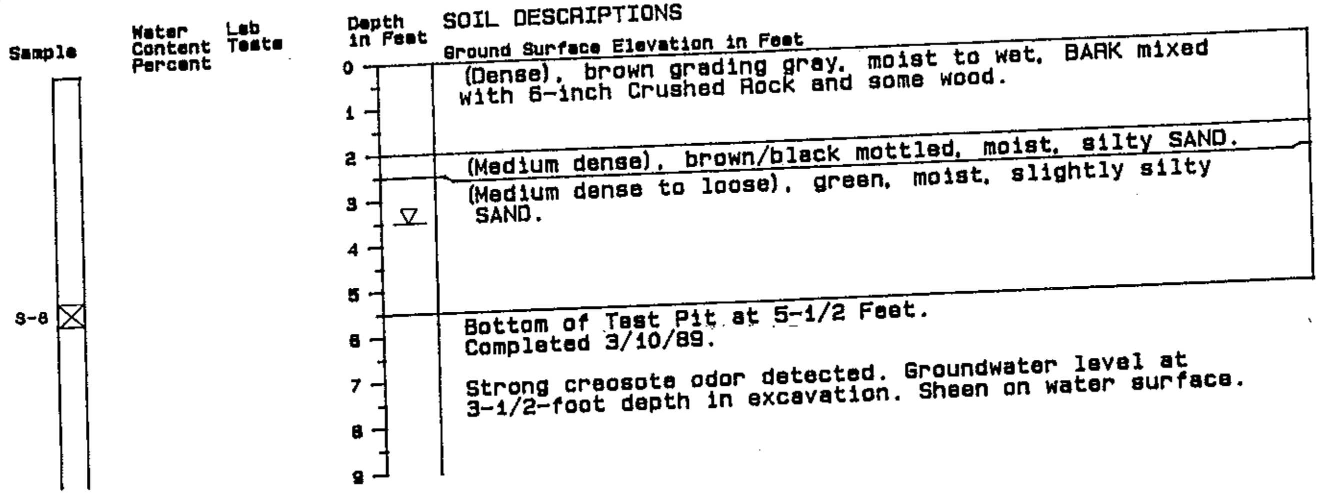
Bottom of Test Pit at 6 Feet.
Completed 3/10/89.

Very strong creosote odor detected. Product visually observed in excavation. Groundwater level at 3-foot depth in excavation.

1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2395 March 1989
HART-CROWSER & associates, inc.
Figure D-5

Test Pit Log TP-13



(Dense), brown grading gray, moist to wet, BARK mixed with 6-inch Crushed Rock and some wood.

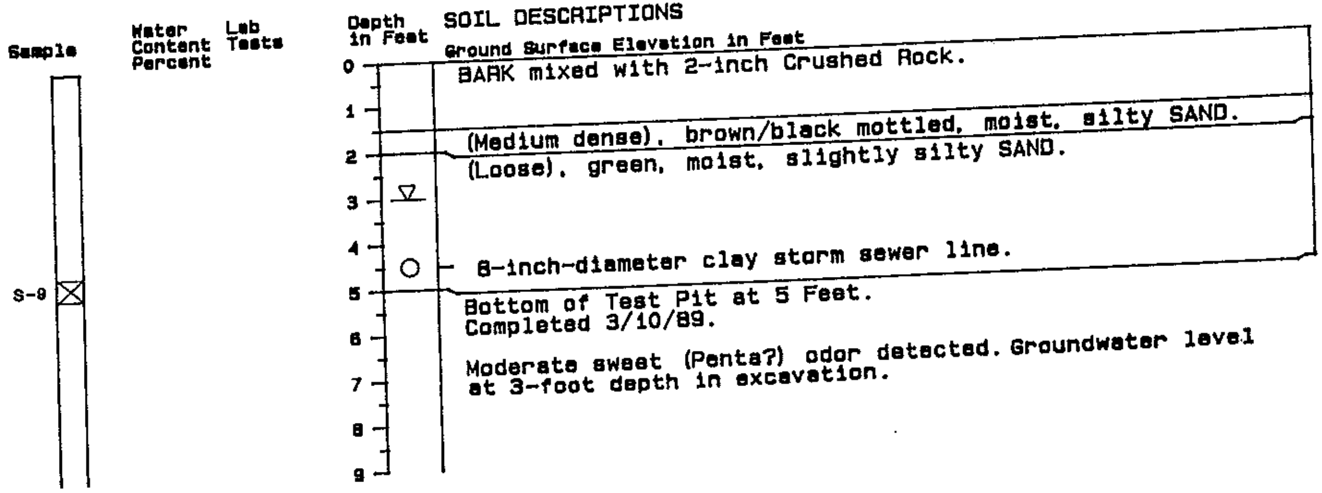
(Medium dense), brown/black mottled, moist, silty SAND.

(Medium dense to loose), green, moist, slightly silty SAND.

Bottom of Test Pit at 5-1/2 Feet.
Completed 3/10/89.

Strong creosote odor detected. Groundwater level at 3-1/2-foot depth in excavation. Sheen on water surface.

Test Pit Log TP-14



BARK mixed with 2-inch Crushed Rock.

(Medium dense), brown/black mottled, moist, silty SAND.

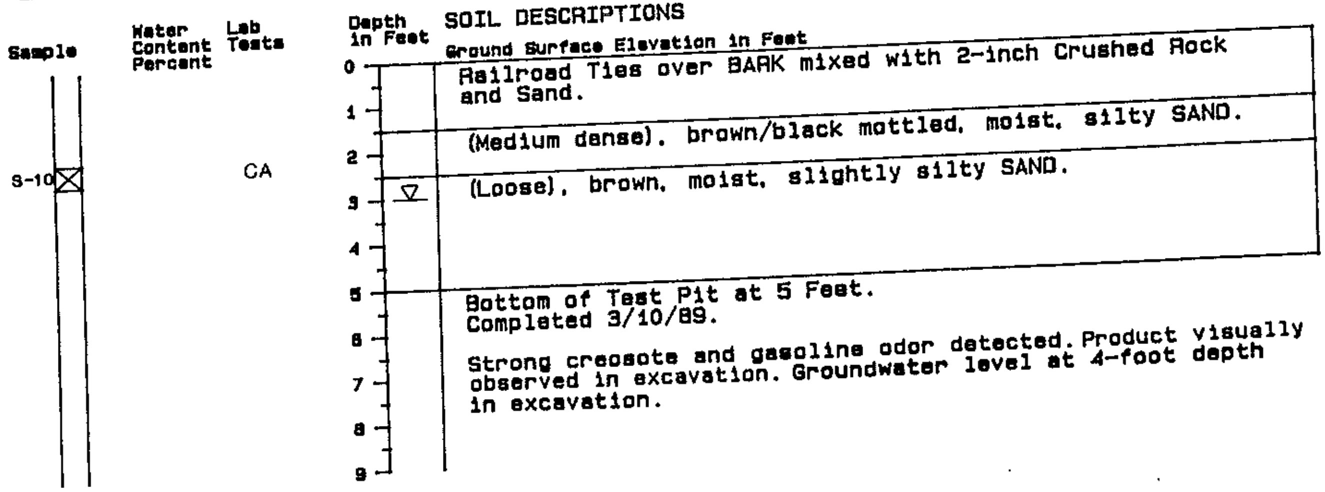
(Loose), green, moist, slightly silty SAND.

8-inch-diameter clay storm sewer line.

Bottom of Test Pit at 5 Feet.
Completed 3/10/89.

Moderate sweet (Penta?) odor detected. Groundwater level at 3-foot depth in excavation.

Test Pit Log TP-15



Railroad Ties over BARK mixed with 2-inch Crushed Rock and Sand.

(Medium dense), brown/black mottled, moist, silty SAND.

(Loose), brown, moist, slightly silty SAND.

Bottom of Test Pit at 5 Feet.
Completed 3/10/89.

Strong creosote and gasoline odor detected. Product visually observed in excavation. Groundwater level at 4-foot depth in excavation.

1. Refer to Figure D-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2395 March 1989
HART-CROWSER & associates, inc.
Figure D-6

ATTACHMENT E
CERTIFICATES OF ANALYSIS
LAUCKS TESTING LABORATORIES, INC.

ucks 81 years
aboratories, Inc.
ney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

Certificate

LABORATORY NO. 15494

DATE: Mar. 29, 1989

JOB #2395-01

CLIENT: Hart Crowser Inc.
1910 Fairview Ave. E.
Seattle, WA 98102-3699
ATTN: Scott Ferris

REPORT ON: SOIL

SAMPLE IDENTIFICATION: Submitted 3/17/89 and identified as shown:

1) S-3 TP-6 3/10 11:55
2) S-7 TP-12 3/10 14:50
3) S-10 TP-15 3/10 16:11

Prior to sieving, sample splits were removed for the volatile organics portions of the analysis. The remainder of the samples were then passed through a No. 10 sieve, with percent retained and description of retained matter shown below. Only material passing the sieve was analyzed for the remainder of the analyses.

Sample No.	% Retained	Major Description	Minor Description
1	<2.	---	---
2	<2.	---	---
3	<2.	---	---

	1	2	3	Lab Blank
Total Solids, %	70.8	80.0	94.1	-
	parts per million (mg/kg), dry basis			
Arsenic	35.	340.	130.	<0.5
Copper	37.	11.	9.	1.
Lead	<10.	<10.	<10.	<10.
Zinc	64.	47.	36.	11.

Hart Crowser

LABORATORY NO. 15494

The samples were analyzed by gas chromatography with flame ionization detector. The major peaks of the standards of interest (gasoline and diesel fuel) were compared to these same peaks, if any, in the samples. Copies of chromatograms are enclosed.

	parts per million (mg/kg), dry basis				
	1	2	3	1 Lab Blank	2 Lab Blank
GC/FID Screen, calculated as Diesel	<1.	2300.	30.	<100.	<1.
CG/FID Screen, calculated as Gasoline	<1.	<10.	7.	<40.	<1.

Comment:

Both sample numbers 2 and 3 contained hydrocarbon mixtures which obscured the characteristic chromatographic patterns of diesel fuel and gasoline. These hydrocarbons represent the major extractable organics present in these samples and are estimated to be at least 5-fold greater in concentration than either the diesel fuel or gasoline detected in these samples.

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LABORATORY NO. 15494

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846), U.S.E.P.A., 1986, Method 8240 (volatile organics).

parts per billion (ug/kg), dry basis

	1	3	Lab Blank
Chloromethane	<3.	<3.	<1.
Bromomethane	<3.	<3.	<1.
Vinyl Chloride	<3.	<3.	<1.
Chloroethane	<8.	<8.	<3.
Methylene Chloride	<3.	<3.	<1.
Acetone	250.	98.	<5.
Carbon Disulfide	<3.	<3.	<1.
1,1-Dichloroethene	<3.	<3.	<1.
1,1-Dichloroethane	<3.	<3.	<1.
trans-1,2-Dichloroethenene	<3.	<3.	<1.
cis-1,2-Dichloroethene	<3.	<3.	<1.
Total-1,2-Dichloroethene	<3.	<3.	<1.
Chloroform	<3.	<3.	<1.
2-Butanone	46.	<8.	<3.
1,2-Dichloroethane	<3.	<3.	<1.
1,1,1-Trichloroethane	<3.	<3.	<1.

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LABORATORY NO. 15494

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	parts per billion (ug/kg), dry basis		
	1	3	Lab Blank
Carbon Tetrachloride	<3.	<3.	<1.
Vinyl Acetate	<3.	<3.	<1.
Bromodichloromethane	<3.	<3.	<1.
1,2-Dichloropropane	<3.	<3.	<1.
Trichloroethene	<3.	<3.	<1.
Benzene	<3.	<3.	<1.
Dibromochloromethane	<8.	<8.	<3.
1,1,2-Trichloroethane	<3.	<3.	<1.
Bromoform	<3.	<3.	<1.
4-Methyl-2-pentanone	<8.	<8.	<3.
2-Hexanone	<8.	<8.	<3.
1,1,2,2-Tetrachloroethane	<8.	<8.	<3.
Tetrachloroethene	<3.	<3.	<1.
Toluene	<3.	9.	<1.
Chlorobenzene	<8.	<8.	<3.
trans-1,3-Dichloropropene	<8.	<8.	<3.
Ethylbenzene	<3.	<3.	<1.
cis-1,3-Dichloropropene	<8.	<8.	<3.
Styrene	<3.	<3.	<1.
Total Xylenes	10.	130.	<1.

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Hart Crowser

LABORATORY NO. 15494

parts per billion (ug/kg), dry basis

	2	Lab Blank
Chloromethane	<1200.	<1200.
Bromomethane	<1200.	<1200.
Vinyl Chloride	<1200.	<1200.
Chloroethane	<3700.	<3700.
Methylene Chloride	<1200.	<1200.
Acetone	<6200.	<6200.
Carbon Disulfide	<1200.	<1200.
1,1-Dichloroethene	<1200.	<1200.
1,1-Dichloroethane	<1200.	<1200.
trans-1,2-Dichloroethenene	<1200.	<1200.
cis-1,2-Dichloroethene	<1200.	<1200.
Total-1,2-Dichloroethene	<1200.	<1200.
Chloroform	<1200.	<1200.
2-Butanone	<3700.	<3700.
1,2-Dichloroethane	<1200.	<1200.
1,1,1-Trichloroethane	<1200.	<1200.
Carbon Tetrachloride	<1200.	<1200.
Vinyl Acetate	<1200.	<1200.

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Hart Crowser

LABORATORY NO. 15494

parts per billion (ug/kg), dry basis

	2	Lab Blank
Bromodichloromethane	<1200.	<1200.
1,2-Dichloropropane	<1200.	<1200.
Trichloroethene	<1200.	<1200.
Benzene	<1200.	<1200.
Dibromochloromethane	<3700.	<3700.
1,1,2-Trichloroethane	<1200.	<1200.
Bromoform	<1200.	<1200.
4-Methyl-2-pentanone	<3700.	<3700.
2-Hexanone	<3700.	<3700.
1,1,2,2-Tetrachloroethane	<3700.	<3700.
Tetrachloroethene	<1200.	<1200.
Toluene	<1200.	<1200.
Chlorobenzene	<3700.	<3700.
trans-1,3-Dichloropropene	<3700.	<3700.
Ethylbenzene	**5800.**	<1200.
cis-1,3-Dichloropropene	<3700.	<3700.
Styrene	<1200.	<1200.
Total Xylenes	**35,000.**	<1200.

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LABORATORY NO. 15494

Hart Crowser

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846) U.S.E.P.A. 1986 Method 8270 (semi-volatile extractables).

	parts per billion (ug/kg), dry basis		
	1	2	3
Phenol	<47.	<2500.	<35.
Aniline	<240.	<12,000.	<180.
bis(2-Chloroethyl)Ether	<47.	<2500.	<35.
2-Chlorophenol	<47.	<2500.	<35.
1,3-Dichlorobenzene	<47.	<2500.	<35.
1,4-Dichlorobenzene	<47.	<2500.	<35.
Benzyl Alcohol	<47.	<2500.	<35.
1,2-Dichlorobenzene	<47.	<2500.	<35.
2-Methylphenol	<47.	<2500.	<35.
bis(2-Chloroisopropyl)Ether	<47.	<2500.	<35.
4-Methylphenol	290.	<2500.	200.
N-Nitroso-Di-n-Propylamine	<47.	<2500.	<35.
Hexachloroethane	<94.	<5000.	<71.
Nitrobenzene	<47.	<2500.	<35.
Isophorone	<47.	<2500.	<35.
2-Nitrophenol	<94.	<5000.	<71.
2,4-Dimethylphenol	140.	<2500.	<35.
Benzoic Acid	<1200.	<62,000.	<890.
bis(2-Chloroethoxy)Methane	<47.	<2500.	<35.
2,4-Dichlorophenol	<94.	<5000.	<71.

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	parts per billion (ug/kg), dry basis		
	1	2	3
1,2,4-Trichlorobenzene	<47.	<2500.	<35.
Naphthalene	1200.	1,000,000.	5300.
4-Chloroaniline	<47.	<2500.	<35.
Hexachlorobutadiene	<47.	<2500.	<35.
4-Chloro-3-Methylphenol	<94.	<5000.	<71.
2-Methylnaphthalene	52.	640,000.	4900.
Hexachlorocyclopentadiene	<94.	<5000.	<71.
2,4,6-Trichlorophenol	<94.	<5000.	<71.
2,4,5-Trichlorophenol	<94.	<5000.	<71.
2-Chloronaphthalene	<47.	<2500.	<35.
2-Nitroaniline	<94.	<5000.	<71.
Dimethyl Phthalate	<47.	<2500.	<35.
Acenaphthylene	<47.	8400.	<35.
3-Nitroaniline	<240.	<12,000.	<180.
Acenaphthene	<47.	230,000.	660.
2,4-Dinitrophenol	<470.	<25,000.	<350.
4-Nitrophenol	<470.	<25,000.	<350.
Dibenzofuran	<47.	150,000.	570.
2,4-Dinitrotoluene	<94.	<5000.	<71.
2,6-Dinitrotoluene	<94.	<5000.	<71.
Diethyl Phthalate	<47.	<2500.	<35.
4-Chlorophenyl-Phenylether	<47.	<2500.	<35.
Fluorene	<47.	160,000.	580.
4-Nitroaniline	<94.	<5000.	<71.

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	parts per billion (ug/kg), dry basis		
	1	2	3
4,6-Dinitro-2-Methylphenol	<470.	<25,000.	<350.
N-Nitrosodiphenylamine	<47.	<2500.	<35.
1,2-Diphenylhydrazine	<94.	<5000.	<71.
4-Bromophenyl-Phenylether	<94.	<5000.	<71.
Hexachlorobenzene	<94.	<5000.	<71.
Pentachlorophenol	<470.	100,000.	<350.
Phenanthrene	<47.	390,000.	2300.
Anthracene	<47.	82,000.	270.
Di-n-Butyl Phthalate	<47.	<2500.	<35.
Fluoranthene	<47.	200,000.	1300.
Pyrene	<47.	150,000.	780.
Benzidine	<1200.	<62,000.	<890.
Butylbenzylphthalate	<47.	<2500.	<35.
3,3'Dichlorobenzidine	<470.	<25,000.	<350.
Benzo(a)Anthracene	<47.	39,000.	110.
bis(2-Ethylhexyl)Phthalate	75.	<2500.	1200.
Chrysene	<47.	44,000.	150.
Di-n-Octyl Phthalate	<47.	<2500.	<35.
Benzo(b)Fluoranthene	<94.	19,000.	<71.
Benzo(k)Fluoranthene	<94.	14,000.	<71.
Benzo(a)Pyrene	<94.	16,000.	<71.
Indeno(1,2,3-cd)Pyrene	<94.	6200.	<71.
Dibenzo(a,h)Anthracene	<94.	<5000.	<71.
Benzo(g,h,i)Perylene	<94.	5900.	<71.

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LABORATORY NO. 15494

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parts per billion (ug/kg), dry basis

	Lab Blank 1	Lab Blank 2
	<33.	<2000.
Phenol	<170.	<10,000.
Aniline	<33.	<2000.
bis(2-Chloroethyl)Ether	<33.	<2000.
2-Chlorophenol	<33.	<2000.
1,3-Dichlorobenzene	<33.	<2000.
1,4-Dichlorobenzene	<33.	<2000.
Benzyl Alcohol	<33.	<2000.
1,2-Dichlorobenzene	<33.	<2000.
2-Methylphenol	<33.	<2000.
bis(2-Chloroisopropyl)Ether	<33.	<2000.
4-Methylphenol	<67.	<4000.
N-Nitroso-Di-n-Propylamine	<33.	<2000.
Hexachloroethane	<33.	<2000.
Nitrobenzene	<67.	<4000.
Isophorone	<33.	<2000.
2-Nitrophenol	<830.	<50,000.
2,4-Dimethylphenol	<33.	<2000.
Benzoic Acid	<67.	<4000.
bis(2-Chloroethoxy)Methane	<33.	<2000.
2,4-Dichlorophenol	<67.	<4000.
1,2,4-Trichlorobenzene	<33.	<2000.
Naphthalene	<33.	<2000.
4-Chloroaniline	<67.	<4000.
Hexachlorobutadiene	<33.	<2000.
4-Chloro-3-Methylphenol	<67.	<4000.
2-Methylnaphthalene	<67.	<4000.
Hexachlorocyclopentadiene	<67.	<4000.
2,4,6-Trichlorophenol		
2,4,5-Trichlorophenol		

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LABORATORY NO. 15494

	parts per billion (ug/kg), dry basis	
	Lab Blank 1	Lab Blank 2
2-Chloronaphthalene	<33.	<2000.
2-Nitroaniline	<67.	<4000.
Dimethyl Phthalate	<33.	<2000.
Acenaphthylene	<33.	<2000.
3-Nitroaniline	<170.	<10,000.
Acenaphthene	<33.	<2000.
2,4-Dinitrophenol	<330.	<20,000.
4-Nitrophenol	<330.	<20,000.
Dibenzofuran	<33.	<2000.
2,4-Dinitrotoluene	<67.	<4000.
2,6-Dinitrotoluene	<67.	<4000.
Diethyl Phthalate	<33.	<2000.
4-Chlorophenyl-Phenylether	<33.	<2000.
Fluorene	<33.	<2000.
4-Nitroaniline	<67.	<4000.
4,6-Dinitro-2-Methylphenol	<330.	<20,000.
N-Nitrosodiphenylamine	<33.	<2000.
1,2-Diphenylhydrazine	<67.	<4000.
4-Bromophenyl-Phenylether	<67.	<4000.
Hexachlorobenzene	<67.	<4000.
Pentachlorophenol	<330.	<20,000.
Phenanthrene	<33.	<2000.
Anthracene	<33.	<2000.
Di-n-Butyl Phthalate	<33.	<2000.
Fluoranthene	<33.	<2000.
Pyrene	<33.	<2000.
Benzidine	<830.	<50,000.

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LABORATORY NO. 15494

	parts per billion (ug/kg), dry basis	
	Lab Blank 1	Lab Blank 2
Butylbenzylphthalate	<33.	<2000.
3,3'Dichlorobenzidine	<330.	<20,000.
Benzo(a)Anthracene	<33.	<2000.
bis(2-Ethylhexyl)Phthalate	**97.**	**15,000.**
Chrysene	<33.	<2000.
Di-n-Octyl Phthalate	<33.	<2000.
Benzo(b)Fluoranthene	<67.	<4000.
Benzo(k)Fluoranthene	<67.	<4000.
Benzo(a)Pyrene	<67.	<4000.
Indeno(1,2,3-cd)Pyrene	<67.	<4000.
Dibenzo(a,h)Anthracene	<67.	<4000.
Benzo(g,h,i)Perylene	<67.	<4000.

Key

< = less than

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:veg

Hart Crowser

APPENDIX

Surrogate Recovery Quality Control Report

Attached and below are surrogate (chemically similar) compounds utilized in the analysis of organic compounds. The surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

Comment Key

D. Persistently poor surrogate and spike recoveries signal a laboratory problem and the need for re-extraction and re-analysis. However, occasional outliers are regarded as anomolies and, in this case, re-analysis was not deemed necessary because other indicators were in control.

Diesel & Gasoline Surrogates

Sample	% Recovery Dodecane
Blank 1	40.
Blank 2	79.
1	52.
2	NC*
3	NC*

NC = Surrogate recoveries for samples 2 and 3 were not calculated due to the presence of a major interfering peak.

JOB No. 15494 DATE: 03/24/89

Sample No. B0320MSVSMG Matrix: Soil Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	72		30 - 99
d5-Phenol	73		27 - 105
2-Bromophenol	73		30 - 107
d5-Nitrobenzene	78		45 - 100
2-Fluorobiphenyl	76		54 - 103
d10-Azobenzene	89		34 - 123
2.4.6-Tribromophenol	86		10 - 158
d14-p-Terphenyl	75		29 - 130

Sample No. 2 Matrix: Soil Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	76		30 - 99
d5-Phenol	79		27 - 105
2-Bromophenol	79		30 - 107
d5-Nitrobenzene	89		45 - 100
2-Fluorobiphenyl	79		54 - 103
d10-Azobenzene	89		34 - 123
2.4.6-Tribromophenol	94		10 - 158
d14-p-Terphenyl	80		29 - 130

Sample No. B0320MSVSLG Matrix: Soil Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	55		30 - 99
d5-Phenol	63		27 - 105
2-Bromophenol	61		30 - 107
d5-Nitrobenzene	61		45 - 100
2-Fluorobiphenyl	65		54 - 103
d10-Azobenzene	73		34 - 123
2.4.6-Tribromophenol	78		10 - 158
d14-p-Terphenyl	69		29 - 130

Sample No. 1 Matrix: Soil Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	42		30 - 99
d5-Phenol	56		27 - 105
2-Bromophenol	59		30 - 107
d5-Nitrobenzene	37	D	45 - 100
2-Fluorobiphenyl	62		54 - 103
d10-Azobenzene	83		34 - 123
2,4,6-Tribromophenol	51		10 - 158
d14-p-Terphenyl	67		29 - 130

Sample No. 3 Matrix: Soil Analysis: MS-ABN

Surrogate Compound	Percent Recovery	Comment	Control Limits
2-Fluorophenol	66		30 - 99
d5-Phenol	68		27 - 105
2-Bromophenol	66		30 - 107
d5-Nitrobenzene	73		45 - 100
2-Fluorobiphenyl	73		54 - 103
d10-Azobenzene	82		34 - 123
2,4,6-Tribromophenol	73		10 - 158
d14-p-Terphenyl	78		29 - 130

JOB No. 15494 DATE: 03/24/89

Sample No. B0322MVOSJ2 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	108		74 - 125
d8-Toluene	108		77 - 121
p-Bromofluorobenzene	100		75 - 115

Sample No. B0322MVOSJ3 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	109		74 - 125
d8-Toluene	107		77 - 121
p-Bromofluorobenzene	102		75 - 115

Sample No. 01 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	108		74 - 125
d8-Toluene	111		77 - 121
p-Bromofluorobenzene	95		75 - 115

Sample No. 02 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	89		74 - 125
d8-Toluene	109		77 - 121
p-Bromofluorobenzene	102		75 - 115

Matrix: Soil Analysis: MS-VOA

Sample No. 03

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	108		74 - 125
d8-Toluene	106		77 - 121
p-Bromofluorobenzene	105		75 - 115

WEYERHAEUSER COMPANY
ANALYTICAL LABORATORIES
ATOMIC SPECTROSCOPY
Tacoma, WA

SR19182
Everett Cleanup - Test Pit #4
Total Metals

Lab Code	Sample I.D.	As	Cr	Cu
		(mg/kg, O.D. basis)		
25451	S-2	20	31	16
"	(dup)	20	37	15

Approved ______ 3/17/89

Notebook ______

SR 19182
Page 1

WEYERHAEUSER
ANALYTICAL AND TESTING SERVICES
Tacoma, WA 98477

Report

Creosote Estimation for Everett Cleanup

Sample Identification	WTC Number	Creosote (ug/Kg)
Test Pit S-2 11:22AM 3/10/89	25451	180,000

Approved ______________________ Date 3/24/89

2D

SOIL SEMIVOLATILE SURROGATE RECOVERY

ab Name: WEYERHAEUSER Contract: MCCOURT

ab Code: WEYER Case No.: 19182 SAS No.: SDG No.:

evel: (low/med) LOW

	EPA SAMPLE NO.	S1 (NBZ)#	S2 (FBP)#	S3 (TPH)#	S4 (PHL)#	S5 (2FP)#	S6 (TBP)#	OTHER	TOT OUT
01	TESTPIT-S2	50	46	51	42	39	39		0
02	TESTPIT-S2	D	70	72	33	28	30		0

	QC LIMITS
S1 (NBZ) = Nitrobenzene-d5	(23-120)
S2 (FBP) = 2-Fluorobiphenyl	(30-115)
S3 (TPH) = Terphenyl	(18-137)
S4 (PHL) = Phenol-d5	(24-113)
S5 (2FP) = 2-Fluorophenol	(25-121)
S6 (TBP) = 2,4,6-Tribromophenol	(19-122)

\# Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out

EPA SAMPLE NO.

TESTPIT-S2

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

ab Name: WEYERHAEUSER Contract: MCCOURT

ab Code: WEYER Case No.: 19182 SAS No.: SDG No.:

atrix: (soil/water) SOIL Lab Sample ID: 25451

ample wt/vol: 30.1 (g/mL) G Lab File ID: BN90323A

evel: (low/med) LOW Date Received: 03/10/89

Moisture: not dec. dec. Date Extracted: 03/21/89

xtraction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/23/89

PC Cleanup: (Y/N) Y pH: Dilution Factor: 6.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	4100	U
111-44-4	bis(2-Chloroethyl)Ether	4100	U
95-57-8	2-Chlorophenol	4100	U
541-73-1	1,3-Dichlorobenzene	4100	U
106-46-7	1,4-Dichlorobenzene	4100	U
100-51-6	Benzyl Alcohol	4100	U
95-50-1	1,2-Dichlorobenzene	4100	U
95-48-7	2-Methylphenol	4100	U
39638-32-9	bis(2-Chloroisopropyl)Ether	4100	U
106-44-5	4-Methylphenol	4100	U
621-64-7	N-Nitroso-Di-n-Propylamine	4100	U
67-72-1	Hexachloroethane	4100	U
98-95-3	Nitrobenzene	900	J
78-59-1	Isophorone	4100	U
88-75-5	2-Nitrophenol	4100	U
105-67-9	2,4-Dimethylphenol	4100	U
65-85-0	Benzoic Acid	20000	U
111-91-1	bis(2-Chloroethoxy)Methane	4100	U
120-83-2	2,4-Dichlorophenol	4100	U
120-82-1	1,2,4-Trichlorobenzene	4100	U
91-20-3	Naphthalene	31000	
106-47-8	4-Chloroaniline	4100	U
87-68-3	Hexachlorobutadiene	4100	U
59-50-7	4-Chloro-3-Methylphenol	4100	U
91-57-6	2-Methylnaphthalene	23000	
77-47-4	Hexachlorocyclopentadiene	4100	U
88-06-2	2,4,6-Trichlorophenol	4100	U
95-95-4	2,4,5-Trichlorophenol	20000	U
91-58-7	2-Chloronaphthalene	4100	U
88-74-4	2-Nitroaniline	20000	U
131-11-3	Dimethyl Phthalate	4100	U
208-96-8	Acenaphthylene	4100	U
606-20-2	2,6-Dinitrotoluene	4100	U

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1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TESTPIT-S2

ab Name: WEYERHAEUSER Contract: MCCOURT

ab Code: WEYER Case No.: 19182 SAS No.: SDG No.:

atrix: (soil/water) SOIL Lab Sample ID: 25451

ample wt/vol: 30.1 (g/mL) G Lab File ID: BN90323A

evel: (low/med) LOW Date Received: 03/10/89

Moisture: not dec. dec. Date Extracted: 03/21/89

xtraction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/23/89

PC Cleanup: (Y/N) Y pH: Dilution Factor: 6.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	20000	U
83-32-9	Acenaphthene	15000	
51-28-5	2,4-Dinitrophenol	20000	U
100-02-7	4-Nitrophenol	20000	U
132-64-9	Dibenzofuran	8300	
121-14-2	2,4-Dinitrotoluene	4100	U
84-66-2	Diethylphthalate	4100	U
7005-72-3	4-Chlorophenyl-phenylether	4100	U
86-73-7	Fluorene	9600	
100-10-6	4-Nitroaniline	20000	U
534-52-1	4,6-Dinitro-2-Methylphenol	20000	U
86-30-6	N-Nitrosodiphenylamine (1)	4100	U
101-55-3	4-Bromophenyl-phenylether	4100	U
118-74-1	Hexachlorobenzene	4100	U
87-86-5	Pentachlorophenol	2600	J
85-01-8	Phenanthrene	17000	
120-12-7	Anthracene	4200	
84-74-2	Di-n-Butylphthalate	4100	U
206-44-0	Fluoranthene	9700	
129-00-0	Pyrene	6400	
85-68-7	Butylbenzylphthalate	4100	U
91-94-1	3,3'-Dichlorobenzidine	8300	U
56-55-3	Benzo(a)Anthracene	1600	J
218-01-9	Chrysene	1800	J
117-81-7	bis(2-Ethylhexyl)phthalate	4100	U
117-84-0	Di-n-Octyl Phthalate	4100	U
205-99-2	Benzo(b)Fluoranthene	790	J
207-08-9	Benzo(k)Fluoranthene	830	J
50-32-8	Benzo(a)Pyrene	610	J
193-39-5	Indeno(1,2,3-cd)Pyrene	4100	U
53-70-3	Dibenz(a,h)Anthracene	4100	U
191-24-2	Benzo(g,h,i)Perylene	4100	U

(1) - Cannot be separated from Diphenylamine

EPA SAMPLE NO.

TESTPIT-S2

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

b Name: WEYERHAEUSER Contract: MCCOURT

b Code: WEYER Case No.: 19182 SAS No.: SDG No.:

itrix: (soil/water) SOIL Lab Sample ID: 25451

imple wt/vol: 30.1 (g/mL) G Lab File ID: BN90323A

vel: (low/med) LOW Date Received: 03/10/89

Moisture: not dec. dec. Date Extracted: 03/21/89

traction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/23/89

C Cleanup: (Y/N) Y pH: Dilution Factor: 6.5

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

umber TICs found: 0

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TESTPIT-S2

Contract: MCCOURT

Name: WEYERHAEUSER

Code: WEYER Case No.: 19182 SAS No.: SDG No.:

trix: (soil/water) SOIL

Lab Sample ID: 25451

mple wt/vol: 30.1 (g/mL) G

Lab File ID: BN90322K

vel: (low/med) LOW

Date Received: 03/10/89

Moisture: not dec. dec.

Date Extracted: 03/21/89

traction: (SepF/Cont/Sonc) SONC

Date Analyzed: 03/22/89

Cleanup: (Y/N) Y pH:

Dilution Factor: 0.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	180	J
111-44-4	bis(2-Chloroethyl)Ether	330	U
95-57-8	2-Chlorophenol	330	U
541-73-1	1,3-Dichlorobenzene	330	U
106-46-7	1,4-Dichlorobenzene	330	U
100-51-6	Benzyl Alcohol	330	U
95-50-1	1,2-Dichlorobenzene	330	U
95-48-7	2-Methylphenol	330	U
39638-32-9	bis(2-Chloroisopropyl)Ether	330	U
106-44-5	4-Methylphenol	330	U
621-64-7	N-Nitroso-Di-n-Propylamine	330	U
67-72-1	Hexachloroethane	330	U
98-95-3	Nitrobenzene	1000	
78-59-1	Isophorone	330	U
88-75-5	2-Nitrophenol	330	U
105-67-9	2,4-Dimethylphenol	50	J
65-85-0	Benzoic Acid	1600	U
111-91-1	bis(2-Chloroethoxy)Methane	330	U
120-83-2	2,4-Dichlorophenol	330	U
120-82-1	1,2,4-Trichlorobenzene	330	U
91-20-3	Naphthalene	28000	E
106-47-8	4-Chloroaniline	330	U
87-68-3	Hexachlorobutadiene	330	U
59-50-7	4-Chloro-3-Methylphenol	330	U
91-57-6	2-Methylnaphthalene	20000	E
77-47-4	Hexachlorocyclopentadiene	330	U
88-06-2	2,4,6-Trichlorophenol	330	U
95-95-4	2,4,5-Trichlorophenol	1600	U
91-58-7	2-Chloronaphthalene	330	U
88-74-4	2-Nitroaniline	1600	U
131-11-3	Dimethyl Phthalate	330	U
208-96-8	Acenaphthylene	330	
606-20-2	2,6-Dinitrotoluene	330	U

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1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

TESTPIT-S2

ab Name: WEYERHAEUSER Contract: MCCOURT

ab Code: WEYER Case No.: 19182 SAS No.: SDG No.:

atrix: (soil/water) SOIL Lab Sample ID: 25451

ample wt/vol: 30.1 (g/mL) G Lab File ID: BN90322K

evel: (low/med) LOW Date Received: 03/10/89

Moisture: not dec. dec. Date Extracted: 03/21/89

traction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/22/89

PC Cleanup: (Y/N) Y pH: Dilution Factor: 0.50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
99-09-2	3-Nitroaniline	1600	U
83-32-9	Acenaphthene	9000	E
51-28-5	2,4-Dinitrophenol	1600	U
100-02-7	4-Nitrophenol	1600	U
132-64-9	Dibenzofuran	5200	
121-14-2	2,4-Dinitrotoluene	140	J
84-66-2	Diethylphthalate	330	U
7005-72-3	4-Chlorophenyl-phenylether	330	U
86-73-7	Fluorene	5300	
100-10-6	4-Nitroaniline	1600	U
534-52-1	4,6-Dinitro-2-Methylphenol	1600	U
86-30-6	N-Nitrosodiphenylamine (1)	330	U
101-55-3	4-Bromophenyl-phenylether	330	U
118-74-1	Hexachlorobenzene	330	U
87-86-5	Pentachlorophenol	3300	
85-01-8	Phenanthrene	19000	E
120-12-7	Anthracene	4400	
84-74-2	Di-n-Butylphthalate	330	U
206-44-0	Fluoranthene	11000	E
129-00-0	Pyrene	6400	E
85-68-7	Butylbenzylphthalate	330	U
91-94-1	3,3'-Dichlorobenzidine	660	U
56-55-3	Benzo(a)Anthracene	1400	
218-01-9	Chrysene	1700	
117-81-7	bis(2-Ethylhexyl)phthalate	330	U
117-84-0	Di-n-Octyl Phthalate	330	U
205-99-2	Benzo(b)Fluoranthene	650	
207-08-9	Benzo(k)Fluoranthene	710	
50-32-8	Benzo(a)Pyrene	470	
193-39-5	Indeno(1,2,3-cd)Pyrene	180	J
53-70-3	Dibenz(a,h)Anthracene	70	J
191-24-2	Benzo(g,h,i)Perylene	150	J

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

TESTPIT-S2

Name: WEYERHAEUSER Contract: MCCOURT

Code: WEYER Case No.: 19182 SAS No.: SDG No.:

trix: (soil/water) SOIL Lab Sample ID: 25451

mple wt/vol: 30.1 (g/mL) G Lab File ID: BN90322K

vel: (low/med) LOW Date Received: 03/10/89

Moisture: not dec. dec. Date Extracted: 03/21/89

traction: (SepF/Cont/Sonc) SONC Date Analyzed: 03/22/89

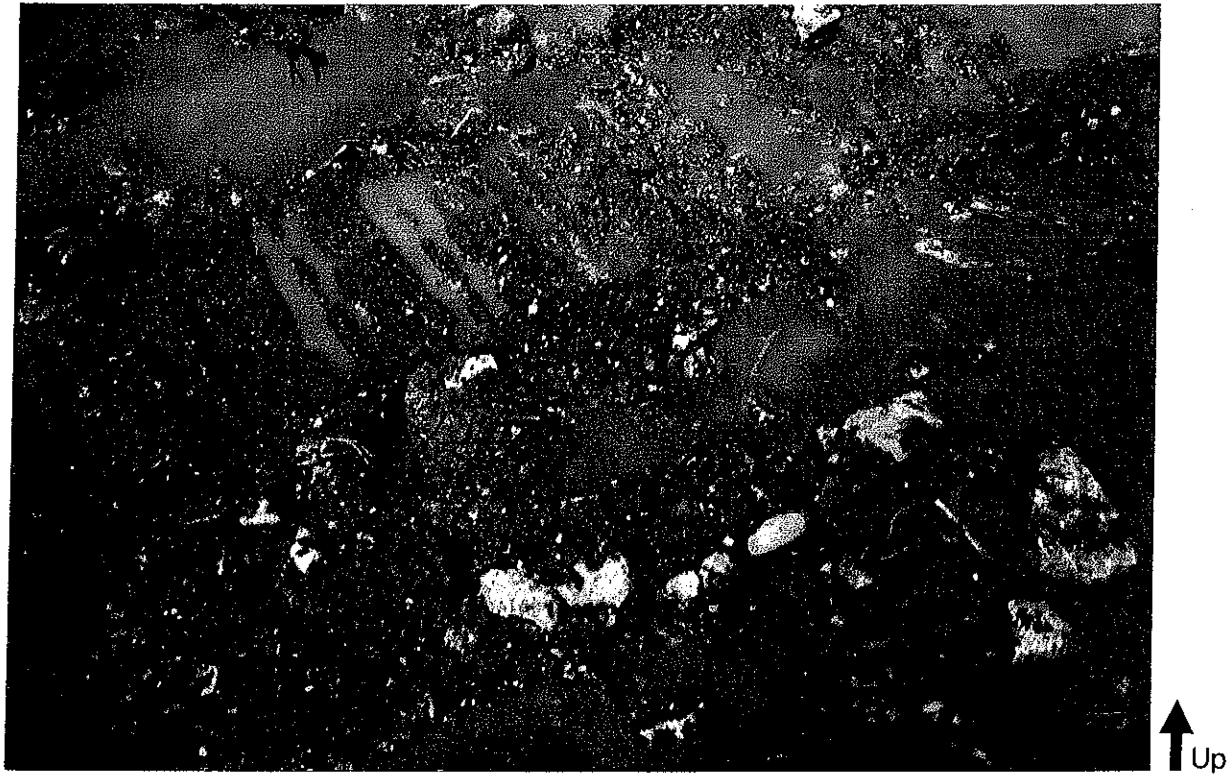
Cleanup: (Y/N) Y pH: Dilution Factor: 0.50

CONCENTRATION UNITS:

mber TICs found: 0 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

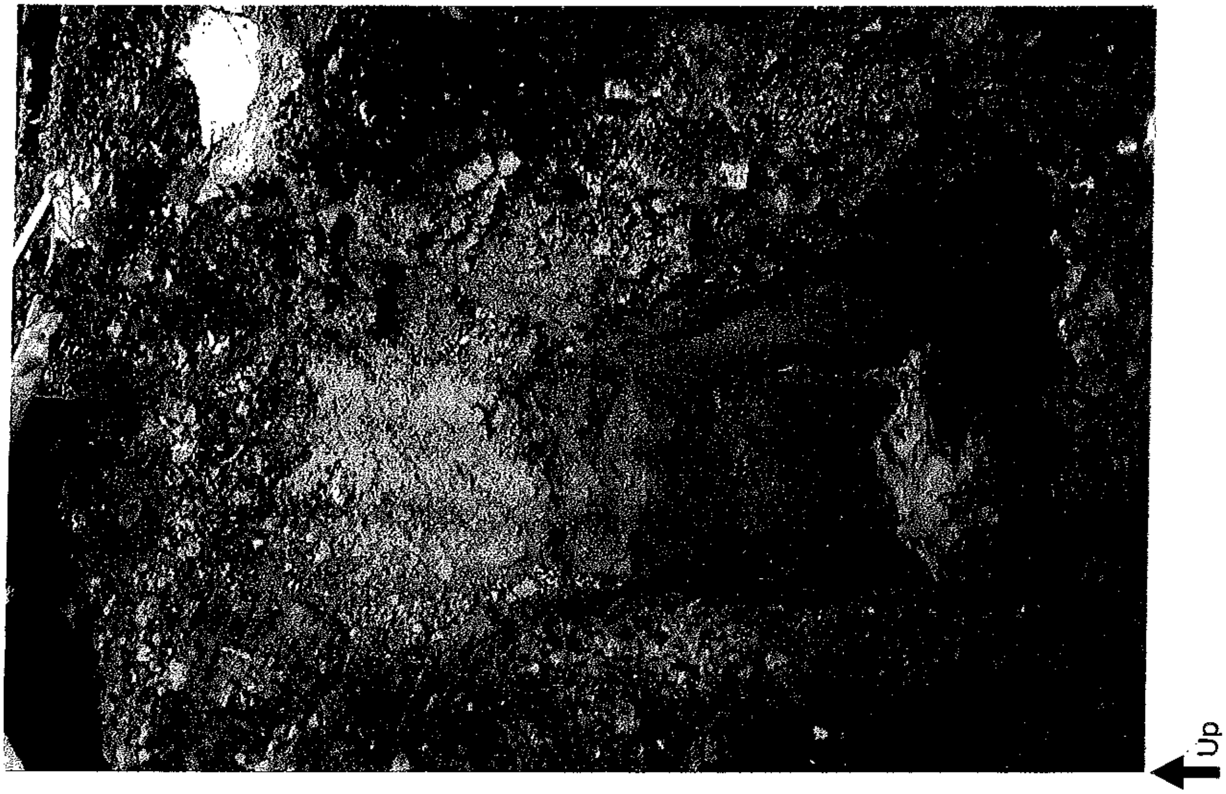
Photograph 10 - Oily sheen on puddle - west end of machine shop.



Photograph 11 - Oily sheen on puddle - south of machine shop near TP-11.

Photograph 8 - Test Pit 15.

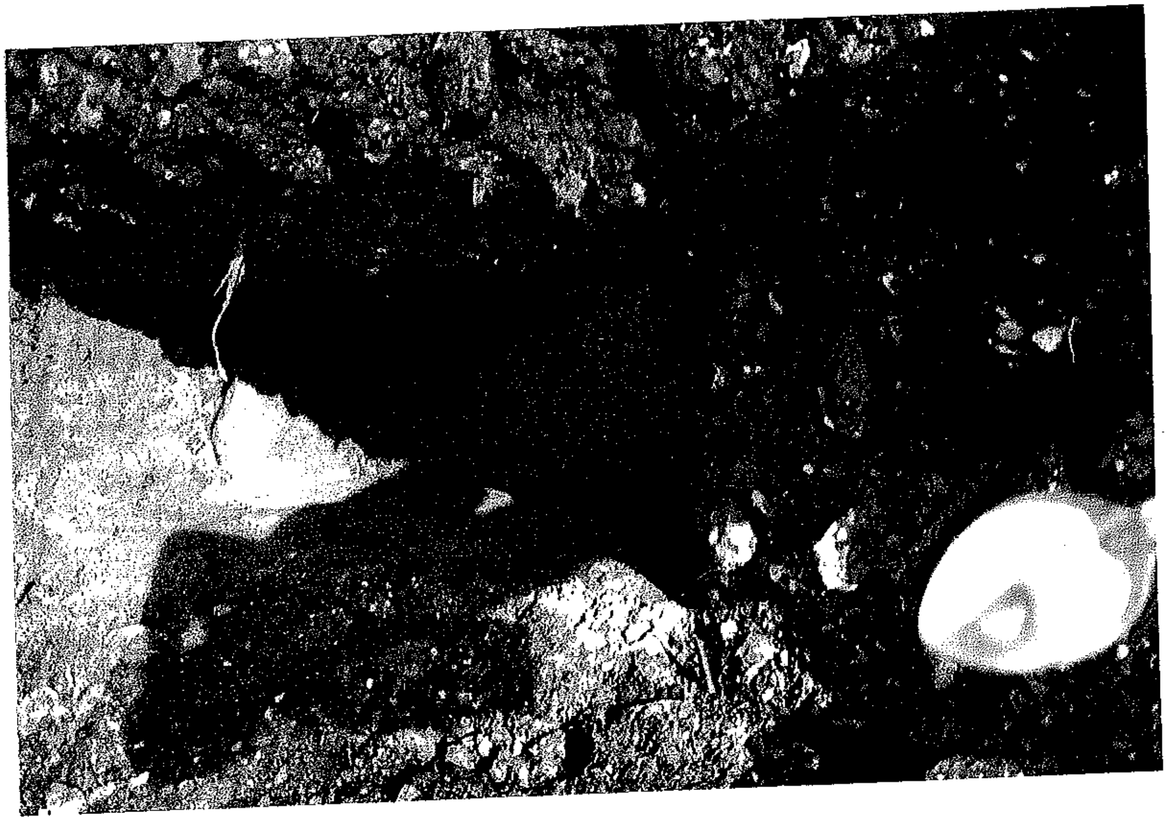
Photograph 9 - Oily sheen on puddle - south end of machine shop.



Photograph 6 - Test Pit 8.

Photograph 7 - Test Pit 12.

Photograph 4 - Test Pit 4.



Photograph 5 - Test Pit 6.

Photograph 2 - Test Pit 1.

Photograph 3 - Test Pit 3.

Photograph 1 - Everett Mill E site - looking south.