May 12, 2022

Robert W. Warren, Section Manager
Washington Department of Ecology, Northwest Region
PO Box 330316
Shoreline, WA 98133-9716

Re: Buse Timber & Sales Cleanup Discussion

Dear Mr. Warren,

Thank you for taking the time last Monday, May 2, 2022, to discuss the Buse Timber & Sales property located at 3812 28th Place NE, Everett, Washington (Buse Timber). As we discussed, the property has been the subject of regulatory oversight for more than 30 years, starting as early as 1990, and is listed with the Washington Department of Ecology (Ecology) as Facility Site ID 2786 and Cleanup Site ID 4340. In connection with their recent purchase of the property, the current owner conducted Phase I and Phase II environmental site assessments and is committed to performing additional remedial action at the property to meet current Model Toxics Control Act (MTCA) cleanup levels.

The purpose of this letter is to provide follow up materials and to answer questions raised during our call. The slides from the meeting are attached for your convenience, as are additional materials identified below. Questions raised by Ecology are in italics below, followed by our response.

When did mill operation begin and were there other former land uses?

The mill began operations in 1942 and modifications to the property are identified in Section 6.2 from the Phase I Environmental Site Assessment prepared by Apex (Phase I ESA), provided with this letter. Prior uses identified as part of the Phase I ESA included a golf course (circa 1900)[1] and dairy farm.

How was the log pond used and was any sampling completed from the log pond fill?

The former log pond at the south end of the facility operated beginning in the 1950s until approximately the mid-1960s based on aerial photograph review. Logs were floated in along the west drainage to the log pond, where they were held until removed for milling. Soil and groundwater samples were collected from the area of the log pond during the 2021 Phase II ESA completed by Apex. Soil and groundwater samples were collected from borings SB-2, SB-3, SB-8, and SB-9 from this area. Soil samples were analyzed for:

- Diesel-range total petroleum hydrocarbons (TPH-Dx): two intervals from SB-2 and SB-3;
- Volatile organic compounds (VOCs): SB-2 (0-5), SB-9 (0-5), and SB-9 (5-10); and
- Chlorinated phenols and dioxins: SB-2 (0-5) and SB-3 (5-10).

Groundwater samples were analyzed for:

- TPH-Dx (SB-2W and SB-3W); and

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[1] The golf course is identified as a prior use in the Phase I Environmental Site Assessment dated June 20, 2018 prepared by Terracon, included in Appendix D to the Apex Phase I ESA.

- Chlorinated phenols (SB-2W and SB-3W).

TPH-Dx was sporadically detected in soil and groundwater samples. No detected concentrations exceeded MTCA Method A cleanup levels. Silica gel cleanup was used based on the presence of polar/biogenic hydrocarbons.

Concentrations of two petroleum VOCs (isopropyltoluene, toluene) were detected in soil at concentrations near method reporting limits (MRLs) and well below MTCA Method A cleanup levels (when available).

Chlorinated phenols were not detected in soil or groundwater samples. Dioxin Toxicity Equivalence Factors (TEQ) in soil samples were below MTCA Method A cleanup levels.

When was the site paved?

The current mill was constructed in 1960 at approximately the same time as Interstate 5 construction. The site was paved at this time.

What is the period of operation of the dry kilns?

The dry kilns were constructed in the early 1970s and taken out of service in approximately 2010. Kilns were reportedly only occasionally used for special orders of untreated lumber.

What is the period of operation of the PCP dip tank? Where was the PCP product stored? Where was finished product stored?

Historically, pentachlorophenol (PCP) treatment was conducted on an occasional basis but was not part of Buse Timber's core business practice. PCP treatment was primarily for clear lumber that would be used for molding (as opposed to utility poles and cross-arms). Pressure treating was not reported.

Aerial photographs (attached) first show the dip tank on the property in 1968. The 1994 EPA Site Screening Inspection (SSI; attached) notes that the dip tank began operations in 1946, but that date could not be corroborated through due diligence. PCP dip tank operations ceased based on an EPA complaint in 1986. Information on the storage location for the PCP is not available. PCP-treated wood was not stored in a dedicated location; rather, it was placed with other dimensional lumber.

What is the type of preservative used in the current dip tank?

The current dip tank uses a water-soluble fungicide for sapstain control of milled lumber. Sapstain control prevents blue to grey mold stains that form on freshly milled lumber. Record information indicates formulations of PQ-8 (copper-8-quinolinolate treatment), Britewood S or Britewood Q (ortho-phenylphenol treatment) have historically been used. Britewood XL (ammonium chloride treatment; safety data sheet attached) is currently used. Treated lumber is dried on racks within containment, under cover, and is not exposed to precipitation until it is dry.

Is information available regarding prior investigations of water quality and/or sediments in Union Slough?

Sediment sampling related to Buse Timber within Union Slough was completed in 1994 as part of EPA's SSI and in 1998 as part of a Phase II ESA completed by others (Exponent, 1998). Additionally, a publicly available sediment characterization completed for Snohomish County provides sediment data immediately downstream of the Buse Timber property. The Phase II ESA by Exponent and the sediment characterization document are attached.

The SSI includes sediment samples from Union Slough (SDUS4) collected from the area near the tide gate outfall. A second sample was collected from a background location (SDUSBK5) at the point where Union Slough joins the Snohomish River at its most upstream point. Samples were analyzed for metals, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs) and chlorinated phenols, including pentachlorophenol. Metals were detected in SDUS4 and SDUSBK5 at concentrations expected for sediments in the Snohomish River estuary. PCBs, SVOCs, and chlorinated phenols were not detected in SDUS4 or SDUSBK5.

The 1998 Draft Phase II ESA (Exponent, 1998) describes two sediment samples (USG-1 and USG-2) collected outside the tide gate in Union Slough. The samples were analyzed for gasoline and diesel-oil range hydrocarbons, volatile organic compounds (VOCs), and chlorinated phenols, including pentachlorophenol. The report summarizes that oil range TPH concentrations in USG-1 and USG-2 ranged from 220 to 245 mg/kg, and that chlorinated phenols were not detected. The report is incomplete and only data for USG-1 are available in the report tables. Only lube oil range TPH is reported as detected.

The 2019 Snohomish River preliminary sediment characterization included samples SG-01 and SG-02, collected from center channel approximately 700 and 4,200 feet, respectively, downstream of the intersection of I-5 and Union Slough. Samples were analyzed for metals, SVOCs, including pentachlorophenol, polycyclic aromatic hydrocarbons (PAHs), pesticides, and PCBs. Metals were detected in SG-01 and SG-02 at concentrations expected for sediments in the Snohomish River estuary. SVOCs, including pentachlorophenol, PAHs, and PCBs were not detected in SDUS4 or SDUSBK5 (some J-flag concentrations of SVOCs and PAHs were detected).

Thank you again for discussing the Buse Timber property. If you have additional questions, please contact me at john.foxwell@apexcos.com or (503) 312-0676.

Sincerely,

John Foxwell, LHg
Principal

cc: Louise Bardy, Washington Department of Ecology
Sonia Fernandez, Washington Department of Ecology
Chris Kelley, Washington Department of Ecology
Kathryn Wyatt, Washington State Office of the Attorney General
Anna Wildeman, Troutman Pepper
Barry G. Ziker, Joyce Ziker Partners, PLLC

ATTACHMENTS

Figure 1	Site Location Map
Figure 2	Site Vicinity Map
Figure 3	Proposed Project Summary
Figure 4	Dioxins/Furans in Soil
Figure 5	Dioxins/Furans in Sediment
Figure 6	Ditch Cleanup Area

Attachment A	Section 6.0, Apex 2021 Phase I ESA
Attachment B	Screening Site Inspection Report
Attachment C	Britewood™ XL Sapstain Control Safety Data Sheet
Attachment D	Historical Aerial Photographs
Attachment E	1998 Draft Phase II ESA by Exponent
Attachment F	Preliminary Sediment Characterization Memorandum

Marysville, Washington

United States Geological Survey
7.5 Minute Series Topographic Map
Contour Interval: 20 feet
Scale: 1 inch = 24,000 feet
Date: 2020

0 2,000 4,000
Scale in Feet

WASHINGTON

Site Location Map

Buse Timber & Sales
3812 28th Place NE
Everett, Washington

APEX
Apex Companies, LLC
801 NW 42nd Street, #204
Seattle, Washington 98107

Project Number:	Drawn:	Approved:	Figure
32-21001485	JP	JF	1
April 2022			

I:\Client\Alterra Property Group LLC\Buse Mill - Everett, WA\Phase II Figures\Ecology Meeting\32-21001485 01 (Alterra Meeting).dwg Modified 4/27/2022 by JPoore

NOTE: Base map prepared from Microsoft Bing imagery (2022).
Parcel information from Snohomish County
(ftp://ftp.snoco.org/assessor/shapefiles/)

0 1,000 2,000
Scale in Feet

Site Vicinity Map

Buse Timber & Sales
3812 28th Place NE
Everett, Washington

Apex Companies, LLC
801 NW 42nd Street, #204
Seattle, Washington 98107

Project Number:	Drawn:	Approved:	Figure
32-21001485	JP	JF	2
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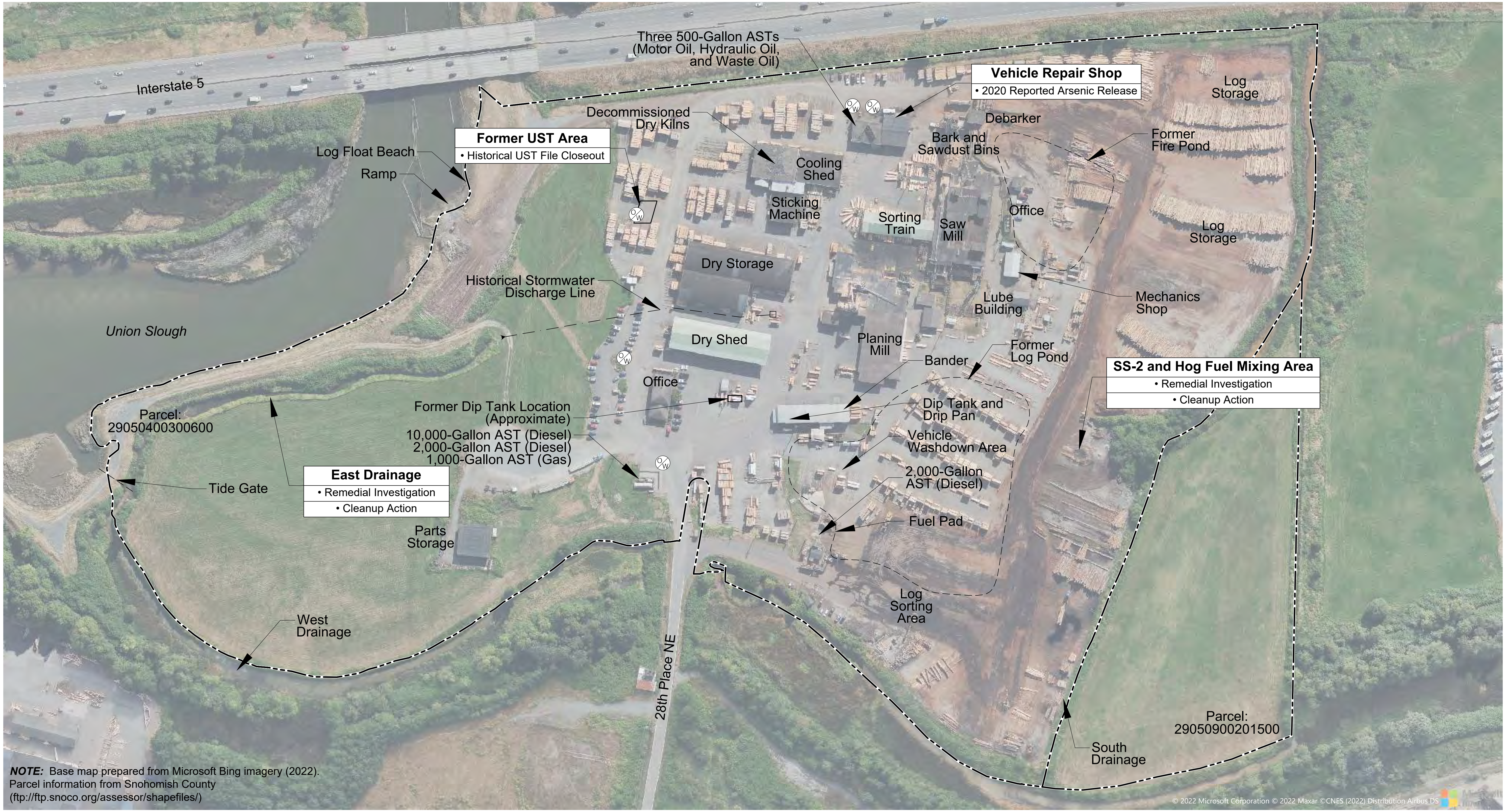

NOTE: Base map prepared from Microsoft Bing imagery (2022).
Parcel information from Snohomish County
(ftp://ftp.snoco.org/assessor/shapefiles/)

Legend:

Ⓞ Oil/Water Separator

Z

0 200 400

Scale in Feet

Proposed Project Summary

Buse Timber & Sales
3812 28th Place NE
Everett, Washington

Apex Companies, LLC 801 NW 42nd Street, #204 Seattle, Washington 98107	Project Number: 32-21001485	Drawn: JP	Approved: JF	Figure 3
	April 2022			

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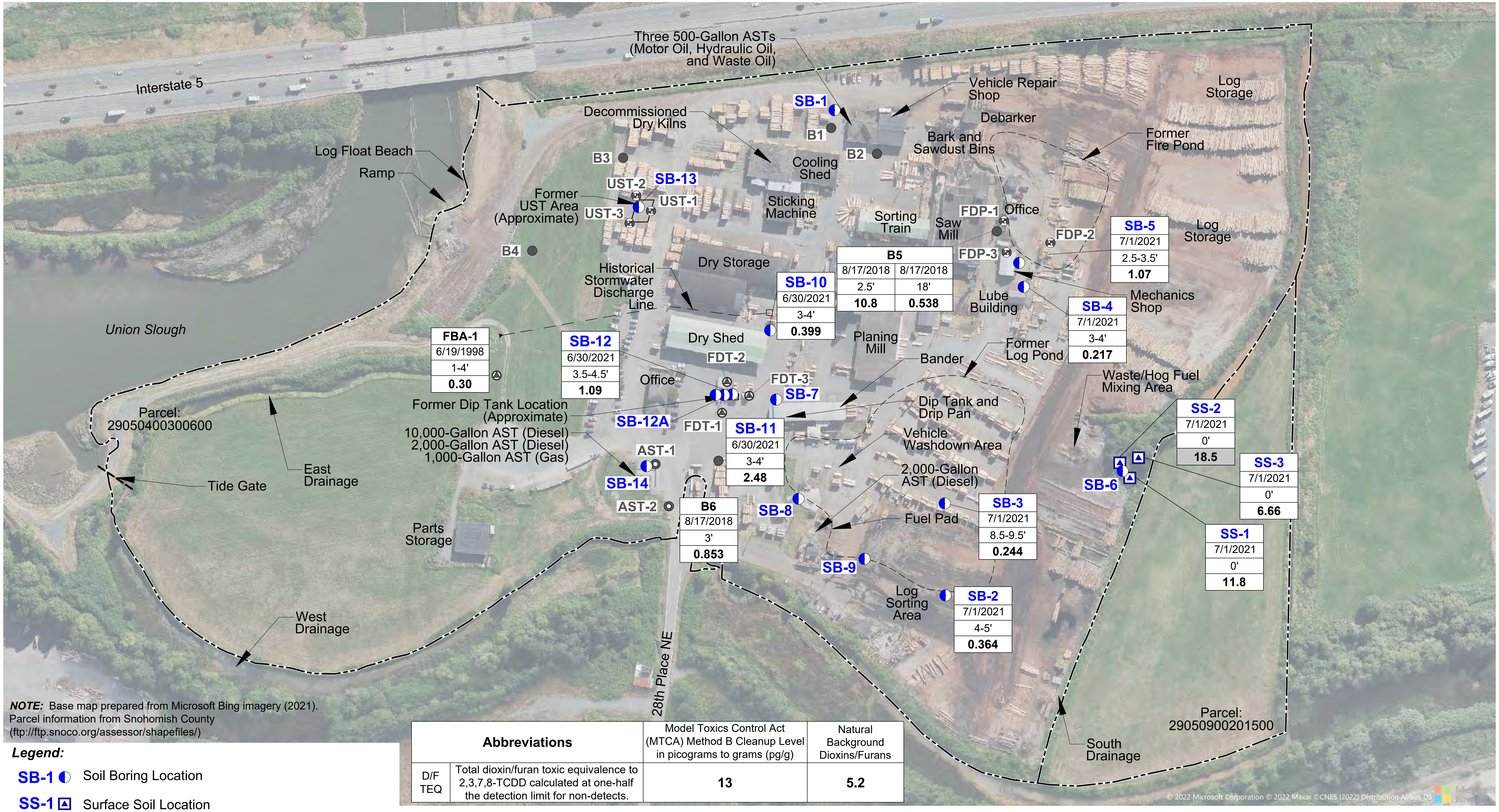


NOTE: Base map prepared from Microsoft Bing imagery (2021). Parcel information from Snohomish County (ftp://ftp.snoco.org/assessor/shapefiles/)

Abbreviations		Model Toxics Control Act (MTCA) Method B Cleanup Level in picograms to grams (pg/g)	Natural Background Dioxins/Furans
D/F TEQ	Total dioxin/furan toxic equivalence to 2,3,7,8-TCDD calculated at one-half the detection limit for non-detects.	**13**	**5.2**

Legend:

SB-1 ◐	Soil Boring Location
SS-1 ⧍	Surface Soil Location
B1 ●	Approximate Historical Soil Boring (Terracon 2018)
AST-1 ◎	Approximate Historical Soil Sample (Exponent 1998)
FDT-1 ⊗	Approximate Historical Subsurface Soil Sample (Exponent 1998)
FDP-1 ⊗	Approximate Historical Soil and Groundwater Sample (Exponent 1998)

FBA-1	Sample Identification
6/19/1998	Date Sampled
1-4'	Sample Depth in Feet
0.30	D/F TEQ Result in picograms per gram (pg/g; parts per trillion)

Shaded Values Exceed the MTCA Method B Cleanup Level

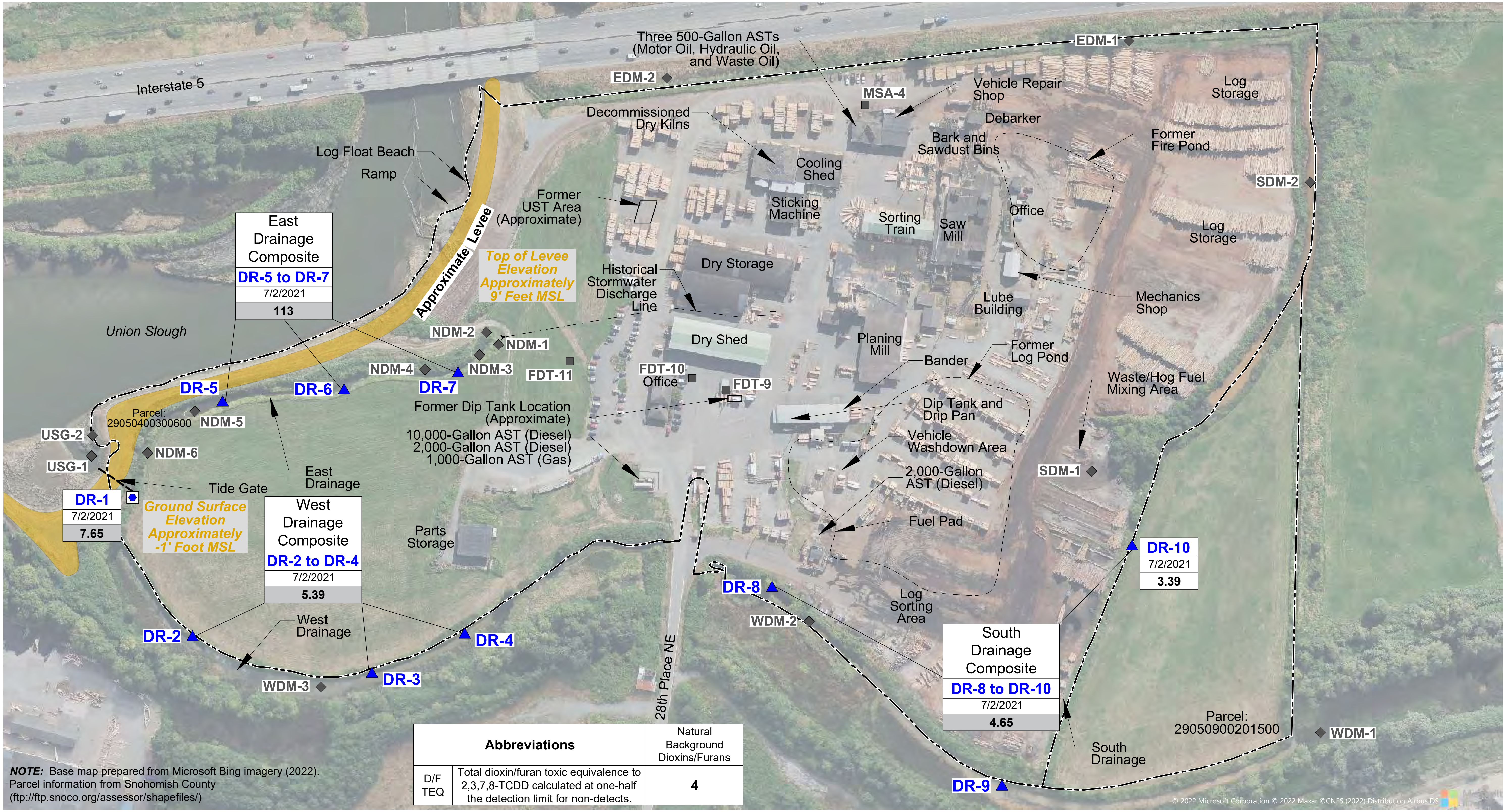
0 200 400
Scale in Feet

Dioxins/Furans in Soil

Buse Timber & Sales
3812 28th Place NE
Everett, Washington

Apex Companies, LLC
801 NW 42nd Street, #204
Seattle, Washington 98107

Project Number:	Drawn:	Approved:	Figure
32-21001485	JP	JF	4
April 2022			



Abbreviations		Natural Background Dioxins/Furans
D/F TEQ	Total dioxin/furan toxic equivalence to 2,3,7,8-TCDD calculated at one-half the detection limit for non-detects.	4

NOTE: Base map prepared from Microsoft Bing imagery (2022). Parcel information from Snohomish County (ftp://ftp.snoco.org/assessor/shapefiles/)

Legend:

DR-1 ●	Discrete Sediment Location
DR-2 ▲	Drainage Sediment Sub-Sample Location
WDM-3 ◆	Approximate Historical Sediment Sample (Exponent 1998)
FDT-9 ■	Approximate Historical Storm Drain Sample (Exponent 1998)

DR-1 — Sample Identification
7/2/2021 — Date Sampled
7.65 — D/F TEQ Result in picograms per gram (pg/g; parts per trillion)

Shaded Values Exceed the Natural Background for Dioxins/Furans

N

0 200 400
Scale in Feet

Dioxins/Furans in Sediment

Buse Timber & Sales
3812 28th Place NE
Everett, Washington

Apex Companies, LLC
801 NW 42nd Street, #204
Seattle, Washington 98107

Project Number:	Drawn:	Approved:	Figure
32-21001485	JP	JF	5
April 2022			

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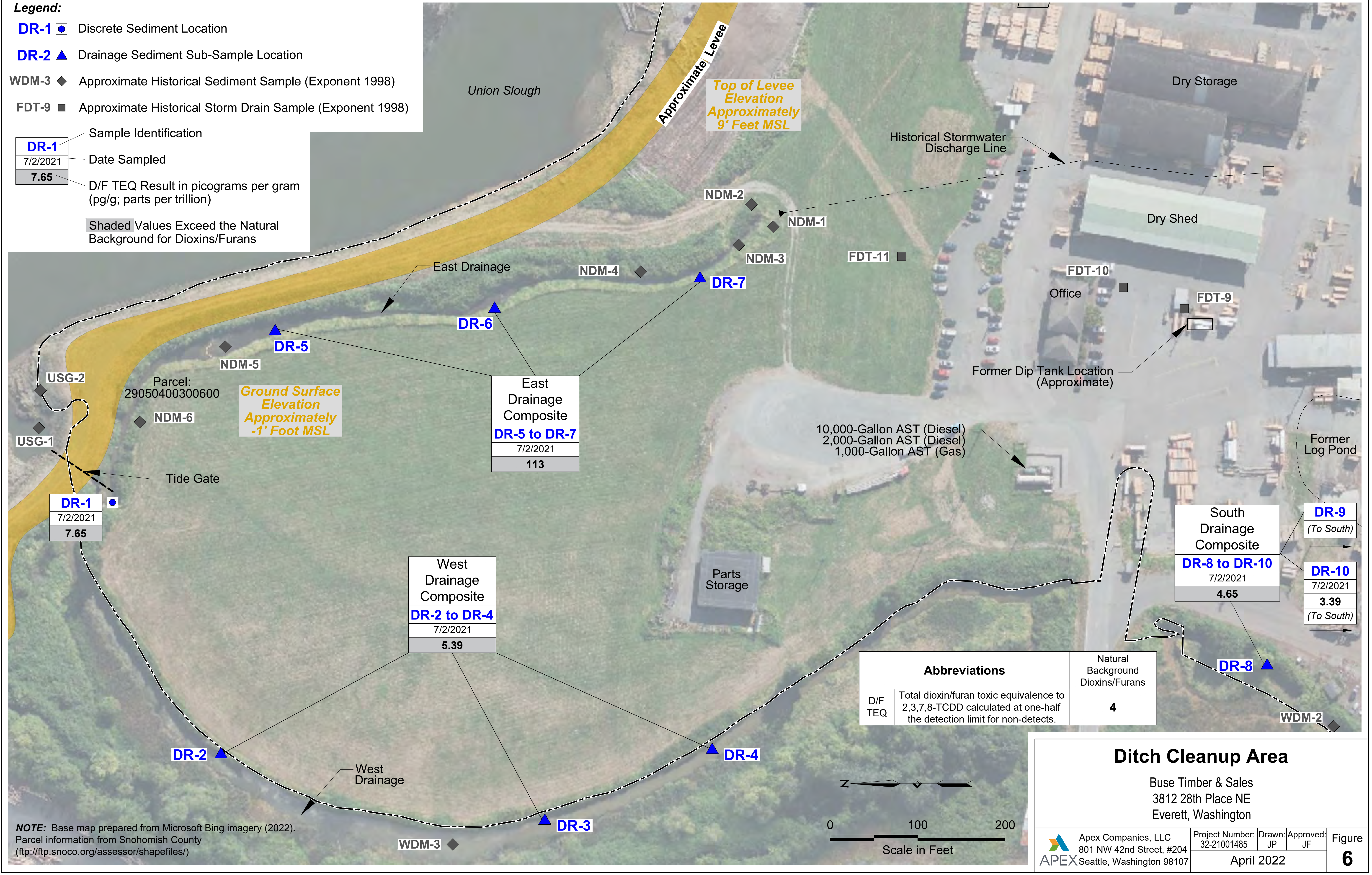

Legend:

DR-1 ● Discrete Sediment Location

DR-2 ▲ Drainage Sediment Sub-Sample Location

WDM-3 ◆ Approximate Historical Sediment Sample (Exponent 1998)

FDT-9 ■ Approximate Historical Storm Drain Sample (Exponent 1998)

DR-1
7/2/2021
7.65

Sample Identification

Date Sampled

D/F TEQ Result in picograms per gram (pg/g; parts per trillion)

Shaded Values Exceed the Natural Background for Dioxins/Furans

Abbreviations		Natural Background Dioxins/Furans
D/F TEQ	Total dioxin/furan toxic equivalence to 2,3,7,8-TCDD calculated at one-half the detection limit for non-detects.	**4**

NOTE: Base map prepared from Microsoft Bing imagery (2022).
Parcel information from Snohomish County
(ftp://ftp.snoco.org/assessor/shapefiles/)

Ditch Cleanup Area

Buse Timber & Sales
3812 28th Place NE
Everett, Washington

Apex Companies, LLC
801 NW 42nd Street, #204
Seattle, Washington 98107

Project Number:	Drawn:	Approved:	Figure
32-21001485	JP	JF	**6**
April 2022			

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Attachment A

Section 6.0, Apex 2021 Phase I ESA

6.0 HISTORICAL RECORDS REVIEW

Apex obtained historical sources from ERIS including aerial photographs (**Appendix G**), topographic maps (**Appendix H**), Sanborn® Fire Insurance maps (**Appendix I**), and city directories (**Appendix J**) for the Site and vicinity. Copies of these historical sources are provided in above-identified appendices.

6.1 Historical Records Review

Historical Records Review

Historical Resource	Years Reviewed
Aerial Photographs	1941, 1952, 1956, 1975, 1981, 1990, 2005, 2009, 2011, 2013, 2015, 2017, and 2019
Topographic Maps	1941, 1943, 1956, 1968, 1973, and 2017
Sanborn® Fire Insurance Maps	No coverage for the Site and adjacent properties.
City Directories	1980, 1990, 1995, 2000-2001, 2006, 2012, 2016, and 2020

6.2 Historical Use Summary

Historical Use Summary

Dates	Site	Surrounding Properties
1940s	The Site is agricultural land with two structures at the western portion of the Site near the western entrance road (28th Pl NE) in the 1941 aerial image and 1941/ 1943 topo map. A drainage ditch is depicted running northwest to southeast through the central portion of the Site.	The surrounding properties are primarily agricultural fields with Union Slough depicted north and west adjacent to the Site. Several structures are depicted to the west adjacent properties across Union Slough in the 1941 aerial image and 1941/1943 topo map.

Dates	Site	Surrounding Properties
1950s	Lumber activities are visible on the western portion of the site with several large structures and a log pond at the southwestern portion of the Site. The remaining portions are agricultural fields in the 1952 aerial image. The log pond is expanded to the eastin the 1956 aerial image and 1956 topo map.	No significant changes. More structures are developed west of the site. Several commercial structures are developed to the south of the site in the 1952 and 1956 aerial image.
1960s	The log pond and one large structure are gone and the general configuration of the current facility has been developed with office/industrial buildings to the central of the Site and a pond south of the sawmill building in the 1968 aerial image and topo map.	No significant changes. Interstate 5 is developed to the east in the 1968 aerial image.
1970s	No significant changes.	No significant changes to the north, south or east. Commercial development to current configuration is visible at the northwest property. The southwest property is cleared for future development in the 1973 topo map and 1975 aerial image.
1980s	The pond area south of the sawmill building has been redeveloped with a small pond and storage area. <u>3812 28th Place Northeast:</u> Buse Timber and Sales (1980) <u>3815 28th Place Northeast:</u> Barbara Buse (1980)	No significant changes to the north, west or east. The south property is under development for boat storage lot in the 1981 aerial image. <u>3811 28th Place Northeast:</u> Jon Buse and Forest Land Service (1980)

Dates	Site	Surrounding Properties
1990s	The former dip tank has been removed and current dip tank building has been developed south of the main office building in the 1990 aerial image. 3812 28th Place Northeast: Buse Timber and Sales (1990 and 1995)	No significant changes. 3807 28th Place Northeast: Ron Luellen (1990 and 1995) 1871 Ross Avenue: Custom Canvas, Dagmars Marina and Hawleys Boats &Motor (1990); Dagmars Marine, Hawleys Boats &Motor and Signal Trailer (1995) 2005 Ross Avenue: Carles Helmick (1990); Ron Kondrasuk (1995)
2000s	The small pond south of the sawmill building is gone and replaced with several buildings to current configuration in the 2005 and 2009 aerial image. 3812 28th Place Northeast: Buse Timber and Sales (2000-2001), Buse Timber and Sales Inc. and West Coast Lumber Inspection Bureau (2006)	No significant changes except for the southwest properties have been developed with commercial/industrial business to current configuration in the 2005 and 2009 aerial image. 1871 Ross Avenue: Boat Country, Dagmars Marina, and Signal Trailer (2000-2001); Boat Country and Dagmars Marina (2006)
2010s	Two residential structures at the northwestern portion of the Site have been demolished in the 2011 aerial image. No significant changes in the 2013, 2015, 2017 and 2019 aerial images. 3812 28th Place Northeast: Buse Timber and Sales Inc. (2012 and 2016)	No significant changes. 1871 Ross Avenue: Boat Country, Dagmars Marina, Signal Trailer, and North West Products Unlimited (2012); Boat Country, Dagmars Marina, Signal Trailer, and K E Enterprise Inc. (2016) 2111 Ross Avenue: Granite Construction Company and Wilder Construction (2012); Granite Construction Company (2016)

Dates	Site	Surrounding Properties
2020s	No significant changes. 3812 28th Place Northeast: Buse Timber and Sales Inc. (2020)	No significant changes. 1870 Ross Avenue: Boat Country (2020) 1871 Ross Avenue: Boat Country, Dagmars Marina, and Signal Trailer (2020) 2111 Ross Avenue: Granite Construction Company (2020)

In summary, the Site was originally used for agricultural uses prior to the early 1940s. The lumber mill originally operated on the western portion of the site until the late 1960s. By 1968 the mill was developed to it's current configuration. The Two residential structures were demolished in 2011. No significant changes to the Site were noted since 2011. Surrounding properties have been developed as agriculture fields beginning in at least 1941. Major commercial or industrial development occurred between the 1970s to 2000s at the northwest and south surrounding properties.

Agricultural activities can result in environmental impacts as a result of the application of pesticides and herbicides and sometimes involve storage of significant quantities of hazardous materials on-site as well as the maintenance, repair, and operation of farm equipment. No direct evidence of these activities was identified at the Site and there is no indication that the agricultural support structures were used for the chemical storage or mixing areas; however, it would be unusual if pesticides and herbicides have not been applied at the Site based on the historic agricultural use. Such applications are permissible under applicable regulations, but can result in a build-up of contaminants over time. Development of the Site likely resulted in redistribution of remaining near-surface soils, minimizing the potential for hot spots of contamination to remain. In the absence of evidence of a significant release of agricultural chemicals, Apex does not consider the historical agricultural use of the Site a REC.

Per ASTM E1527-13, review of standard historical sources at less than approximately five-year intervals are not required by this practice. If the specific use of the property appears unchanged over a period longer than five-years, then it is not required to research the use during that period. Data gaps of greater than five years were identified as: pre-1941, 1943-1952, 1956-1968, and 1981-1990. None of these data gaps are considered significant.

Attachment B

Screening Site Inspection Report

SCREENING SITE INSPECTION REPORT
FOR
BUSE TIMBER & SALES
EVERETT, WASHINGTON

CERCLIS NO. WAD009480542

Prepared for:

Work Assignment No. 54-17-0JZZ
Contract No. 68-W9-0054
United States Environmental Protection Agency
Region 10 ARCS
1200 Sixth Avenue
Seattle, Washington 98101

Prepared by:

URS Consultants, Inc.
1100 Olive Way, Suite 200
Seattle, Washington 98101

August 19, 1994

URS DOC 62760.17.20.654.27.b1

CONTENTS

CONTENTS (Continued)

FIGURES

TABLES

ABBREVIATIONS AND ACRONYMS

ARCS	Alternative Remedial Contract Strategy
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CRDL	contract-required detection limit (inorganics)
CRQL	contract-required quantitation limit (organics)
EPA	United States Environmental Protection Agency
HRS	Hazard Ranking System
IATA	International Air Transport Association
IDW	investigation-derived waste
NEIC	National Enforcement Investigations Center
NPL	National Priorities List
PA	preliminary assessment
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
QMP	Quality Management Plan
RAS	routine analytical service
RSCC	Regional Sample Coordination Center
SARA	Superfund Amendments and Reauthorization Act of 1986
SAS	special analytical services
SDL	sample detection limit
SI	site inspection
SM	site manager (URS)
SQL	sample quantitation limit
SV	semivolatile
SVOC	semivolatile organic compound
TCP	tetrachlorophenol
TSCA	Toxic Substance Control Act
TSOP	technical standard operating procedures
URS	URS Consultants, Inc.

1.0 INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Contract No. 68-W9-0054 and Work Assignment No. 54-17-0JZZ, URS Consultants, Inc., (URS) conducted a site inspection (SI) of Buse Timber & Sales located at 3812 28th Place N.E. in Everett, Washington. This SI was conducted under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The SI process is intended to document a threat or potential threat to public health or the environment posed by a site, identify whether a potential emergency situation exists that may require an immediate response, document the presence or absence of uncontained or uncontrolled hazardous substances on a site, and confirm site characteristics and area receptor information collected during past studies. The SI is intended to collect sufficient data to enable evaluation of the site's potential for inclusion on the National Priorities List (NPL) and, for those sites determined to be NPL candidates, establish priorities for additional action. The SI process and this SI do not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment.

This document presents the Buse Timber & Sales SI in the following manner:

•	Section 1.0	Introduction—description of authority and purpose
•	Section 2.0	Site Background—site-related information
•	Section 3.0	Exposure Pathways and Potential Targets—evaluation of specific pathways and their possible targets
•	Section 4.0	Sampling Program—synopsis of sampling conducted
•	Section 5.0	Sampling Results—discussion of sampling results and those substances determined to be "significant"
•	Section 6.0	Bibliography—list of references

Appendix A	Photodocumentation of May 24 and 25, 1994, URS Sampling Event
Appendix B	Background sample location map
Appendix C	Laboratory Data Reports and Data Validation Reports for Samples Collected for Buse Timber & Sales
Appendix D	Data Quality Objectives

2.0 SITE BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

Site Name:	Buse Timber & Sales
CERCLIS No.:	WAD009480542
Location:	3812 28th Place N.E. Everett, Washington
Latitude:	48°1′17.2″ North
Longitude:	122°10′32.5″ West
Legal Description:	Section 4 and Section 9 Township 29, Range 5 East
Site Owner:	Norman and Delmar Buse 3812 28th Place NE Everett, Washington 98206
Site Operator:	Norman and Delmar Buse
Site Contact:	Steve Fogg (206) 258-2577

Buse Timber & Sales, located at 3812 28th Place N.E., is situated on Smith Island in the Snohomish River floodplain. The mill is 1 mile northeast of the city of Everett, in Snohomish County, Washington. The plant and log yard combined occupy approximately 25 acres of land in the southeast quarter of the southwest quarter of section 4, Township 29 North, Range 5 East, Willamette Meridian, and the northeast quarter of the northwest quarter of section 9, Township 29 North, Range 5 East, Willamette Meridian (USGS 1976). The coordinates of the site are 48°1′17.2″ N. latitude 122°10′32.5″ W. longitude. The site is surrounded by sloughs and agricultural lands. Directly to the east of the mill is Interstate 5. Figure 2-1 shows the general location of the Buse mill.

The mill is adjacent to Union Slough and several backwater arms of the slough. Within ½ mile, the slough discharges into Possession Sound. Because of the proximity to tidally influenced waters, the sloughs surrounding the mill are affected by tidal flooding and ebbing. The water level in an unnamed slough that receives runoff from the northern portion of the mill is controlled by a tidal gate; this slough will be referred to as the tidal gate slough. Because the site is located in the Snohomish River delta, it is underlain by large quantities of alluvial deposits. Tidal influence and Snohomish River water levels have a large influence on groundwater levels in the area. The depth to groundwater is shallow in the area and generally follows the Snohomish River water levels (Ecology 1990).

Twenty-eighth Place N.E., leading from State Route 593, provides access to the site via a land bridge which traverses Union Slough. Although the site is not secured by a fence, the property is physically separated from the surrounding areas by sloughs. The property owned by the Buses includes a large quantity of farmland and pasture on Smith Island. The Buses permit local farmers to produce hay to the south of the mill. The nearest residence, situated 300 feet from the mill offices in the northwest corner of the property, is owned by a member of the Buse family. A pasture to the north and west of the residence serves as a small golf course (URS 1994a).

The 20-acre facility comprises nine main buildings and several smaller ancillary structures (see the site map, Figure 2-2). A 5-acre log storage yard is situated south of the mill complex. Raw logs brought in by trucks and beauty bark from the debarking operation are deposited here.

The 20-acre facility has been in operation on this site since 1946. The Buses purchased the land in 1942 (Buse 1994). Originally, at an unknown point in time prior to the Buse's purchase of the land, the area was used as farmland (Buse 1994).

2.2 SITE OPERATIONS AND WASTE CHARACTERISTICS

Buse Timber & Sales produces approximately 60 million board feet per year of finished lumber products of various dimensions for domestic sale and export to Asia or Canada. Production activities include sizing, debarking, trimming, milling, planing, treating, drying, banding, and shipping. The operations employ 120 persons on two 8-hour shifts at the sawmill and one 8-hour shift at the planer mill. Logs are sorted by size because the mill can handle only logs of a certain dimension. Logs that are too large or too small are sold to pulp mills (Buse 1994). Appropriately sized logs are sent to the debarking machine. Bark from this machine is then sold as mulch or beauty bark. Debarked logs are transferred to the sawmill where they are trimmed and cut to the required dimensions. Next, the rough-cut wood is sent to the planer for surfacing. Chips and sawdust from sawing and planing are retained and sold to Scott Paper Company in Everett. The lumber is then sorted by hand and sent off to be dipped, dried, or endsealed if necessary. Buse personnel manually spray a product called Light Green Endseal on the ends of the lumber. This water-based paint is a nonhazardous waste defined in RCRA 40 CFR 261. After the endseal has dried, the lumber is banded and wrapped for shipment.

Lumber that is being shipped long distances is sometimes treated in a dip tank with anti-stain chemicals called Britewood S or Britewood Q sapstain control. These are phenolate solutions that contain sodium ortho-phenylphenate. The bundled lumber is dipped into a 28 by 5 by 5-foot-deep steel tank (approximately 5,300 gallons) that contains one of the above products. After the wood is dipped, it rests over a drip pan, which drains back into the tank. The company adds 50 gallons per month to the tank. According to Mr. Buse, because the solution is constantly agitated by compressed air, sludge does not develop at the bottom of the tank. The company has not had to dispose of any sludges since tank installation (Buse 1994). Eighty percent of the tank is underground and is surrounded by a concrete-walled pit, which acts as a secondary containment system. At the bottom of the pit is a sump that pumps the Britewood solution back into the tank. Table 2-1 lists waste-related activities at Buse.

Occasionally, lumber must be kiln dried for special orders. The company has four gas-heated drying kilns for this purpose. Carts of lumber are rolled into the kiln on tracks and heated to 180 degrees under controlled humidity for 3 days (URS 1994a).

Until 1986, the company used pentachlorophenol (PCP) to treat lumber in a dip tank with no cover or secondary containment. On a complaint from EPA and on the advice of the company's chemical supplier, the mill switched to a product called PQ8. At the same time, the dip tank was moved into a shed in an area that is asphalted and bermed. The soils in the former diptank area were simply paved over (Ecology 1990).

In 1986, the EPA sponsored studies to determine whether wood treatment chemicals were entering the soil from lumber mills across the state of Washington. A sediment sample taken from a storm drain near the former dip tank revealed PCP and

Table 2-1
Hazardous-Waste-Related Activities On Site

Activity/Process	Dates	Waste(s) Produced	Storage/Disposal Method(s)	Containment Features	Hazardous Constituents
PCP wood treating	1946-86	PCP sludge	Landfilled	Tank without containment	PCP

Source: URS 1994a, Ecology 1990

trichlorophenol (TCP) at 240 mg/kg, and 47.5 mg/kg respectively. A sediment sample taken from Union Slough revealed 1.97 mg/kg PCP and 0.89 mg/kg TCP.

In 1989, Ecology recommended that Buse Timber & Sales be placed on the EPA CERCLIS list of potential hazardous waste sites. The detection of PCP and TCP in the sediments on and around the site prompted the Washington Department of Ecology to conduct a preliminary assessment (PA), which was completed in November 1990 (Ecology 1990). The Ecology PA recommended that the site be scored using the revised Hazard Ranking System (HRS) before further on-site investigations were conducted.

On June 13, 1990, a Toxic Substance Control Act (TSCA) inspection by Ecology revealed several polychlorinated biphenyl (PCB) violations at the mill. Buse was fined a total of $7,650 (Ecology 1992a).

In June 1992, Ecology again sampled sediments from the same locations as the 1986 EPA sampling effort. Although this round of sampling revealed no evidence of either PCP or TCP in the drain or slough, it revealed petroleum contamination in Union Slough. However, Ecology found no evidence linking the petroleum contamination in the slough with operations at Buse Timber & Sales (Ecology 1992a).

During the URS site visit on March 14, 1994, a rapid immunoassay field screening kit specific for PCP was used to test sediments from the tidal gate slough north of the mill. The results of this screening indicated that PCP was present at concentrations of at least 0.5 ppm in the slough sediments (URS 1994a) (see Table 2-1).

Buse Timber & Sales operates with coverage under the Storm Water Baseline General Permit SO3-000097 (Ecology 1992b).

3.0 EXPOSURE PATHWAYS AND POTENTIAL TARGETS

3.1 GROUNDWATER PATHWAY

3.1.1 Geology and Hydrogeology

Everett is located in the central part of the Puget Sound Lowland, which is a broad, rolling, glacial drift plain of low relief bordered by the Olympic and Cascade Mountains. The geologic features of the Puget Sound Lowland are primarily the result of the Fraser Glaciation, when the Puget glacial lobe made its last advance into the region. The sediments deposited during this time are collectively called "drift" and cover much of the lowland (Haase 1987).

In the Everett area, the glacial history is complicated by repeated advance and retreat episodes of glacial movement. This resulted in the deposition of several drift units, ranging from tills, sands, outwash gravels, silts, and clays to glaciomarine and terrace deposits.

The site is located in the delta region of the Snohomish River. The geology underlying the facility consists mainly of alluvial river deposits derived from glacial sediments and upstream surficial geologic materials. Washington State Department of Transportation boring logs from Interstate 5 bridges across the Snohomish River and the sloughs indicate silts, clays, and sands with small amounts of gravel, shell debris, and decomposing wood debris from the ground surface to more than 130 feet below ground surface (bgs)(DOH 1965).

There are three aquifer systems in the area: recent alluvial deposits associated with the Snohomish River and Union Slough, the Marysville sand member, and the Esperance sand member. The static water level at the site is probably within a range of 10 to 15 feet bgs (Ecology 1990). The depth to the water table varies due to tidal and river flow volume influences. The groundwater in this area is not used for domestic purposes, according to Ecology (Ecology 1990). However, two wells designated as domestic have been identified on Smith Island.

The average annual net precipitation in the Everett area is 18.5 inches (Ecology 1990).

3.1.2 Groundwater Targets

Only about 1 percent of the population within 4 miles of the site uses wells as the primary source of drinking water (Ecology 1990). Everett and the surrounding territory (including Marysville and the Tulalip Indian Reservation) are served by water collected from the 60-square-mile Sultan Basin. The water is stored 30 miles southeast of Everett in the Spada Reservoir, which has a capacity of 50 billion gallons (Wolcott 1994). Approximately 102 domestic and 54 community wells are located within a 4-mile radius of the site. An estimated 1,023 people use these wells for drinking water. However, only two of these wells are on Smith Island. All other wells within 4 miles are separated from the site by either the Snohomish River or the sloughs. Since the river and sloughs are groundwater divides, it is unlikely that contamination from the site could affect groundwater on the other side of these water bodies. A breakdown of groundwater drinking water populations within 4 miles of the site is shown in Table 3-1 (USDC 1990).

Table 3-1
Groundwater Drinking Populations Within 4 Miles of the Buse Timber & Sales Site

Distance from Site (miles)	Number of Domestic Wells	Estimated Domestic Population	Number of Community Wells	Community Well User Population	Total Population
On site	1	2	0	0	2
0 to 0.25	0	0	0	0	0
0.25 to 0.5	0	0	0	0	0
0.5 to 1	1	2	1	10	12
1 to 2	3	7	1	10	17
2 to 3	54	129	18	180	309
3 to 4	102	243	34	340	583
Total	161	383	54	540	923

Note: Domestic well population is based on an estimate of 2.38 people per household to obtain person/household/well except for wells on site. It is known that two persons reside on site (USDC 1990; U.S. EPA 1994a). Community well population assumes 10 persons per well.

3.2 SURFACE WATER PATHWAY

3.2.1 Surface Water Flow

The Buse Timber site is located adjacent to and south of Union Slough on Smith Island north of the Snohomish River. The site is relatively flat, with a general slope less than 5 degrees toward the northeast. The area has a relatively mild and wet climate and a 2-year, 24-hour precipitation of 2.3 inches (Ecology 1990). The site is located within the 100-year flood plain.

The Soil Conservation Service has mapped the soils in the area as Puget-Sultan Pilchuck. These soils are very deep and range from poorly drained to excessively drained, nearly level soils on the floodplain (USDA 1983).

Precipitation accumulating on site would tend to percolate into the ground or flow north; storm sewer drains are located on site to assist in surface water drainage. The on-site surface water flow would eventually reach Union Slough by either the storm sewer or overland flow. The storm sewer has a tidal gate to prevent saltwater from entering the storm sewer system. During the URS 1994 site visit, the stormwater system appeared to be in satisfactory condition.

The flow of Union Slough depends on tidal influences. Union Slough is 120 feet wide adjacent to the site and the Snohomish River is 850 feet wide. Average annual flow of the Union Slough is approximately 5,000 cubic feet per second (cfs). The average discharge in the Snohomish River for the past 29 years is 9,605 cfs (Miles 1992).

3.2.2 Surface Water Quality

As revealed by past sampling events, elevated concentrations of pentachlorophenol (PCP) and trichlorophenol (TCP) have been identified in sediments collected from the tidal gate slough which drains into the Union Slough. These elevated concentrations of contaminants have likely impacted the habitability of the slough for fish and other aqueous species.

3.2.3 Surface Water Targets

There are no surface water intakes for drinking water use within 15 miles downstream of the site. At approximately 1.5 miles downstream from the site, both the Snomomish River and Union Slough empty into Possession Sound.

Two bodies of water in Possession Sound, at Port Gardner and Port Susan, are popular for non-Indian commercial fishing and Indian fishing and shellfish harvesting. The fish species observed in Port Gardner and Port Susan include chinook salmon (*Oncorhynchus tshawytscha*), chum salmon (*Oncorhynchus keta*), pink salmon (*Oncorhynchus gorbuscha*), and coho salmon (*Oncorhynchus kisutch*). The Snohomish River is an important migratory route for all of these anadromous fish species and is also home to the bull trout (*Salvelinus confluentis*) and the olympic mudminnow (*Novumbra hubbsi*), both of which are federal candidates for the endangered species list (WDW 1993). Port Gardner and Port Susan have an average annual harvest of 251,095 pounds of fish (WDF 1991) and an average annual harvest of 162,400 pounds of hardshell clams (WDF 1991).

Wetland frontage was calculated for the 1.5 miles downstream of Buse Timber to the point where both the Snohomish River and Union Slough enter the Pacific Ocean in Possession Sound. The frontage of wetlands in that span is 6 miles. National Wetlands Inventory maps classify this area as palustrine, estuarine, riverine, and forested wetlands. However, riverine and estuarine wetlands are also found in the areas downstream of the Buse site.

3.3 SOIL PATHWAY

3.3.1 Soil Description

The surface soils on site are classified as fill and alluvial soils deposited by the Snohomish River and extend 130 feet below the ground surface. These soils have low-to-moderate permeability estimated at 10^{-5} cm/second (Freeze and Cherry 1979) and often become waterlogged in the winter. The underlying sediments consist of alluvial and glacial deposits.

3.3.2 Soil Targets

The Buse Timber site is located within the city limits of Everett, which has a total population of 69,961 (USDC 1990). Residing within a 1-mile radius of the site are 154 people. Both Snohomish River and Union Slough, popular recreational areas, are located within 1 mile of the site. Although the Buse site is not fenced, it is physically separated from surrounding areas by sloughs and blackberries. There are no day cares or schools within 200 feet of the site. The closest resident lives within 200 feet west of the site. Residential populations identified within a 4-mile radius of the site are summarized in Table 3-2.

Table 3-2
Residential Populations Located Within 4 Miles of the Buse Timber & Sales Site

Distance From Site (miles)	Resident Population
0 to 0.25	7
0.25 to 0.5	10
0.5 to 1	137
1 to 2	7,743
2 to 3	22,792
3 to 4	19,801
Total Population	**50,490**

Source: U.S. EPA 1994a

3.3.3 On-Site Workers

Approximately 120 full-time employees work at the Buse facility.

3.4 AIR PATHWAY

3.4.1 Regional Characteristics

The Buse Timber site is located in the tideflats of the Snohomish River in a primarily industrial and agricultural mixed-use area. Possession Sound is located west of the site.

The area has a relatively mild and wet climate, with a normal annual rainfall of 36.51 inches (NOAA 1992).

3.4.2 Air Targets

The residential population within 4 miles of the site is detailed in Table 3-3. The closest residence (owned by Buse) is located within 200 feet of the Buse Timber & Sales office. Although access to the Buse Timber site is limited by the Snohomish River and the Union Slough, there is a road to the site and the east boundary of the site abuts the Interstate 5 right of way.

Table 3-3
Wetlands Within 4 Miles of the Buse Timber & Sales Site

Distance from Site (miles)	Wetland Acreage (estimated)
Onsite	3
0 - ¼	10
¼ - ½	40
½ - 1	150
1 - 2	560
2 - 3	1,000
3 - 4	580

Source: USDI 1987

There is one wetland of approximately 3 acres located on site. Approximately 200 acres of wetlands are located within 1 mile of the site. Table 3-3 gives a breakdown of wetlands within 4 miles of the site (USDI 1987).

3.4.3 Sensitive Areas

Washington State Department of Wildlife Sensitive Area maps were used to determine the presence of sensitive species within 4 miles of the site. The mouth of the Snohomish River, which is 1.5 miles from the site, is an estuary that supports bull trout and the olympic mudminnow. There are three bald eagle nesting sites between 1 and 2 miles from the site, and one nesting site in both the 2- to 3-mile and 3- to 4-mile ranges.

4.0 SAMPLING PROGRAM

The media-specific sampling procedures were consistent with methodologies described in the field sampling plan (URS 1994b) and technical standard operating procedures (TSOP) (URS 1990b) for ARCS contract activity, as well as those described in EPA's *A Compendium of Superfund Field Operations Methods* (U.S. EPA 1987). All sampling equipment was decontaminated before and after use (TSOP 3.7). Four 8-ounce jars of sediment and soil (one each for SVs and PCBs, and two for inorganics and mercury) were collected from each sample station. All sample containers were clearly labeled with the EPA sample number, URS station number, replicate number (if applicable), date, time, type of sample, and sampling personnel (TSOP 2.4). Additionally, EPA sample tags were taped to the sample bottles, and the bottle lids were custody-label sealed. After sample collection, the containers were placed in a cooled ice chest maintained at approximately 4°C, as appropriate, for transport to an analytical laboratory (TSOP 2.3). The routine analytical service (RAS) samples (PCB and inorganics) were shipped to a different laboratory than the SAS samples (SVs). Additional preservation for water samples was conducted at the time of sampling. A chain-of-custody form was filled out and placed in the chest with the samples. The ice chests were sealed for shipment with duct tape and chain-of-custody seals. An accurate log of the sampling conducted and other information pertinent to the sampling were kept in the field logbook (TSOP 2.6). Photographs were taken during the sampling event and tracked in the field logbook (TSOP 2.5). Refer to Figure 4-1 and Table 4-1 for sample locations, rationale, and identifiers.

4.1 SEDIMENT SAMPLES (TSOP 5.5)

Sediments from the storm drain (sample SDDRN1) were characterized to assess the possible release of wood treating chemicals or their components. The sample locations were selected based on historical sampling results and best professional judgment. All sediment samples were collected as grab samples with a stainless steel spoon. The sediment was collected from the surface of the sediment where no water was present. Since no water was present in the catch basin, the catch basin sediment sample was collected from the bottom of the catch basin. The samples were transferred directly into the sample container. Sticks, rocks, and other large organic matter were removed. The on-site sediment sample was collected as close as possible to the area of sediment accumulation.

Table 4-1
Sample Descriptions

Sample Number	Location	Rationale	Date:Time Collected
SSURO01	Treatment tank area surface soil	Characterize on-site surface soil	05/25/94:0820
SSUBO02	Treatment tank area subsurface soil	Characterize on-site subsurface soil	05/25/94:0844
SDDRN1	Storm drain catch basin	Characterize on-site sediments	05/25/94:0930
SDSD2	Storm drain outfall	Characterize outfall sediments	05/25/94:0957
SDSD3	Storm drain outfall	Characterize outfall sediments, quality control duplicate	05/25/94:1003
SDUS4	Tidal gate outfall to slough	Characterize on-site site slough sediments	05/25/94:1025
SSURBAK3	Off-site surface soil	Characterize background soil	05/25/94:1305
SSUBBAK4	Off-site subsurface soil	Characterize background subsurface soils	05/25/94:1310
ER01	Equipment rinsate	Quality assurance	05/25/94:1052
SBUSBK5	Union slough off-site sediment	Characterize background slough sediment	05/24/94:0940

4.2 SURFACE SOIL SAMPLES (TSOP 5.4)

To determine whether past practices have impacted on-site surface soil quality, one surface soil sample (SSURO01) was collected near the drain at the former dip tank location. Only one soil sample was collected because all other locations near the former dip tank location are paved. The sample was collected at a depth of 0 to 6 inches from the surface level at the location where it is suspected that wastes have been placed. An additional surface soil sample was collected off site to characterize background conditions (SSURBAK3). The background soil sampling location was collected from the residence of a home 2.9 miles southeast of the site. The background soils sampled are the alluvial soils in the valley of the Snohomish River. The map in Appendix B shows the exact location.

The surface soil sample was collected using a decontaminated stainless steel trowel. The sample was placed immediately into the sample containers.

4.3 SUBSURFACE SOIL SAMPLES (TSOP 5.4)

To determine whether past site practices have impacted subsurface soil quality, a subsurface soil sample was collected. One subsurface sample (SSUBO02) was collected from the unpaved area southwest of the former dip tank area. The sample was collected at an approximate depth of 2 feet below surface level. An additional subsurface soil sample was collected off site to characterize background conditions (SSUBBAK4). The location of this sample was 2.9 miles southeast of the site (for location of background surface soil sample, see Appendix B). The background soil sample was not collected in an industrial or agricultural area.

The soil was excavated to the predetermined sampling depth by using a decontaminated hand auger at a right angle to the surface. Once the desired depth was reached, the decontaminated hand auger was used to collect a sufficient soil volume. The soil was placed into a decontaminated stainless steel bowl, homogenized, and placed into the sample containers.

The borehole was refilled with the excavated material using a stainless steel trowel.

4.4 TIDAL GATE SLOUGH, UNION SLOUGH, AND SNOHOMISH RIVER SEDIMENT SAMPLING (TSOP 5.5)

One sediment sample and one field duplicate sample were collected from the outfall basin that drains the area near the former dip tank (SDSD2 and SDSD3) to characterize outfall sediments. The sampling event was conducted during a low tide when sediments are exposed and easily accessible. The sample material was placed into the bowl, debris removed, and homogenized. The sediment was then placed into the sample containers.

The sediment samples from Union Slough (SDUS4 and SDUSBK5) were not collected near piers, pilings, or any other obvious source of wood treatment chemicals. Sample SDUS4 was collected from the tidal gate outfall area to characterize sediments that have entered Union Slough. During the low tide, the sample locations were easily accessible from the boat or shore. The sediment samples were collected following the procedure described for SDSD2. Because the area is located in the Snohomish River delta, a small boat was required for gathering background samples. Exact background sample locations were determined in the field and based on grain size comparison with site samples. The background Union Slough sample (SDUSBK5) was collected at the point where Union Slough joins the Snohomish River at its most upstream point. See the map in Appendix B for exact locations.

5.0 SAMPLING RESULTS

The conditions used to define an "observed release" of a particular substance to any of the matrices sampled during the data evaluation process are summarized in Table 5-1 (U.S. EPA 1990a, 1990b). Discussions of data results in this report use the term "significant" to classify concentrations of detected chemicals based on the criteria described in Table 5-1. The results discussed in the following sections are limited to those substances determined to be significant (as defined in Table 5-1). Based on EPA Region 10 policy, aluminum, calcium, iron, magnesium, potassium, sodium, and zinc (common earth crust metals) generally are employed only in water mass tracing, which is beyond the scope of this report. These elements will not be discussed further.

Table 5-1
Significance Criteria for Chemical Analysis

Sample Measurement < Sample Quantitation Limit[a]
No observed release is established; the result is not identified as "significant"
Sample Measurement ≥ Sample Quantitation Limit[a]
An observed release or "significant" result is established as follows:
If the background concentration is not detected (or is less than the detection limit), an observed release or significant result is established when the sample measurement equals or exceeds the sample quantitation limit.[a]
If the background concentration equals or exceeds the detection limit, an observed release or significant result is established when the sample measurement is three times or more above the background concentration.

Source: U.S. EPA 1994b

[a] If the SQL cannot be established, determine if there is an observed release as follows: If the sample analysis was performed under the EPA CLP, use the EPA CRQL in place of the SQL. If the sample analysis was not performed under the EPA CLP, use the detection limit in place of the SQL.

The tables provided in the following discussion include all reported concentrations of any metals, polychlorinated biphenyls (PCBs), semivolatiles (SVs), and chlorinated phenols detected in at least one sample collected on May 25, 1993. The laboratory data results and data validation reports are provided in Appendix C. A summary table of the target and actual data quality objectives of the Buse Timber field sampling are also presented in Appendix H. Only four chemicals were detected in significant concentrations and only in sediment samples collected from the storm drain catch basin and the storm drain outfall. It should be noted that detection limits varied considerably between and among samples. There were also a high number of qualified results. Only four organics results, three chlorinated phenols results, and one PCB result were unqualified among all SV, PCB, and chlorinated phenol detections.

5.1 ON-SITE SURFACE SOIL

None of the on-site surface soil results meet the criteria listed in Table 5-1 for significant concentrations. Results are summarized in Table 5-2. All samples collected during this investigation were analyzed for metals, PCBs, SVs, and chlorinated phenols as described in the field sampling plan (URS 1994b). No information was available in the data validation reports to assign a bias (high or low) to the qualified ("J") sample results identified in Table 5-2. Because the appropriate comparable sample for determining elevated concentrations in a surface soil sample is a background surface soil sample, SSURO01 was compared to SSURBAK3 (see Table 5-2).

5.1.1 Metals Analyses

Metals detected in the off-site background surface soil sample (SSURBK3) are summarized in Table 5-2. The metals detected represent concentrations for natural soils in the Snohomish River basin.

Metals detected in the on-site surface soil sample collected at the Buse site are summarized in Table 5-2. For the on-site soil sample location, see Figure 4-1.

5.1.2 PCB Analyses

PCBs were not detected in the off-site background surface soil sample or in the on-site surface soil samples.

Table 5-2
Surface Soil Sampling Results for Buse Timber and Sales, Inc.
May 25, 1994

	Off-site Background Soil	Treatment Tank Area Surface Soil	Treatment Tank Area Surface Soil Laboratory Duplicate
Substance Detected	SSURBAK3	SSURO01	SSURO01 DS
Total Metals (mg/kg)			
Aluminum	20900	18200	19700
Arsenic	22 J	20 J	17 J
Barium	108	50.5 J	52.9
Beryllium	0.49 J	0.34 J	0.37 J
Cadmium	0.35 J	0.24 J	0.2 U
Calcium	3010	2940	3280
Chromium	86.3	54.1	58.1
Cobalt	23.6	9.25	9.63
Copper	45.5	40.1	41.1
Iron	30300	30100	31300
Lead	52.3	12 J	14 J
Magnesium	8720	8840	9250
Manganese	417	298	311
Mercury	0.0575	0.0749	0.076
Nickel	64.1	36.2	39.3
Potassium	905	2410	2500
Selenium	6 U	15 J	15 J
Sodium	299	335	362
Thallium	6 J	5 U	8 J
Vanadium	66	68.6	70.3
Zinc	89.6	57.9	61.2
Semivolatiles (ug/kg)			
Di-n-butylphthalate	32 J	470 U	NAF

Notes:
J =value is an estimate
mg/kg = milligrams per kilograms
NAF = not analyzed for
U =sampe was undetected
ug = Microgram (1E-6 gram)

5.1.3 Semivolatile Organic Analyses

Di-n-butylphthalate was detected in the background sample (SSURBAK3) at an estimated concentration of 32 μg/kg. There were no detections of any SVs in the on-site surface soil sample.

5.1.4 Chlorinated Phenol Analyses

There were no significant detections of any chlorinated phenols in any of the surface soil samples.

5.2 SUBSURFACE SOIL

None of the subsurface soil results meet the criteria listed in Table 5-1 for significant concentrations. Results are summarized in Table 5-3. All samples collected during this investigation were analyzed for metals, PCBs, SVs, and chlorinated phenols as described in the field sampling plan (URS 1994b). No information was available in the data validation reports to assign a bias (high or low) to qualified ("J") sample results identified in Table 5-3. Because the appropriate comparable sample for determining elevated concentrations in a subsurface soil sample is a background subsurface soil sample, SSUBO02 was compared to SSUBBAK4 (see Table 5-3).

5.2.1 Metals Analyses

Metals detected in the off-site background subsurface soil sample (SSUBBK4) are summarized in Table 5-3. The metals detected represent concentrations for natural soils in the Snohomish River basin.

Metals detected in the on-site subsurface soil sample collected at the Buse site are summarized in Table 5-3. For the on-site soil sample location, see Figure 4-1.

5.2.2 PCB Analyses

PCBs were not detected in the off-site background subsurface soil sample or in the on-site subsurface soil samples.

Table 5-3
Subsurface Soil Sampling Results for Buse Timber and Sales, Inc.
May 25, 1994

Substance Detected	Offsite Background Subsurface Soil SSURBAK4	Treatment Tank Area Subsurface Soil SSUBO02
Inorganics (mg/kg)		
Aluminum	18800	18200
Arsenic	17 J	25 J
Barium	70.9	46.4
Beryllium	0.28 J	0.3 J
Calcium	2530	2630
Chromium	61.5	79.4
Cobalt	13.2	9.92
Copper	34	41.4
Iron	28300	26500
Lead	12 J	9.8 J
Magnesium	7690	8630
Manganese	223	248
Mercury	0.0485	0.0668
Nickel	32.7	44.9
Potassium	985	2230
Selenium	6 J	13 J
Sodium	269	543
Thallium	7 J	6.2 J
Vanadium	63.3	69.6
Zinc	57.4	52.7
Semivolatiles (ug/kg)		
Di-n-butylphthalate	33 J	510 U

Notes:
J = value is an estimate
mg/kg = milligrams per kilogram
U = sample was undetected
ug = Microgram (1E-6 gram)

5.2.3 Semivolatile Organic Analyses

Di-n-butylphthalate was detected in the background sample (SSURBAK4) at an estimated concentration of 33 μg/kg. There were no detections of any SVs in any of the on-site subsurface soil samples.

5.2.4 Chlorinated Phenol Analyses

There were no significant detections of any chlorinated phenols in any of the subsurface soil samples.

5.3 STORM DRAIN SEDIMENT

Data results that satisfy the criteria listed in Table 5-1—described in this section to be significant—are highlighted in Table 5-4. All samples collected during this investigation were analyzed for metals, PCBs, SVs, and chlorinated phenols as described in the field sampling plan (URS 1994b). No information was available in the data validation reports to assign a bias (high or low) to qualified ("J") sample results identified in Table 5-3. Because the appropriate comparable sample for determining elevated concentrations in a sediment sample is a background sediment, sediment samples were compared to SDUSBK5 (see Table 5-4, Sediment Soil Sampling Results for Buse Timber & Sales, Inc., May 25, 1994).

5.3.1 Metals Analyses

Metals detected in the off-site background sediment sample represent concentrations expected for sediments in the Snohomish River estuary conditions. Results for all sediment samples are summarized in Table 5-4. For sample locations, see Figure 4-1.

There were several significant detections of metals in the on-site sediment samples. Lead and mercury were detected in the samples collected from the storm drain catch basin (SDDRN1) and the duplicate samples collected at the outfall for that storm drain (SDSD2 and SDSD3). Lead was detected in sample SDDRN1 at 57 mg/kg and in sample SDSD3 at 56.2 mg/kg, but the concentration of lead in duplicate sample SDSD2 was not significant. Mercury was detected in sample SDDRN1 at 1.84 mg/kg and in sample SDSD2 at 0.282 mg/kg, but the result for duplicate sample SDSD3 was not

Table 5-4
Sediment Sampling Results for Buse Timber and Sales, Inc.
May 25, 1994

	Union Slough Background Sediment	Storm Drain Catch Basin Sediment	Storm Drain Outfall Sediment	Storm Drain Outfall Sediment Duplicate	Union Slough Tidal Gate Sediment
Substance Detected	SDUSBK5	SDDRN1	SDSD2	SDSD3	SDUS4
Total Metals (mg/kg)					
Aluminum	17600	7410	3790	5030	14400
Antimony	3.2 J	3 UJ	3.4 J	5.6 J	3 UJ
Arsenic	15 J	8 J	6.7 J	7.7 J	10 J
Barium	61.2	51.2	63.9	69.3	45.6
Beryllium	0.41 J	0.15 J	0.13 J	0.15 J	0.33 J
Cadmium	0.29 J	0.56 J	1.9 J	2 J	0.23 J
Calcium	3770	3770	2770	2920	4540
Chromium	72.5	182	96.3	94.6	102
Cobalt	16.5	238	10.6	11.4	29.6
Copper	44.1	108	57.2	69.3	36.2
Iron	25900	13200	16700	18000	26900
Lead	11 J	57	39.9	56.2	13 J
Magnesium	9380	5300	2250	2880	8560
Manganese	385	188	144	153	263
Mercury	0.0694	1.84	0.282	0.159	0.103
Nickel	56.8	56.8	59	60.1	67.9
Potassium	1380	524	380 J	511	1380
Selenium	6.5 J	6 U	6 U	11 J	9.7 J
Sodium	440	378	797	952	3210
Thallium	5 U	5 U	5.2 J	5 U	7.4 J
Vanadium	53	32.3	18.1	22.7	45.4
Zinc	76.8	329	231	262	62.5
PCBs (ug/kg)					
Aroclor 1254	70 U	1000	460J	600 J	75 U

Notes:

Highlighted values indicate sample was detected at significant concentrations based on the criteria in Table 5-1.

J = Value is an estimate

U = Sample was undetected

ug = Microgram (1E-6 gram)

UJ = analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is an estimate

Table 5-4 (Continued)
Sediment Sampling Results for Buse Timber and Sales, Inc.
May 25, 1994

	Union Slough Background Sediment	Storm Drain Catch Basin Sediment	Storm Drain Outfall Sediment	Storm Drain Outfall Sediment Duplicate	Union Slough Tidal Gate Sediment
Substance Detected	**SDUSBK5**	**SDDRN1**	**SDSD2**	**SDSD3**	**SDUS4**
Semivolatile (ug/kg)					
2-Methylnaphthalene	610 U	4600 U	1900 U	3700 J	610 U
2-Methylphenol	610 U	4600 U	30000 U	2900 J	610 U
4-Methylphenol	140 J	4600 U	2100 J	2900 J	610 U
Benzo(g,h,i)perylene	610 U	380 J	30000 U	29000 U	610 U
Butylbenzylphthalate	610 U	650 J	30000 U	29000 U	610 U
Chrysene	610 U	320 J	30000 U	29000 U	610 U
Di-n-butylphthalate	42 J	4600 U	30000 U	1700 J	610 U
Di-n-octylphthalate	610 U	520 J	30000 U	29000 U	610 U
Diethylphthalate	34 J	4600 U	30000 U	29000 U	610 U
Fluoranthene	110 J	400 J	30000 U	29000 U	610 U
Pentachlorophenol	1500 U	460 J	73000 U	70000 U	1500 U
Phenanthrene	74 J	240 J	30000 U	1800 J	610 U
Pyrene	130 J	750 J	2200 J	1800 J	610 U
Chlorinated Phenols (ug/kg)					
2,4,5-Trichlorophenol	18 U	16 J	43 U	56 U	20 U
2,4,6-Trichlorophenol	18 U	16 U	43 U	56 U	10 J
2,4-Dichlorophenol	18 U	16 J	43 U	56 U	20 U
2,6-Dichlorophenol	18 J	16 J	109 J	56 U	40 J
2-Phenylphenol	18 U	32	43 J	56 U	20 J
4-Chloro-3-methylphenol	18 U	8 J	22 J	56 U	20 U
Pentachlorophenol	18 U	71	109	56 U	10 U

Notes:

Highlighted values indicate sample was detected at significant concentrations based on the criteria in Table 5-1.

J = Value is an estimate

U = Sample was undetected

ug = Microgram (1E-6 gram)

significant. There is no known source for mercury on the Buse site. The only known source of lead on the Buse site is leaded gasoline used in vehicles operated on the site.

5.3.2 PCB Analyses

No PCBs were detected in the off-site background sediment sample.

One PCB compound was detected in one on-site sample at a significant concentration. Aroclor 1254 was detected at 1,000 μg/kg in sample SDDRN1, the storm drain catch basin sample. Ecology noted several PCB violations in a 1990 TSCA inspection performed for the EPA (U.S. EPA 1991b). No other significant detections of PCBs were reported.

5.3.3 Semivolatile Analyses

Six SVs were detected at estimated concentrations in the off-site background sediment sample: 4-methylphenol, di-n-butylphthalate, diethylphthalate, fluoranthene, phenanthrene, and pyrene. See Table 5-4 for concentrations. No significant detections of SVs were reported for any of the on-site sediment samples.

5.3.4 Chlorinated Phenol Analyses

One chlorinated phenol (2,6-dichlorophenol) was detected at an estimated concentration of 18 mg/kg in the background sediment sample (SDUSBK5). All sample detections for chlorinated phenol analyses are reported in Table 5-4.

Pentachlorophenol was detected at significant concentrations in both the storm drain outfall sample (SDSD2) and in the storm drain catch basin sample (SDDRN1). Sample SDSD2 was reported to contain 109 μg/kg pentachlorophenol and sample SDDRN1 was reported to contain 71 μg/kg pentachlorophenol. The duplicate storm drain outfall sediment sample did not have any detections of chlorinated phenols. The detection limit for this duplicate sample was reported as 56 μg/kg for pentachlorophenol. The storm drain catch basin sample (SDDRN1) reported a significant concentration of 2-phenylphenol at 32 μg/kg.

5.4 QUALITY CONTROL SAMPLES

Duplicate samples were collected during this field sampling event to evaluate the environmental variability at a location and the consistency of sample collection. The results from the duplicates collected at the Buse site reported detections of similar compounds. However, none of the significant detections in either sample was confirmed by a significant detection in the other sample. Sample detections and detection limits varied widely. For example, sample SDSD3 has a reported concentration of di-n-butylphthalate of 1,700 (estimated) but the duplicate sample's (SDSD2) result is not detected at a detection limit of 30,000. Apparently, despite sample homogenization residual heterogeneity existed between the sample duplicates.

During the field sampling conducted at Buse Timber and Sales, an equipment rinsate sample (ERO01) was collected. The analytes detected in this sample are provided in Table 5-5. The equipment rinsate sample was collected after the stainless steel auger was decontaminated. None of the analytes detected in the rinsate sample were detected at significant concentrations in any of the environmental samples, indicating that cross contamination is not likely to have occurred.

5.5 SUMMARY

Significant quantities of lead, mercury, and pentachlorophenol were detected in the storm drain catch basin and storm drain outfall samples. One PCB (Aroclor 1254) and 2-phenylphenol were detected at significant quantities in the sediment sample collected from the storm drain catch basin. No other significant quantities of any other compound were detected in any sample.

Table 5-5
Rinsate Sample Results for Buse Timber & Sales
May 25, 1994

Substance Detected	Equipment Rinsate ER01
Inorganics ug/kg	
Aluminum	5.8 UJ
Iron	9.98 J
Magnesium	25 J
Manganese	0.21 UJ
Sodium	5.4 UJ
PCBs ug/kg	
	ND
Semivolatiles ug/kg	
1,4-Dichlorobenzene	1 J
Naphthalene	6 J
Chlorinated Phenols ug/kg	
4-Chloro-3-methylphenol	0.3 J
Phenol	0.3 J

Notes:
J =value is an estimate
mg/kg = milligrams per kilograms
ND = none detected
U =sampe was undetected
ug = Microgram (1E-6 gram)
UJ = analyte was not detected above the reported ample quantitation limit. However, the reported quantitation limit is an estimate.

6.0 REFERENCES

Buse, Dell (Owner). 1994. (Buse Timber & Sales) Personal communication during site interview with Jeff Kesner, URS Consultants, Inc., Seattle, Washington, re: purchase date, past land use, and past and current industrial operations. March 14, 1994.

Freeze, Allan, and John A. Cherry. 1979. *Groundwater*, Table 2-2. Published by Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 07632.

Haase, Paul C. 1987. "Glacial Stratigraphy and Landscape Evolution of the North-Central Puget Lowland, Washington." Master's Thesis, University of Washington, Seattle, Washington.

Miles, M.B., et al. 1992. *Water Resource Data Washington Water Year 1992.* United States Geological Survey Water-Data Report WA-92-1.

National Oceanic and Atmospheric Administration (NOAA). 1992. *Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days; 1961 - 1990.* United States Department of Commerce, Asheville, North Carolina.

United States Department of Agriculture (USDA), Soil Conservation Service (SCS). 1983. *Soil Survey of Snohomish County Area Washington.* Government Publications.

United States Department of Commerce (USDC), Bureau of the Census. 1990. *Summary Population and Housing Characteristics for Washington, 1990.* U.S. Government Printing Office, Washington, D.C.

United States Department of the Interior (USDI), Fish and Wildlife Service. 1987. National Wetlands Inventory Maps for the Everett and Marysville, Washington, Quadrangles. Prepared by National Wetlands Inventory.

United States Environmental Protection Agency (U.S. EPA). 1994a. *Geographical Information Section Report for Buse Timber and Sales.* August 8, 1994.

———. 1994b. *Using Qualified Data to Document an Observed Release.* Directive 9285.7-14FS. July 1994.

———. 1991. *National Functional Guidelines for Organic Data Review.* February 1991.

———. 1990a. *Contract Laboratory Program Statement of Work for Organic Analyses.*

———. 1990b. *Contract Laboratory Program Statement of Work for Inorganic Analyses.*

———. 1987. *A Compendium of Superfund Field Operations Methods*, Office of Emergency and Remedial Response, EPA/540/P-87/001.

United States Geological Survey (USGS). 1976. 7.5 minute Topographic Map of Everett Washington.

URS Consultants, Inc. (URS). 1994a. Site Visit of Buse Timber & Sales. Everett, Washington. March 14, 1994.

———. 1994b. *Field Sampling Plan for Buse Timber and Sales.* Everett, Washington. April 25, 1994.

———. 1990a. *Quality Assurance Program Plan (QAPP) for Alternative Remedial Contracting Strategy (ARCS)*, Contract No. 68-W9-0054.

———. 1990b. *Technical Standard Operating Procedures (TSOP) for ARCS*, Contract No. 68-W9-0054.

Washington Department of Ecology (Ecology). 1992a. Summary Score Sheet for Buse Timber & Sales. October 19, 1992.

———. 1992b. Coverage Under the Storm Water Baseline General Permit for Buse Timber. December 24, 1992.

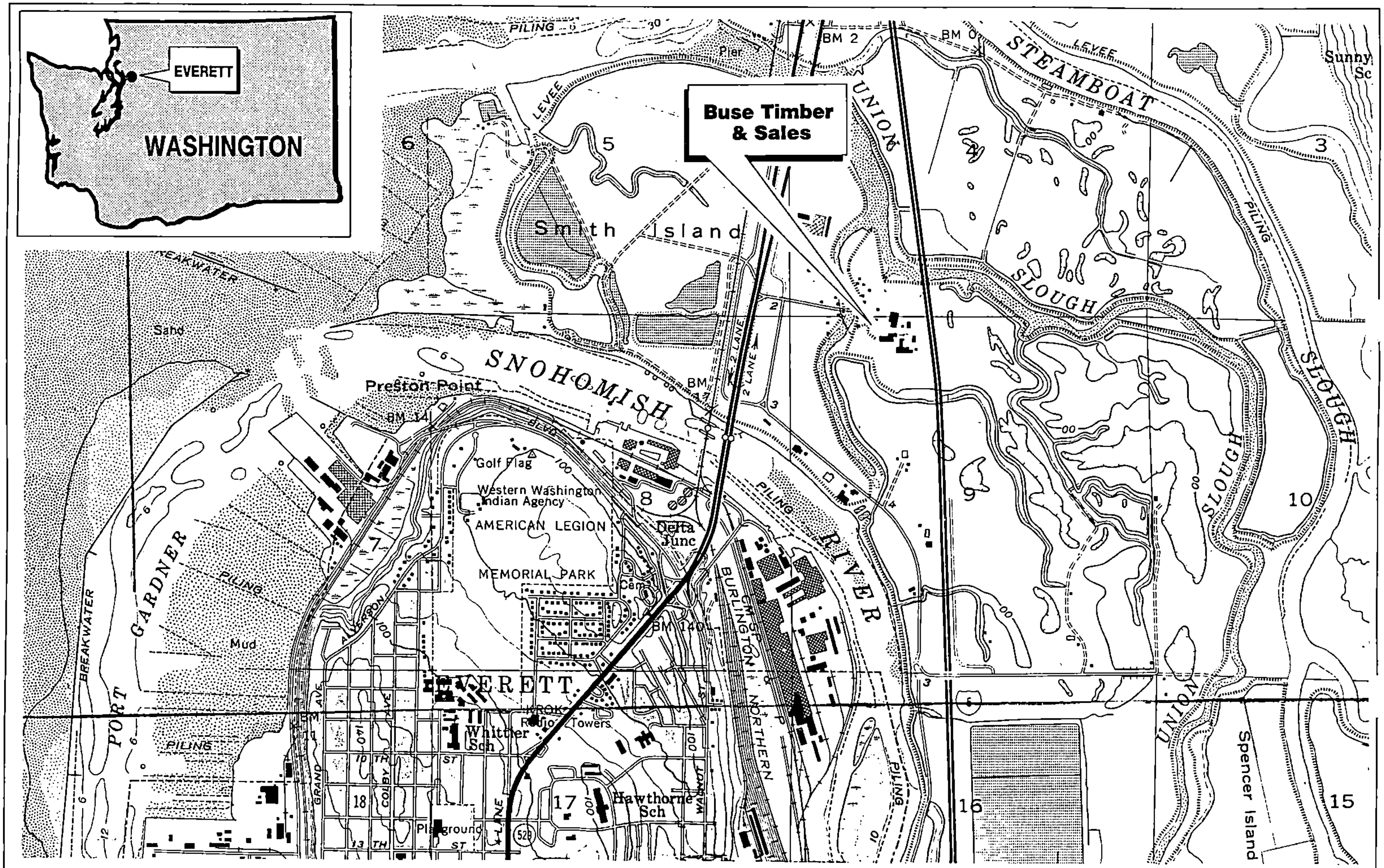
———. 1990. *Preliminary Assessment of Buse Timber & Sales.* Conducted for the U.S. EPA. November 1990.

Washington Department of Highways (DOH). 1965. Interstate 5 Boring Logs. Washington State Department of Transportation Archives.

Washington State Department of Fisheries (WDF). 1991. Puget Sound Commercial Catches from 1987-1991.

Washington State Department of Wildlife (WDW). 1993. Map of Priority Habitats and Species and Nongame Information. Re: Sensitive Information for Everett Region. March 1993.

Wolcott, P. 1994. City of Everett Public Works. Telecommunication with Jeff Kesner. Regarding Everett water supply. July 19, 1994.



Source: USGS 7.5 Min. Topo Map, MARYSVILLE, WA 1973

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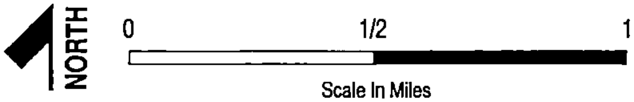
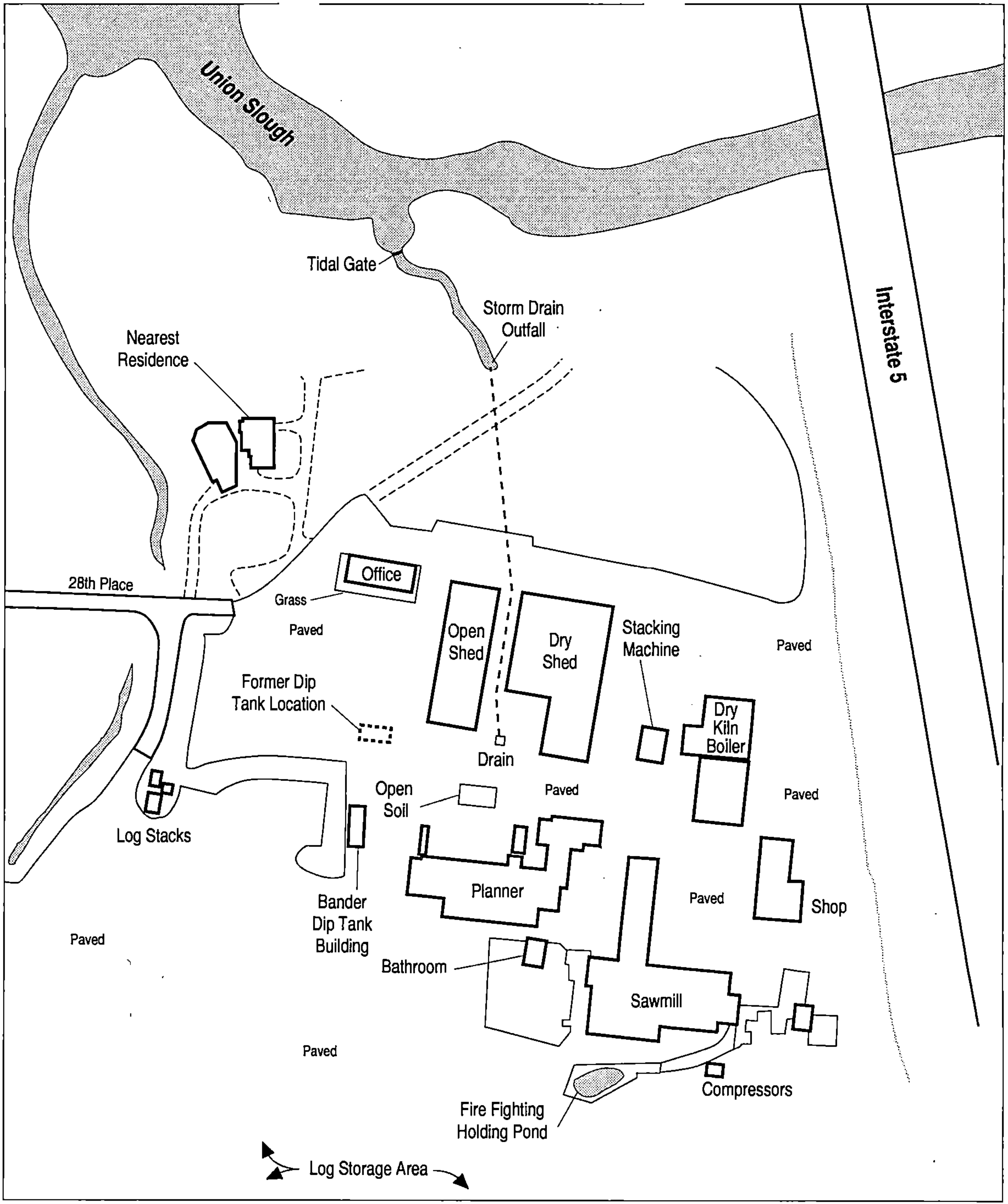


Figure 2-1
Buse Timber & Sales Site Location Map

Buse Timber & Sales
Everett, Washington



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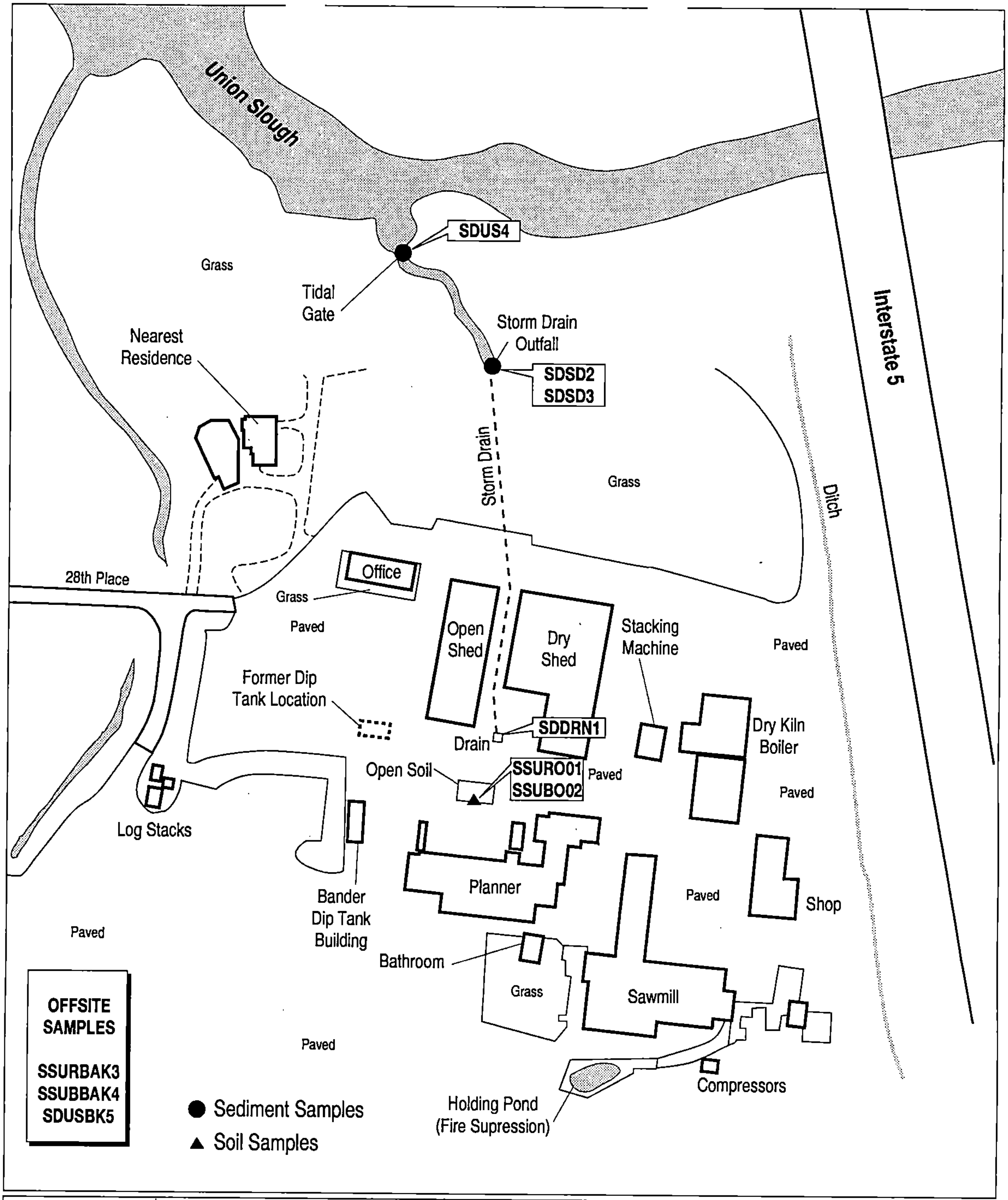
NORTH
0 130 260
Scale In Feet

Figure 2-2
Buse Timber & Sales
Site Map

Buse Timber & Sales
Everett, Washington



URS
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NORTH

0 130 260
Scale In Feet

Figure 4-1
Buse Timber & Sales
Sample Locations

Buse Timber & Sales
Everett, Washington

APPENDIX A

PHOTODOCUMENTATION OF MAY 24 AND 25, 1994, URS SAMPLING EVENT

URS Consultants	ARCS Photograph Log	DCL # 4162760.17.20.638.27.a	
Project Number 4162760.17	Project/Site Name Buse Marine Construction and Repair, Inc.	Photographer(s) Signatures(s) Thomas Mercer Jeff Kesner	
Camera Type Canon	Film Type/Speed Kodak 200 ASA	Roll Number 1	Date 8/15/94

Frame	Date	Time	Orientation	Subject
1	5-24-94	0940	S	JMK and TAM at Union Slough background
2	5-24-94	0940	N	Sampling the Union Slough background sediment sample
3	5-24-94	0940	N	Sampling the Union Slough background sediment sample
4	5-25-94	0818	N	JMK at SSUR01 sample location
5	5-25-94	0920	SW	BUSE personnel attempting to remove catch basin cover
6	5-25-94	0922	SW	BUSE personnel attempting to remove catch basin cover
7	5-25-94	0926	NW	The catch basin where sample SDRN1 was collected
8	5-25-94	0930	Down	TAM collecting sample SDRN1
9	5-25-94	0946	W	Sample SDSD2 and SDSD3 location
10	5-25-94	0959	NW	JMK sampling SDSD2
11	5-25-94	1024	W	Panorama of tidal gate slough
12	5-25-94	1024	WSW	Panorama of tidal gate slough
13	5-25-94	1024	WSW	Panorama of tidal gate slough
14	5-25-94	1025	SW	Collecting subaqueous tidal gate sediment sample
15	5-25-94	1215	S	SSURBAK3 Abandoned location for background sample
16	5-25-94	1301	SE	JMK preparing to sample background samples SSURBAK3 and SSUBBAK4 at Barbara Lawson's home

Date Delivered to Processor	Date Received from Processor	Comments

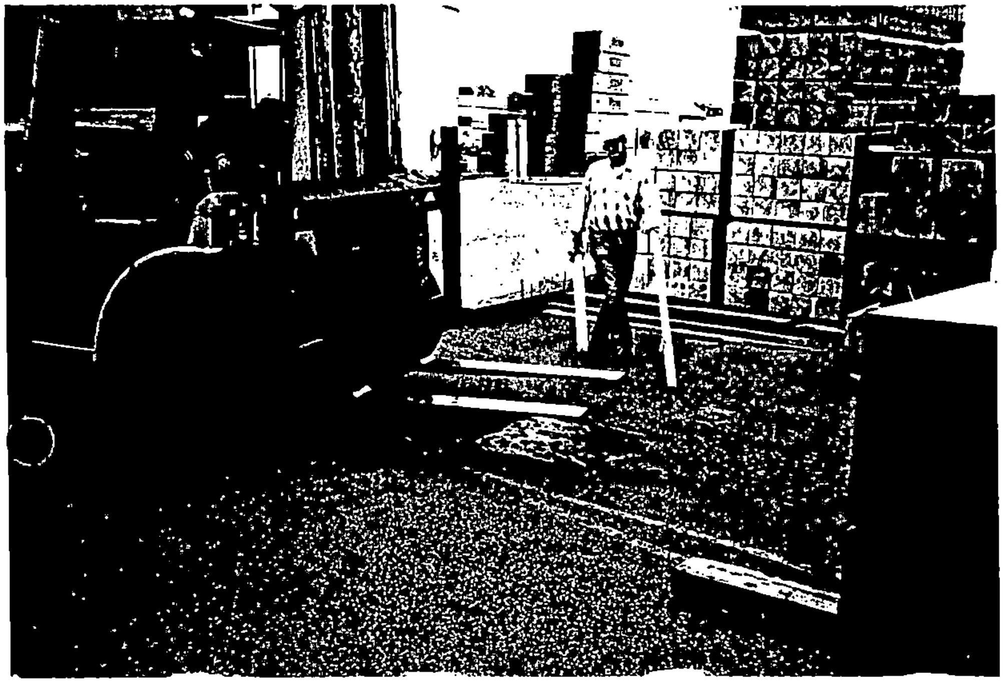
1 JMK and TAM at Union Slough background

2 Sampling the Union Slough background sediment sample

3 Sampling the Union Slough background sediment sample

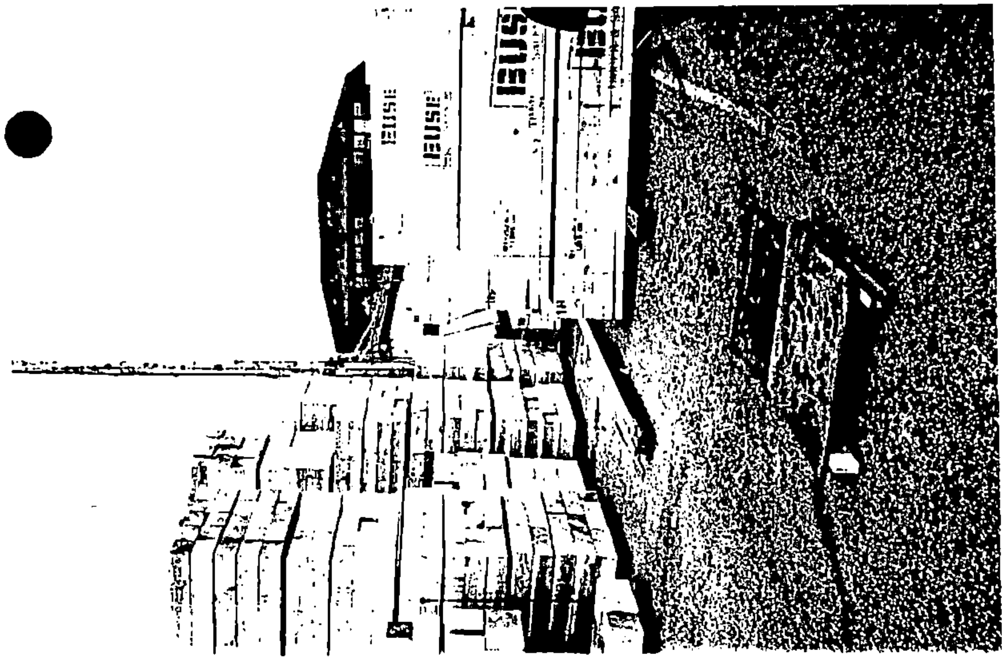
4 JMK at SSUR01 sample location

5 BUSE personnel attempting to remove catch basin cover

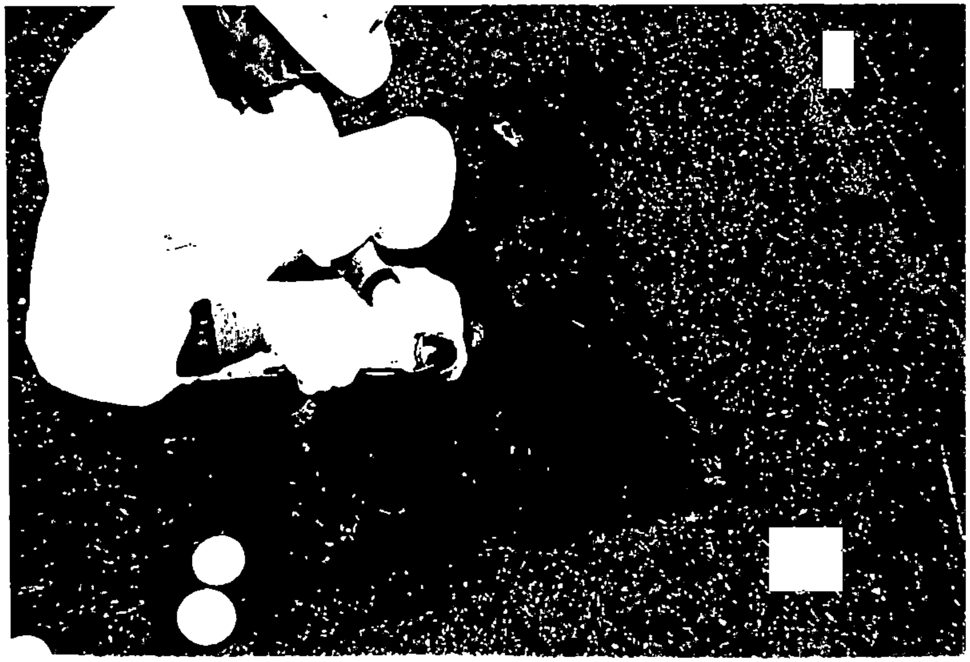


6 BUSE personnel attempting to remove catch basin cover

7 The catch basin where sample SDRN1 was collected



8 TAM collecting sample SDRN1



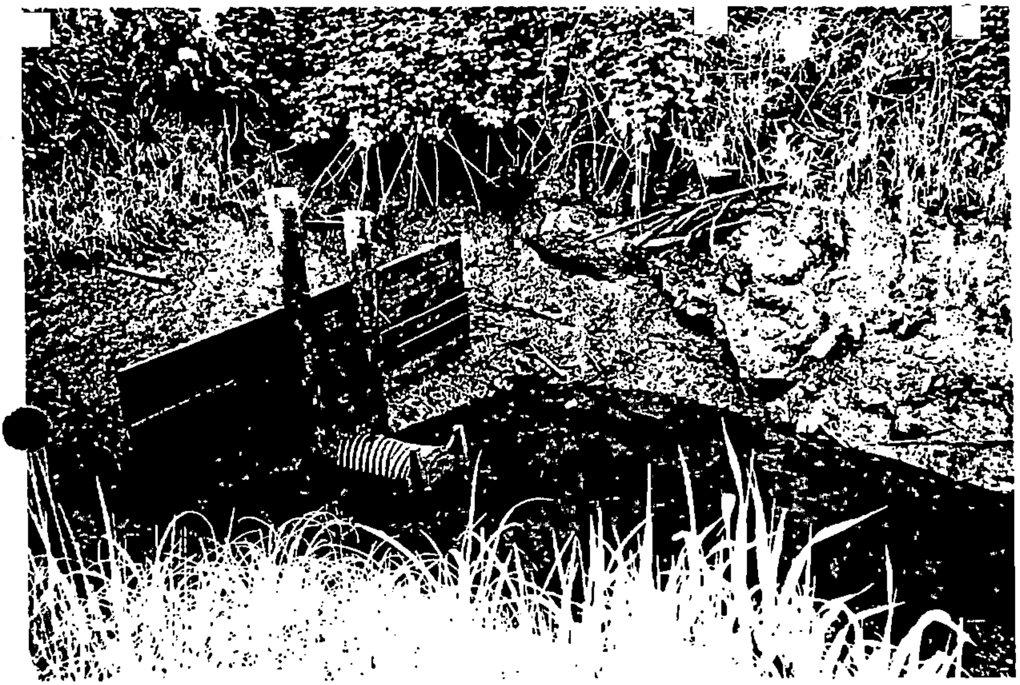
9 Sample SDSD2 and SDSD3 location

10 JMK sampling SDSD2

11 Panorama of tidal gate slough

12 Panorama of tidal gate slough

13 Panorama of tidal gate slough



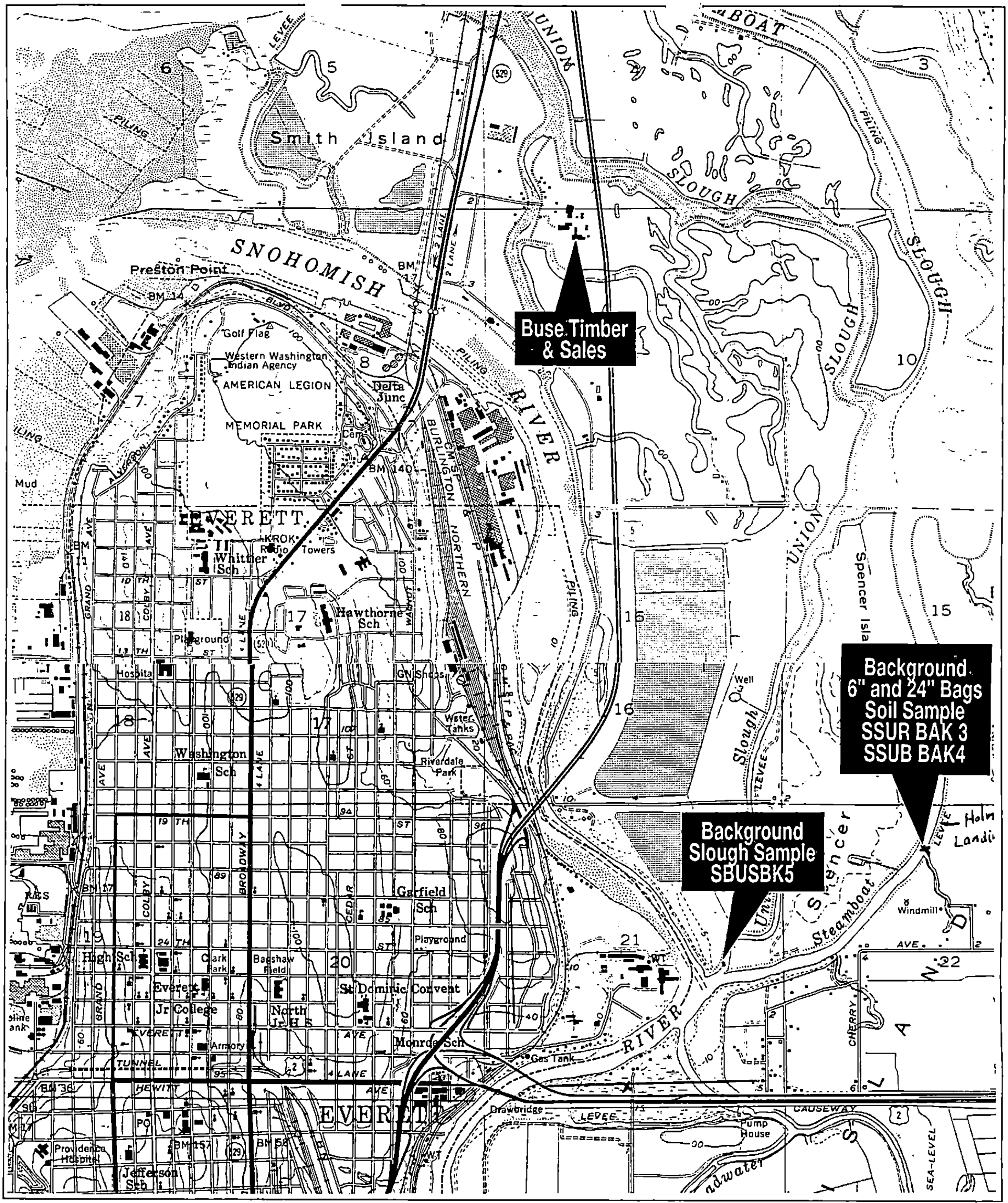
14 Collecting subaqueous tidal gate sediment sample

15 SSURBAK3 Abandoned location for background sample

16 JMK preparing to sample background samples SSURBAK3 and SSUBBAK4 at Barbara Lawson's home

APPENDIX B

BACKGROUND SAMPLE LOCATION MAP



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NORTH

0 1/2 1
Scale In Miles

Background Sample Location Map

Buse Timber & Sales
Everett, Washington

APPENDIX C

LABORATORY DATA REPORTS AND DATA VALIDATION REPORTS FOR SAMPLES COLLECTED FOR BUSE TIMBER & SALES

RECEIVED
JUL - 6 1994
URS CONSULTANTS
Keener

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366
June 28, 1994

MEMORANDUM

SUBJECT: Buse Timber (SSI) Total Metals in Soil Analysis
Samples Nos: 94214115 - 94214124

FROM: Isabel Chamberlain, Task Monitor, USEPA, Region 10

TO: David Bennet, Project Manager, USEPA, Region 10

FULL DATA REVIEW

I have reviewed the attached data package and the corresponding raw data. Based on this review, I find that the Self Evaluation Report prepared by the ESAT contractor was conducted in accordance with the Functional Guidelines, and that the data qualifiers recommended in the ESAT contractor's evaluation are appropriate.

ENVIRONMENT SERVICE ASSISTANCE AMS - ZONE 2

ESAT Region 10
ICF Technology Inc.
7411 Beach Drive East
Port Orchard, WA 98366
Phone (206) 871-8760

ICF Technology Inc.
ManTech Environmental

MEMORANDUM

DATE: June 17, 1994

TO: Jerry Muth, Regional Project Officer, USEPA, Region 10
Isa Chamberlain, Task Monitor, USEPA, Region 10
David Bennett, Project Manager, USEPA, Region 10

THROUGH: Barry Pepich, Team Manager, ESAT, Region 10

FROM: John Alexander, Senior Chemist, ESAT, Region 10

SUBJECT: Quality Assurance Review of Buse Timber (SSI) Total Metals in Soil Analysis
Sample Nos: 94214115 - 94214124
Project Code: TEC-613A; Account Code: 4TFA10PUZZ

TID#: 10-9404-430
DOC#: ESAT-10A-7075
WUD#: 1420

CC: Bruce Woods, USEPA RQAMO, Region 10
Jeff Kesner, URS Consultants Inc., Seattle, WA

The following is a quality assurance review of the total metals analysis of nine soil samples and one field blank sample from the Buse Timber & Sales investigation, Everett, WA. The analysis was performed following CLP and laboratory guidelines by the ESAT Team at the USEPA Manchester Environmental Laboratory, Port Orchard, WA. This quality assurance review was conducted for the following samples:

94214115	94214116	94214117	94214118	94214119	94214120
94214121	94214122	94214123	94214124		

DATA QUALIFICATIONS

The following comments refer to the ESAT Team's performance in meeting quality control specifications outlined in the *CLP Statement of Work (CLP-SOW) for Inorganic Analysis, rev. ILMO3.0*, the *Manchester Environmental Laboratory Quality Assurance Manual, revision 5/88*, and the *Buse Timber & Sales Field Sampling Plan, Rev. 2, 05/04/94*. The recommendations presented herein are based on the information provided for the review.

1.0 TIMELINESS - Acceptable

The suggested holding time from the date of collection for mercury in soil is 28 days and the holding time for remaining metals in soil is 180 days. The samples were collected on 05/24/94 and 05/25/94. Mercury analysis was completed by 06/02/94, nine days from collection. The remaining metals analyses were completed by 06/15/94, twenty-two days from collection. No qualification was recommended based on these holding time criteria.

2.0 SAMPLE PREPARATION - Acceptable

The samples were prepared using hot-plate digestion for total metals on 05/31/94 and for total mercury on 06/01/94. All procedures were in accordance with Manchester Laboratory and CLP protocols. Qualification was not recommended on this basis.

3.0 CALIBRATION - Acceptable

The samples were analyzed by ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) on 06/15/94. The instrument was standardized according to the analytical method using a blank and a series of calibration standards.

The samples were analyzed by CVAAS (Cold Vapor Atomic Absorption Spectroscopy) on 06/02/94 for mercury. Initial calibration included a blank and at least four standards, as required. The curve was linear with a correlation coefficient greater than 0.995.

All calibrations met acceptable criteria therefore no qualification was recommended on this basis.

4.0 REFERENCE CONTROL SAMPLES/CALIBRATION VERIFICATION - Acceptable

Laboratory reference control samples are required before and after sample analysis and after every 10 samples during analysis. All control samples met frequency and recovery criteria of 90 - 110% for ICP-AES and 80 - 120% for CVAAS (mercury) analysis except for aluminum in the final ICP-AES control sample (111%) on 06/15/94. However, a second control standard run for initial and final control verification was within limits and was deemed to be more representative of the aluminum concentrations found in the samples. On this basis, no qualification was recommended.

5.0 BLANKS

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analysis procedure. If an analyte was found in the associated blank, the sample results were recommended for qualification if the analyte concentration was less than ten times the analytical value in the blank.

Calcium, iron, magnesium, manganese and sodium were detected in the ICP-AES procedural blank. The concentration of these analytes in the samples exceeded the minimum blank criterion except in the field blank sample 94214123. On this basis, (B) qualification was recommended for these analytes in sample 94214123.

6.0 ICP-AES INTERFERENCE CHECK SAMPLE - Acceptable

The interference check sample (ICS) is analyzed by ICP-AES to verify interelement and background correction factors. Analysis is required at the beginning and end of each sample analysis run. The acceptance criterion for the ICS is 80% - 120%. All results met frequency and recovery requirements on the day of analysis.

7.0 DUPLICATE ANALYSIS - Acceptable

Duplicate analysis was performed on samples 94214115 for ICP-AES and CVAAS analyses. All relative percent difference (RPD) were within 20%, as required by the laboratory. No qualification was recommended on this basis.

8.0 FIELD DUPLICATE ANALYSIS - Not Applicable

Field duplicate analysis was not indicated in the field collection documentation.

9.0 MATRIX SPIKE ANALYSIS

Matrix spike sample analyses are performed to provide information about the effect of the sample matrix on digestion and measurement methods. Manchester Laboratory and CLP guidelines specify that the matrix spike recovery must be within the limits of 75 - 125%. Matrix spike/matrix spike duplicate analyses were performed on sample 94214115. All recoveries were within acceptable limits except for antimony (0/0%) in ICP-AES analysis. Low recoveries for antimony are not uncommon in soil matrices, and subsequent post spike analysis demonstrated acceptable recoveries which indicate that matrix interference was not the likely cause of the low matrix spike results. Based on these results, the (N) qualifier was recommended for attachment to all antimony results to denote potential bias due to loss of the analyte during digestion or analysis.

10.0 GRAPHITE FURNACE ATOMIC ABSORPTION SPEC. (GFAAS) QC - Not Applicable

This analytical method was not used for these samples.

11.0 ICP-AES SERIAL DILUTION - Acceptable

Sample 94214115 was analyzed by serial dilution and compared to the original, undiluted analyses in the ICP-AES procedure. All percent differences of analytes above 50 times the detection level were within the required 10% criterion range. No qualification was recommended on this basis.

12.0 DETECTION LIMITS - Acceptable

Sample results which fall below the instrument detection limit (IDL) are assigned the value of the instrument detection limit and the (U) qualifier is recommended for attachment. Any sample result falling between the detection limit and the quantitation limit is recommended for qualification as an estimate (P). This notifies the data user that the element was detected at the reported value, but below the minimum level of practical quantitation determined to be within precision limits of 10% relative standard deviation.

13.0 OVERALL ASSESSMENT OF THE DATA

The quality assurance review of the data is based on the criteria outlined in the *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses (7/88).*

The following is a summary of the recommended qualification for soil samples from the Buse Timber site, EPA sample numbers 94214115, 94214116, 94214117, 94214118, 94214119, 94214120, 94214121, 94214122, 94214123 and 94214124. The (U) qualifier was recommended for attachment to sample results below the minimum level of detection. The (P) qualifier was recommended for attachment to sample results less than the laboratory's quantitation limit.

The (N) qualifier was recommended for attachment to antimony results (4.3% of the reported sample data) due to low matrix spike recovery. The (B) qualifier was recommended for calcium, iron, magnesium, manganese and sodium results (2.2%) in the equipment rinsate blank sample.

Definitions of laboratory data qualifiers are attached.

USEPA Region 10 Laboratory

Below are the definitions for the qualifiers used in the metals area when qualifying data from metals analysis.

DATA QUALIFIERS

U - Element was analyzed but not detected. The associated numerical value is the instrument detection limit/method detection limit.

P - The analyte was detected above the Instrument Detection Limit, but not quantified within expected limits of precision. The laboratory has established minimum quantitation limits having a relative standard deviation of no more than 10%

H - The samples were analyzed after the suggested holding time limit.

E - The reported value is an estimate because of the presence of interference. An explanatory note will be included with the report.

B - Analyte is found in the analytical blank as well as the sample indicating possible/probable blank contamination. If analytes are found in any of the associated procedural blanks the concentration in the samples must be at least ten times the quantity observed in the blank. If the sample result fails these criteria the sample result is qualified (B).

N - Spiked sample recovery not within control limits.

NAR - There is no analysis result for this analyte.

NA - Not Applicable/Not Required.

S - Sample was analyzed by method of standard additions.

+ - Sample was analyzed by method of standard additions and the correlation coefficient was less than 0.995.

* - The analyte was present in the sample.

W - Post spike out of specified range, and sample was less than 50% the spike added.

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
SampleNumber : 94214115
Type : Reg sample
Station Description: SSURO01

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.0749	mg/kg					
ICP-RAS							
Aluminum	18200	mg/kg		Antimony	3.0	mg/kg	UN
Arsenic	20	mg/kg	P	Barium	50.5	mg/kg	
Beryllium	0.34	mg/kg	P	Cadmium	0.24	mg/kg	P
Calcium	2940	mg/kg		Chromium	54.1	mg/kg	
Cobalt	9.25	mg/kg		Copper	40.1	mg/kg	
Iron	30100	mg/kg		Lead	12	mg/kg	P
Magnesium	8840	mg/kg		Manganese	298	mg/kg	
Nickel	36.2	mg/kg		Potassium	2410	mg/kg	
Selenium	15	mg/kg	P	Silver	0.30	mg/kg	U
Sodium	335	mg/kg		Thallium	5.0	mg/kg	U
Vanadium	68.6	mg/kg		Zinc	57.9	mg/kg	

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid
SampleNumber : 94214115
Type : Duplicate
Station Description:

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.0760	mg/kg					
ICP-RAS							
Aluminum	19700	mg/kg		Antimony	3.0	mg/kg	UN
Arsenic	17	mg/kg	P	Barium	52.9	mg/kg	
Beryllium	0.37	mg/kg	P	Cadmium	0.20	mg/kg	U
Calcium	3280	mg/kg		Chromium	58.1	mg/kg	
Cobalt	9.63	mg/kg		Copper	41.1	mg/kg	
Iron	31300	mg/kg		Lead	14	mg/kg	P
Magnesium	9250	mg/kg		Manganese	311	mg/kg	
Nickel	39.3	mg/kg		Potassium	2500	mg/kg	
Selenium	15	mg/kg	P	Silver	0.30	mg/kg	U
Sodium	362	mg/kg		Thallium	8.0	mg/kg	P
Vanadium	70.3	mg/kg		Zinc	61.2	mg/kg	

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid
SampleNumber : 94214115
Type : Matrix Spike
Station Description:

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	92	%R					
ICP-RAS							
Aluminum	NA			Antimony	0	%R	
Arsenic	91	%R		Barium	100	%R	
Beryllium	96	%R		Cadmium	89	%R	
Calcium	NA	%R		Chromium	97	%R	
Cobalt	94	%R		Copper	97	%R	
Iron	NA			Lead	91	%R	
Magnesium	NA	%R		Manganese	100	%R	
Nickel	95	%R		Potassium	NA	%R	
Selenium	101	%R		Silver	81	%R	
Sodium	NA	%R		Thallium	97	%R	
Vanadium	100	%R		Zinc	92	%R	

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid
SampleNumber : 94214115
Type : Matrix Spike Dupl
Station Description:

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	94	%R					
ICP-RAS							
Aluminum	NA			Antimony	0	%R	
Arsenic	89	%R		Barium	98	%R	
Beryllium	94	%R		Cadmium	90	%R	
Calcium	NA	%R		Chromium	99	%R	
Cobalt	93	%R		Copper	95	%R	
Iron	NA			Lead	90	%R	
Magnesium	NA	%R		Manganese	100	%R	
Nickel	93	%R		Potassium	NA	%R	
Selenium	99	%R		Silver	80	%R	
Sodium	NA	%R		Thallium	94	%R	
Vanadium	98	%R		Zinc	92	%R	

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
Sample Number : 94214116
Type : Reg sample
Station Description: SSUBO02

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.0668	mg/kg					
ICP-RAS							
Aluminum	18200	mg/kg		Antimony	3.0	mg/kg	UN
Arsenic	25	mg/kg	P	Barium	46.4	mg/kg	
Beryllium	0.30	mg/kg	P	Cadmium	0.20	mg/kg	U
Calcium	2630	mg/kg		Chromium	79.4	mg/kg	
Cobalt	9.92	mg/kg		Copper	41.4	mg/kg	
Iron	26500	mg/kg		Lead	9.8	mg/kg	P
Magnesium	8630	mg/kg		Manganese	248	mg/kg	
Nickel	44.9	mg/kg		Potassium	2230	mg/kg	
Selenium	13	mg/kg	P	Silver	0.30	mg/kg	U
Sodium	543	mg/kg		Thallium	6.2	mg/kg	P
Vanadium	69.6	mg/kg		Zinc	52.7	mg/kg	

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
SampleNumber : 94214117
Type : Reg sample
Station Description: SDDRN1

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	1.84	mg/kg					
ICP-RAS							
Aluminum	7410	mg/kg		Antimony	3.0	mg/kg	UN
Arsenic	8.0	mg/kg	P	Barium	51.2	mg/kg	
Beryllium	0.15	mg/kg	P	Cadmium	0.56	mg/kg	P
Calcium	3770	mg/kg		Chromium	182	mg/kg	
Cobalt	238	mg/kg		Copper	108	mg/kg	
Iron	13200	mg/kg		Lead	57.0	mg/kg	
Magnesium	5300	mg/kg		Manganese	188	mg/kg	
Nickel	56.8	mg/kg		Potassium	524	mg/kg	
Selenium	6.0	mg/kg	U	Silver	0.30	mg/kg	U
Sodium	378	mg/kg		Thallium	5.0	mg/kg	U
Vanadium	32.3	mg/kg		Zinc	329	mg/kg	

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
Sample Number : 94214118
Type : Reg sample
Station Description: SDSD3

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.159	mg/kg					
ICP-RAS							
Aluminum	5030	mg/kg		Antimony	5.6	mg/kg	PN
Arsenic	7.7	mg/kg	P	Barium	69.3	mg/kg	
Beryllium	0.15	mg/kg	P	Cadmium	2.0	mg/kg	P
Calcium	2920	mg/kg		Chromium	94.6	mg/kg	
Cobalt	11.4	mg/kg		Copper	69.3	mg/kg	
Iron	18000	mg/kg		Lead	56.2	mg/kg	
Magnesium	2880	mg/kg		Manganese	153	mg/kg	
Nickel	60.1	mg/kg		Potassium	511	mg/kg	
Selenium	11	mg/kg	P	Silver	0.30	mg/kg	U
Sodium	952	mg/kg		Thallium	5.0	mg/kg	U
Vanadium	22.7	mg/kg		Zinc	262	mg/kg	

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
SampleNumber : 94214119
Type : Reg sample
Station Description: SDSD2

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.282	mg/kg					
ICP-RAS							
Aluminum	3790	mg/kg		Antimony	3.4	mg/kg	PN
Arsenic	6.7	mg/kg	P	Barium	63.9	mg/kg	
Beryllium	0.13	mg/kg	P	Cadmium	1.9	mg/kg	P
Calcium	2770	mg/kg		Chromium	96.3	mg/kg	
Cobalt	10.6	mg/kg		Copper	57.2	mg/kg	
Iron	16700	mg/kg		Lead	39.9	mg/kg	
Magnesium	2250	mg/kg		Manganese	144	mg/kg	
Nickel	59.0	mg/kg		Potassium	380	mg/kg	P
Selenium	6.0	mg/kg	U	Silver	0.30	mg/kg	U
Sodium	797	mg/kg		Thallium	5.2	mg/kg	P
Vanadium	18.1	mg/kg		Zinc	231	mg/kg	

Manchester Environmental Laboratory
Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
SampleNumber : 94214120
Type : Reg sample
Station Description: SDUS4

Analyte	Result	Units	Qlfr
MET			
Hg			
Mercury	0.103	mg/kg	
ICP-RAS			
Aluminum	14400	mg/kg	
Arsenic	10.	mg/kg	P
Beryllium	0.33	mg/kg	P
Calcium	4540	mg/kg	
Cobalt	29.6	mg/kg	
Iron	26900	mg/kg	
Magnesium	8560	mg/kg	
Nickel	67.9	mg/kg	
Selenium	9.7	mg/kg	P
Sodium	3210	mg/kg	
Vanadium	45.4	mg/kg	

Analyte	Result	Units	Qlfr
Antimony	3.0	mg/kg	UN
Barium	45.6	mg/kg	
Cadmium	0.23	mg/kg	P
Chromium	102	mg/kg	
Copper	36.2	mg/kg	
Lead	13	mg/kg	P
Manganese	263	mg/kg	
Potassium	1380	mg/kg	
Silver	0.30	mg/kg	U
Thallium	7.4	mg/kg	P
Zinc	62.5	mg/kg	

Manchester Environmental Laboratory

Final Report

Project Code	: TEC-613A	**Collected**	: 5/25/94
Project Name	: BUSE TIMBER (SSI)	**Matrix**	: Solid
Project Officer	: DAVID BENNETT	**SampleNumber**	: 94214121
Account Code	: 4TFA10PUZZ	**Type**	: Reg sample
		Station Description:	SSURBAK3

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.0575	mg/kg					
ICP-RAS							
Aluminum	20900	mg/kg		Antimony	3.0	mg/kg	UN
Arsenic	22	mg/kg	P	Barium	108	mg/kg	
Beryllium	0.49	mg/kg	P	Cadmium	0.35	mg/kg	P
Calcium	3010	mg/kg		Chromium	86.3	mg/kg	
Cobalt	23.6	mg/kg		Copper	45.5	mg/kg	
Iron	30300	mg/kg		Lead	52.3	mg/kg	
Magnesium	8720	mg/kg		Manganese	417	mg/kg	
Nickel	64.1	mg/kg		Potassium	905	mg/kg	
Selenium	6.0	mg/kg	U	Silver	0.30	mg/kg	U
Sodium	299	mg/kg		Thallium	6.0	mg/kg	P
Vanadium	66.0	mg/kg		Zinc	89.6	mg/kg	

Manchester Environmental Laboratory
Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
SampleNumber : 94214122
Type : Reg sample
Station Description: SSURBAK4

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.0485	mg/kg					
ICP-RAS							
Aluminum	18800	mg/kg		Antimony	3.0	mg/kg	UN
Arsenic	17	mg/kg	P	Barium	70.9	mg/kg	
Beryllium	0.28	mg/kg	P	Cadmium	0.20	mg/kg	U
Calcium	2530	mg/kg		Chromium	61.5	mg/kg	
Cobalt	13.2	mg/kg		Copper	34.0	mg/kg	
Iron	28300	mg/kg		Lead	12	mg/kg	P
Magnesium	7690	mg/kg		Manganese	223	mg/kg	
Nickel	32.7	mg/kg		Potassium	985	mg/kg	
Selenium	6.0	mg/kg	U	Silver	0.30	mg/kg	U
Sodium	269	mg/kg		Thallium	7.0	mg/kg	P
Vanadium	63.3	mg/kg		Zinc	57.4	mg/kg	

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid
SampleNumber : 94214123
Type : Reg sample
Station Description: ER01

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.020	mg/kg	U				
ICP-RAS							
Aluminum	5.8	mg/kg	P	Antimony	3.0	mg/kg	UN
Arsenic	4.0	mg/kg	U	Barium	0.10	mg/kg	U
Beryllium	0.050	mg/kg	U	Cadmium	0.20	mg/kg	U
Calcium	18.5	mg/kg	B	Chromium	0.50	mg/kg	U
Cobalt	0.50	mg/kg	U	Copper	0.30	mg/kg	U
Iron	9.98	mg/kg	B	Lead	2.5	mg/kg	U
Magnesium	25.0	mg/kg	B	Manganese	0.21	mg/kg	PB
Nickel	1.0	mg/kg	U	Potassium	45	mg/kg	U
Selenium	6.0	mg/kg	U	Silver	0.30	mg/kg	U
Sodium	5.4	mg/kg	PB	Thallium	5.0	mg/kg	U
Vanadium	0.30	mg/kg	U	Zinc	0.40	mg/kg	U

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/24/94
Matrix : Solid
SampleNumber : 94214124
Type : Reg sample
Station Description: SBUSBK5

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
MET							
Hg							
Mercury	0.0694	mg/kg					
ICP-RAS							
Aluminum	17600	mg/kg		Antimony	3.2	mg/kg	PN
Arsenic	15	mg/kg	P	Barium	61.2	mg/kg	
Beryllium	0.41	mg/kg	P	Cadmium	0.29	mg/kg	P
Calcium	3770	mg/kg		Chromium	72.5	mg/kg	
Cobalt	16.5	mg/kg		Copper	44.1	mg/kg	
Iron	25900	mg/kg		Lead	11	mg/kg	P
Magnesium	9380	mg/kg		Manganese	385	mg/kg	
Nickel	56.8	mg/kg		Potassium	1380	mg/kg	
Selenium	6.5	mg/kg	P	Silver	0.30	mg/kg	U
Sodium	440	mg/kg		Thallium	5.0	mg/kg	U
Vanadium	53.0	mg/kg		Zinc	76.8	mg/kg	

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid
SampleNumber : S940531B
Type : Blank
Station Description:

MET

ICP-RAS

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
Aluminum	2.0	mg/kg	U	Antimony	3.0	mg/kg	U
Arsenic	4.0	mg/kg	U	Barium	0.10	mg/kg	U
Beryllium	0.050	mg/kg	U	Cadmium	0.20	mg/kg	U
Calcium	18.7	mg/kg		Chromium	0.50	mg/kg	U
Cobalt	0.50	mg/kg	U	Copper	0.30	mg/kg	U
Iron	2.65	mg/kg		Lead	2.5	mg/kg	U
Magnesium	22.0	mg/kg		Manganese	0.15	mg/kg	P
Nickel	1.0	mg/kg	U	Potassium	45	mg/kg	U
Selenium	6.0	mg/kg	U	Silver	0.30	mg/kg	U
Sodium	2.9	mg/kg	P	Thallium	5.0	mg/kg	U
Vanadium	0.30	mg/kg	U	Zinc	0.40	mg/kg	U

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid
SampleNumber : S940601B
Type : Blank
Station Description:

Analyte	Result	Units	Qlfr
MET			
Hg			
Mercury	0.020	mg/kg	U

Analyte	Result	Units	Qlfr

62760.-60.605
27.bl Kesner

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10 LABORATORY
7411 Beach Dr. East
Port Orchard, Washington 98366

July 15, 1994

RECEIVED
JUL 25 1994
URS CONSULTANTS

MEMORANDUM

SUBJECT: QA Review for PCBs from Buse Timber, Everett, WA

FROM: R. H. Rieck, Chemist R. H. Rieck

TO: Dave Bennett, Project Officer

LESS THAN FULL DATA REVIEW

I have reviewed the attached data package and spot-checked approximately 10 percent of the corresponding raw data, as requested by the Superfund Project Manager. Based on this review, I find that it appears that the Self Evaluation Report prepared by the ESAT contractor was conducted in accordance with the Functional Guidelines, and that data qualifiers recommended in the evaluation appear to be appropriate.

ENVIRONMENT. SERVICE ASSISTANCE TEAMS - ZONE 2

ESAT Region 10
ICF Technology Inc.
7411 Beach Drive East
Port Orchard, WA 98366
Phone (206) 871-8760

ICF Technology Inc.
ManTech Environmental

MEMORANDUM

DATE: July 14, 1994

TO: Gerald Muth, RPO, USEPA, Region 10
Robert Rieck, GC Supervisor, USEPA, Region 10 accepted 7-15-94 R.A. Rieck
Dave Bennett, Project Officer, USEPA, Region 10

FROM: Linda Karsonovich, Data Reviewer, ESAT, Region 10

THROUGH: Barry Pepich, ESAT Team Manager, Region 10

SUBJECT: Quality Assurance Review of PCB Samples from the Buse Timber, Everett, WA site

TID#; 10-9404-430
DOC#: ESAT 10A-7156
WUD#: 1423

cc: Bruce Woods, USEPA RQAMO
Jeff Kesner, URS Consultants
Sheila Smith, Organic Technical Lead, ESAT, Region 10
John Finke, Chemist, ESAT, Region 10

The quality assurance (QA) review of one water and nine soil samples from the Buse Timber, Everett, WA site has been completed. These samples were analyzed for polychlorinated biphenyls (PCBs) using SW-846 Method 8080 by the USEPA Region 10 Laboratory ESAT Team located in Manchester, WA. This QA review was conducted for the following samples listed by EPA sample codes:

Water	94214123			
Soil	94214115	94214116	94214117	94214118
	94214119	94214120	94214121	94214122
	94214124			

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the SW-846 Method 8080, the CLP Data Review Guidelines Draft 06/91, and the USEPA Region 10 Manchester Environmental Guidelines. The recommendations presented herein are based on the information provided for the review.

TIMELINESS - Acceptable

The technical holding time for the extraction and analysis of soil samples is 14 days and 40 days respectively. The technical holding time for the extraction and analysis of water samples is seven days and 40 days respectively.

All samples were extracted and analyzed within the technical holding times. No qualifiers were recommended on this basis.

INITIAL CALIBRATION

The relative standard deviation (RSD) of the calibration factors of compounds quantified using a linear equation must be ≤20% for target compounds and ≤30% for surrogates. Compounds which are quantified using a quadratic equation must contain a minimum of five calibration levels and have a correlation coefficient of not less than 0.995.

A Perkin Elmer GC with dual columns (a DB-5 on the M channel and a DB-1701 on the N channel) and dual ECD detectors was used for this analysis. Two initial calibration sequences were included with the data set.

The first initial calibration was analyzed on 06/17/94. The sequence included a five point curve for PCB 1260 and single point standards of PCBs 1016, 1221, 1232, 1242, 1248, and 1254. Only the soil samples were analyzed with this sequence.

The soil and water samples were included in the second sequence analyzed on 06/20/94. This initial calibration contained only standards for PCB 1254. The analyst chose to report the sample results using the chromatograms obtained with this sequence. However, in order to obtain quantitation limits for the remaining PCBs the analyst chose to compare the 06/20 analyses to the standards injected on 06/17. A comparison of the PCB 1254 standard analyzed on 06/17/94 with the PCB standard analyzed on 06/02/94 showed that the retention times had remained stable and that the average percent difference of the calibration factors of PCB 1254 ranged from 12.8-13.7 percent. Therefore, the reviewer felt that it was reasonable to assume that the response of the other PCBs had also remained stable, and no qualifiers were recommended on this basis.

CONTINUING CALIBRATION

The percent difference (%D) between the calculated and the true amount for each compound must not exceed ±15%. The absolute retention time of the compounds must be within the windows determined from the initial calibration.

Retention times were within the windows set by the initial calibration. The %D increased over the length of the run to the positive, indicating an increase in sensitivity. However, there were no positive results reported during the affected part of the analytical sequence. No qualifiers were recommended on this basis.

BLANKS - Acceptable

No contamination should be present in the method blanks. Instrument blanks should not display signs of carryover or cross contamination.

No target compounds were detected in the method blanks at or above the practical quantitation limit (PQL). The instrument blanks showed no signs of carryover or cross contamination at or above one half the PQL. No qualifiers were recommended on this basis.

ANALYTICAL SEQUENCE - Acceptable

Samples must be run following an initial calibration. Continuing calibration checks and instrument blanks must be run at least every 12 hours.

The sequence met the criteria for frequency of initial and continuing calibration. No qualifiers were recommended on this basis.

SURROGATES

The acceptance criteria for surrogate recovery is 60% to 150%. Manchester Laboratory Guidelines allow for 50-150% recovery.

Surrogate recoveries for the water samples ranged from 45-96% for tetrachloro-m-xylene (TCMX) and from 84-140% for decachlorobiphenyl (DCB). No qualifiers were recommended on this basis as the DCB recovery was considered to be more indicative of the behavior of the target compounds.

Surrogate recoveries for the soil samples ranged from 55-120% for TCMX and from 48-120% for DCB. Sample 94214118 was recommended for qualification as J/UJ due to a DCB recovery of 48%. No other qualifiers were recommended on this basis.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE - Acceptable

Matrix spike recoveries for PCBs should be between 50% and 150%. Relative percent differences (RPD) should be within ±30%.

The water MS/MSD had recoveries of 96-100%. The RPD was 4.1%. No qualifiers were recommended on this basis.

The soil MS/MSD had recoveries of 120-130% and the RPD was 8%. No qualifiers were recommended on this basis.

COMPOUND IDENTIFICATION - Acceptable

Compound identification is done by retention time matching of sample chromatograms to the chromatograms of authentic standards on dual dissimilar columns. The retention times of surrogates, matrix spikes, and reported compounds in each sample must be within the retention time window determined from the initial calibration.

The retention times of the surrogates and PCBs appeared to be within the windows set by the initial calibration. No qualifiers were recommended on this basis.

COMPOUND QUANTITATION - Acceptable

Reported results must be calculated using the standard curve or average calibration factor. Compounds reported below the detection level must be within 10% of the lowest calibration standard. Detected results should agree within ±30% RPD.

Results were calculated using the standard curve and reported as an average of both channels. PCB 1254 in sample 94214119 was recommended for qualification as JN as it had an 45% RPD between the two channels. No other qualifiers were recommended on this basis.

OVERALL ASSESSMENT

The data was evaluated using the guidelines set out in the quality control specifications outlined in SW-846 Method 8080, the CLP Data Review Guidelines Draft 06/91, and the USEPA Region 10 Manchester Environmental Guidelines. Overall, two percent of the data was recommended for qualification due to the continuing calibration standard and compound quantitation. While no other qualifiers were recommended, the data would have been better presented if a more sound analytical sequence had been followed.

DATA QUALIFIER DEFINITIONS

U -	The analyte was not detected at or above the reported result.
J -	The analyte was positively identified. The associated numerical result is an estimate.
REJ -	The data are unusable for all purposes.
N -	For organic analyses there is evidence that the analyte is present in the sample.
JN -	For organic analyses there is evidence that the analyte is present in the sample. The associated numerical result is an estimate.
UJ -	The analyte was not detected at or above the reported estimated result.
NAF -	Not analyzed for.
* -	The analyte was present in the sample.
EXP -	The result is equal to the number before the EXP times 10 to the power of the number after the EXP.

7/20/94

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid (Soil)
SampleNumber : 94214115
Type : Reg sample
Station Description: SSURO01
Depth 0-6 inches bgs

Analyte	Result	Units	Qlfr
GC			
PCB			
Decachlorobiphenyl	97	%R	
PCB-1221	110	ug/kg	U
PCB-1242	110	ug/kg	U
PCB-1254	55	ug/kg	U
Tetrachlorometaxylen	100	%R	
PCB-1016	110	ug/kg	U
PCB-1232	110	ug/kg	U
PCB-1248	110	ug/kg	U
PCB-1260	110	ug/kg	U

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid (Soil)
SampleNumber : 94214115
Type : Matrix Spike
Station Description: SSUR001

Analyte	Result	Units	Qlfr
GC			
PCB			
Decachlorobiphenyl	120	%R	
Tetrachlorometaxylen	120	%R	

Analyte	Result	Units	Qlfr
PCB-1260	130	%R	

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Solid (soil)
SampleNumber : 94214115
Type : Matrix Spike Dupl
Station Description: SSUR001

Analyte	Result	Units	Qlfr
GC			
PCB			
Decachlorobiphenyl	105	%R	
Tetrachlorometaxylen	104	%R	

Analyte	Result	Units	Qlfr
PCB-1260	120	%R	

Manchester Environmental Laboratory
Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Soil
SampleNumber : 94214116
Type : Reg sample
Station Description: SSUBO02
Sample depth 18-24" bgs

GC
PCB

Analyte	Result	Units	Qlfr
Decachlorobiphenyl	98	%R	
PCB-1221	120	ug/kg	U
PCB-1242	120	ug/kg	U
PCB-1254	62	ug/kg	U
Tetrachlorometaxylen	102	%R	

Analyte	Result	Units	Qlfr
PCB-1016	120	ug/kg	U
PCB-1232	120	ug/kg	U
PCB-1248	120	ug/kg	U
PCB-1260	120	ug/kg	U

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Sediment
SampleNumber : 94214117
Type : Reg sample
Station Description: SDDRN1 Storm Drain

GC

PCB

Analyte	Result	Units	Qlfr
Decachlorobiphenyl	110	%R	
PCB-1221	130	ug/kg	U
PCB-1242	130	ug/kg	U
PCB-1254	1000	ug/kg	
Tetrachlorometaxylen	88	%R	

Analyte	Result	Units	Qlfr
PCB-1016	130	ug/kg	U
PCB-1232	130	ug/kg	U
PCB-1248	130	ug/kg	U
PCB-1260	130	ug/kg	U

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Sediment
SampleNumber : 94214118
Type : Reg sample duplicate
Station Description: SDSD3 Storm drain outfall

GC

PCB

Analyte	Result	Units	Qlfr
Decachlorobiphenyl	48	%R	
PCB-1221	330	ug/kg	UJ
PCB-1242	330	ug/kg	UJ
PCB-1254	600	ug/kg	J
Tetrachlorometaxylen	55	%R	
PCB-1016	330	ug/kg	UJ
PCB-1232	330	ug/kg	UJ
PCB-1248	330	ug/kg	UJ
PCB-1260	330	ug/kg	UJ

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Sediment
SampleNumber : 94214119
Type : Reg sample
Station Description: SDSD2 Storm drain out fall

GC

PCB

Analyte	Result	Units	Qlfr
Decachlorobiphenyl	57	%R	
PCB-1221	400	ug/kg	U
PCB-1242	400	ug/kg	U
PCB-1254	460	ug/kg	JN
Tetrachlorometaxylen	65	%R	
PCB-1016	400	ug/kg	U
PCB-1232	400	ug/kg	U
PCB-1248	400	ug/kg	U
PCB-1260	400	ug/kg	U

Manchester Environmental Laboratory
Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Sediment
SampleNumber : 94214120
Type : Reg sample
Station Description: SDUS4 Union Slough

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
GC							
PCB							
Decachlorobiphenyl	81	%R		PCB-1016	140	ug/kg	U
PCB-1221	140	ug/kg	U	PCB-1232	140	ug/kg	U
PCB-1242	140	ug/kg	U	PCB-1248	140	ug/kg	U
PCB-1254	75	ug/kg	U	PCB-1260	140	ug/kg	U
Tetrachlorometaxylen	84	%R					

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Soil
SampleNumber : 94214121
Type : Reg sample Background
Station Description: SSURBAK3 offsite 0-6inch bgs

Analyte	Result	Units	Qlfr
GC			
PCB			
Decachlorobiphenyl	86	%R	
PCB-1221	120	ug/kg	U
PCB-1242	120	ug/kg	U
PCB-1254	62	ug/kg	U
Tetrachlorometaxylen	91	%R	

Analyte	Result	Units	Qlfr
PCB-1016	120	ug/kg	U
PCB-1232	120	ug/kg	U
PCB-1248	120	ug/kg	U
PCB-1260	120	ug/kg	U

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Solid Soil
SampleNumber : 94214122
Type : Reg sample background
Station Description: SSURBAK4
offsite 18-24" bgs

GC

PCB

Analyte	Result	Units	Qlfr
Decachlorobiphenyl	95	%R	
PCB-1221	150	ug/kg	U
PCB-1242	150	ug/kg	U
PCB-1254	77	ug/kg	U
Tetrachlorometaxylen	100	%R	

Analyte	Result	Units	Qlfr
PCB-1016	150	ug/kg	U
PCB-1232	150	ug/kg	U
PCB-1248	150	ug/kg	U
PCB-1260	150	ug/kg	U

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/25/94
Matrix : Liquid-Total
Sample Number : 94214123
Type : Reg sample Rinsate
Station Description: ER01

GC

PCB

Analyte	Result	Units	Qlfr
Decachlorobiphenyl	140	%R	
PCB-1221	0.20	ug/L	U
PCB-1242	0.20	ug/L	U
PCB-1254	0.11	ug/L	U
Tetrachlorometaxylen	96	%R	
PCB-1016	0.20	ug/L	U
PCB-1232	0.20	ug/L	U
PCB-1248	0.20	ug/L	U
PCB-1260	0.20	ug/L	U

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Liquid-Total
SampleNumber : 94214123
Type : Matrix Spike
Station Description:

Analyte	Result	Units	Qlfr
GC			
PCB			
Decachlorobiphenyl	110	%R	
Tetrachlorometaxylen	51	%R	

Analyte	Result	Units	Qlfr
PCB-1260	100	%R	

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix : Liquid-Total
SampleNumber : 94214123
Type : Matrix Spike Dupl
Station Description:

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
GC							
PCB							
Decachlorobiphenyl	84	%R		PCB-1260	96	%R	
Tetrachlorometaxylen	45	%R					

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected : 5/24/94
Matrix : Solid Sediment
SampleNumber : 94214124
Type : Reg sample background
Station Description: SBUSBK5 Union slough

GC

PCB

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
Decachlorobiphenyl	92	%R		PCB-1016	140	ug/kg	U
PCB-1221	140	ug/kg	U	PCB-1232	140	ug/kg	U
PCB-1242	140	ug/kg	U	PCB-1248	140	ug/kg	U
PCB-1254	70	ug/kg	U	PCB-1260	140	ug/kg	U
Tetrachlorometaxylen	95	%R					

Project Code	: TEC-613A	**Collected**	:
Project Name	: BUSE TIMBER (SSI)	**Matrix**	:
Project Officer	: DAVID BENNETT	**SampleNumber**	: BW4151
Account Code	: 4TFA10PUZZ	**Type**	: Blank
		Station Description:	

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
GC							
PCB							
Decachlorobiphenyl	102	%R		PCB-1016	0.19	ug/L	U
PCB-1221	0.19	ug/L	U	PCB-1232	0.19	ug/L	U
PCB-1242	0.19	ug/L	U	PCB-1248	0.19	ug/L	U
PCB-1254	0.098	ug/L	U	PCB-1260	0.19	ug/L	U
Tetrachlorometaxylen	43	%R					

Manchester Environmental Laboratory

Final Report

Project Code : TEC-613A
Project Name : BUSE TIMBER (SSI)
Project Officer : DAVID BENNETT
Account Code : 4TFA10PUZZ

Collected :
Matrix :
SampleNumber : BW4151D
Type : Blank
Station Description:

GC

PCB

Analyte	Result	Units	Qlfr	Analyte	Result	Units	Qlfr
Decachlorobiphenyl	105	%R		PCB-1016	0.20	ug/L	U
PCB-1221	0.20	ug/L	U	PCB-1232	0.20	ug/L	U
PCB-1242	0.20	ug/L	U	PCB-1248	0.20	ug/L	U
PCB-1254	0.11	ug/L	U	PCB-1260	0.20	ug/L	U
Tetrachlorometaxylen	55	%R					

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27.61

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

RECEIVED
JUL 25 1994
URS CONSULTANTS

REPLY TO
ATTN OF: ES-095

July 21, 19941

MEMORANDUM

SUBJECT: Data Validation for Buse Timber SI, Case No. 22170, SDG No. JL511, Semi-Volatile Organic Analysis

FROM: Donald Matheny, Chemist DM
Quality Assurance Office, ESD

TO: Dave Bennett, Site Manager
Superfund Response & Investigations Branch, HWD

The QA Office has received and is transmitting the above ESAT data validation report.

CC: Porter Lombard, ESAT-RSCC
Jeff Kesner, Site Lead, URS
Bruce Woods, TPO, Region 10
Mike Hiatt, Data Audit Staff, EMSL-LV
QAO, AOB

ENVIRONMENTAL SERVICE ASSISTANCE TEAMS - ZONE 2

ESAT Region 10
ICF Technology Inc.
1200 6th Avenue
Seattle, WA 98101
Phone (206) 224-4162

ICF Technology Inc.
ManTech Environmental

MEMORANDUM

DATE: July 19, 1994

TO: Jerry Muth, RPO, USEPA, Region 10

Donald Matheny, Task Monitor, USEPA, Region 10

THROUGH: Barry Pepich, ESAT Team Manager, Region 10

David J. Lindquist

FROM: David J. Lindquist, ESAT Data Reviewer

SUBJECT: Data Validation Report of Semi-Volatile Organic Analyses of Samples from Buse Timber Site Investigation
Case: 22170 SDG: JL511

TID #: 10-9404-430
DOCUMENT #: ESAT-10B-7479
WUD #: 2347

The quality assurance (QA) review of nine (9) low level soil samples and one water sample (rinseate) collected from the above referenced site has been completed. These samples were analyzed for semi-volatile organic compounds in accordance with the USEPA Contract Laboratory Program Statement of Work. The analyses were performed by Southwest Laboratory of Oklahoma located in Broken Arrow, OK. The samples were numbered:

JL511 JL512 JL513 JL514 JL515
JL516 JL517 JL518 JL519 JL520

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the "Contract Laboratory Program Statement of Work for Organics Analysis, 3/90" and the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, (2/94)".

The conclusions presented herein are based on the information provided for the review.

1. Timeliness - Acceptable

The samples were extracted and analyzed within the contract required and technical (40 CFR 136 water criteria) holding times. The Chain of Custody Form indicates that the rinseate was not preserved with HCl.

Listed below are pertinent collection and analysis dates:

Sample Number	Collection Date	Rec'd. Date	Extraction Date	Analysis Date
JL511	052594	052794	052994	060394
JL512	052594	052794	052994	060394
JL513	052594	052794	052994	062094
JL514	052594	052794	052994	062094
JL515	052594	052794	052994	062094
JL516	052594	052794	052994	060394
JL517	052594	052794	052994	060394
JL518	052594	052794	052994	060394
JL519(r)	052594	052794	052894	060194
JL520	052494	052794	052994	060794

(r) = rinseate

2. GC/MS Tuning - Acceptable

Instrument tuning and system performance criteria were met for all dates of analysis.

Two GC/MS systems were used in the analysis of the samples. All samples were analyzed within the acceptable 12 hour window of decafluorotriphenylphosphine (DFTPP) tunings.

The data presented on each GC/MS Tuning and Mass Calibration Form (Form 5B) was compared with each mass listing and the raw data. Calculations and transcriptions were correct.

3. Initial Calibration - Acceptable

The initial calibrations were performed in accordance with the method. The percent relative standard deviation criterion (%RSD ≤ 30%) and the minimum average relative response factor requirements were met for all compounds.

The raw data was compared with the reported values. Calculations were correct and no transcription errors were noted.

4. Continuing Calibration

The continuing calibration standards met the criteria for minimum RRFs and percent difference (%D) relative to the initial calibration, for all target compounds with the following exceptions:

Analysis Date: 06/03/94

	%D	Sensitivity
2,2'-oxybis(1-chloropropane)	-31.4	increase@
hexachlorocyclopenatadiene	41.2	decrease
di-n-octylphthalate	-33.5	increase@

Hexachlorocyclopentadiene results are qualified "UJ" (estimated at the detection limit) for the samples listed below:

JL511 JL512 JL516 JL517 JL518

Analysis Date: 06/07/94

	%D	Sensitivity
4,6-dinitro-2-methylphenol	29.9+	decrease
hexachlorocyclopenatadiene	37.0	decrease
2,4-dinitrophenol	32.9+	decrease

Hexachlorocyclopenatadiene results are qualified "UJ" (estimated at the detection limit) for sample JL520.

Analysis Date: 06/13/94

	%D	Sensitivity
2,4-dimethylphenol	27.8+	decrease
4-chloroaniline	35.7	decrease
hexachlorocyclopenatadiene	56.0	decrease
4-nitrophenol	-31.9	increase@
3,3'-dichlorobenzidine	29.4+	decrease
2,4,6-tribromophenol	-27.0	increase@

Hexachlorocyclopenatadiene and 4-chloroaniline results are qualified "UJ" (estimated at the detection limit) for the samples listed below:

JL513 JL514 JL515

@ - Results do not warrant qualification on the basis of increased instrument sensitivity relative to the initial calibration and the associated results were non-detected.

+ - Results do not warrant qualification on the basis that the associated results were non-detected and the %D < 35%.

The raw data was compared with the reported values. Calculations were correct and no transcription errors were noted.

5. Blanks

Background levels for all target compounds in the method blanks were below the contract required quantitation limits.

Bis(2-ethylhexyl)phthalate was detected in VBLK02. All associated bis(2-ethylhexyl)phthalate results less than 10X the concentration reported in the blank are qualified "U", non-detected. Associated results that were detected at levels less than the CRQL, are raised to the CRQL on the Form 1. Bis(2-ethylhexyl)phthalate is qualified, "U" for the samples listed below:

JL511 JL512 JL513 JL514 JL515
JL516 JL517 JL518 JL520

Tentatively identified compound (TIC) results reported for the method blanks were deleted from the associated sample Form 1s.

6. Surrogate Recovery - Acceptable

Surrogate recovery criteria were met for all samples, blanks and QC samples.

Listed below are the range of surrogate recoveries:

Surrogate	Recovery Range
nitrobenzene-d5	46-72%
2-fluorobiphenyl	55-85%
terphenyl-d14	58-120%
phenol-d5	39-68%
2-fluorophenol	38-65%
2,4,6-tribromophenol	42-96%
2-chlorophenol-d4	39-68%
1,2-dichlorobenzene-d4	40-71%

The raw data was compared with the data presented in the surrogate recovery forms. Calculations were correct and no transcription errors were noted.

7. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD analysis was performed on sample JL511. The MS/MSD compound recoveries and relative percent differences (%RPD) between values were within the required control limits with one exception noted below.

Compound	MS %R	MSD %R	RPD
acenaphthene	58	75	26*

* QC limit = 19

The data was not qualified on the basis of the MS/MSD results.

8. Internal Standards Performance - Acceptable

The data reported on the Internal Standard Area Summary (Form 8B) was verified with the raw data. Chromatograms, quantitation lists, and transcriptions were examined.

All analyses met the technical acceptance criteria for internal standard area counts (+100% to -50% of the associated continuing calibration internal standard area) and retention time shift (± 0.50 minutes of the associated continuing calibration internal standard RT).

9. Compound Identification - Acceptable

The chromatograms and quantitation lists were inspected. Sample and laboratory generated standard spectra were scrutinized. Calculations were checked with the raw data.

Positive sample results were within relative retention time (RRT) windows and provided spectra meeting USEPA spectral matching criteria.

10. Compound Quantitation and Detection Limits - Acceptable

The raw data was examined to verify the calculations of sample results and the reported detection limits. The sample results were quantitated using an updated continuing calibration standard. The method specified detection limits were achieved. The quantitation ions used were in accordance with the method.

11. Tentatively Identified Compounds (TICs)

The raw data and chromatograms were inspected for tentatively identified compounds. Several hydrocarbon TICs were detected in all of the samples.

12. System Performance - Acceptable

All blanks, samples and QC samples were analyzed on a GC/MS system meeting the technical acceptance criteria.

13. Laboratory Contact

The laboratory was not contacted for this review.

14. Overall Assessment

Approximately five percent of the reported sample results were qualified as non-detects or estimates due to blank contamination and/or continuing calibration criteria.

DATA QUALIFIER DEFINITIONS

U- The analyte was analyzed for and is not present above the level of the associated value. The associated numerical value indicates the approximate concentration necessary to detect the analyte in this sample.

If a decision requires quantitation of the analyte below the associated numerical level, reanalysis or alternative analytical methods should be considered. The technical staff is available to discuss available options.

J- The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample. The data should be seriously considered for decision making and are usable for many purposes.

A subscript may be appended to the "J" that indicates which of the following quality control criteria were not met:

1 Blank contamination: indicates possible high bias and/or false positives.

2 Calibration range exceeded: indicates possible low bias.

3 Holding times not met: indicates low bias for most analytes with the exception of common laboratory contaminants and chlorinated ethenes (i.e.: trichloroethene, 1,1-dichloroethene, vinyl chloride).

4 Other QC outside control limits: bias not readily determined.

R- The data are unusable for all purposes. The analyte was analyzed for, but the presence or absence of the analyte has not been verified.

Resampling and reanalysis are necessary to confirm or deny the presence of the analyte.

UJ - A combination of the "U" and "J" qualifier. The analyte was analyzed for and was not present above the level of the associated value. The associated numerical value may not accurately or precisely represent the concentration necessary to detect the analyte in this sample.

If a decision requires quantitation of the analyte close to the associated numerical level, reanalysis or alternative analytical methods should be considered.

N- The analysis indicates that an analyte is present, and there are strong indications that the identity is correct.

Confirmation of the analyte requires further analysis.

NJ- A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

A subscript may be appended to the "NJ" that indicates which of the following situations applies:

1 DDT/Endrin breakdown evident.

2 Interference from other sample components.

3 Non-Target Compound List (TCL) compounds (Confirmation is necessary using specific target compound methodology to accurately determine the concentration and identity of the detected compound).

4 A confirmation analysis was missing or quality control criteria were not met for the confirmation analysis.

NOTE: Data users are encouraged to contact their Regional representative within ESD to clarify or obtain further information on the appropriate use of analytical data.

DPO: [ ] ACTION [X] FYI

Region /0

ORGANIC REGIONAL DATA ASSESSMENT SUMMARY

CASE NO. 22170

LABORATORY Southwest LABORATORY

SDG NO. JL511

DATA USER SUPERFUND

SOW 3/90

REVIEW COMPLETION DATE 7-19-94

NO. OF SAMPLES 1 WATER 9 SOIL ____ OTHER

REVIEWER [ ] ESD [X] ESAT [ ] OTHER, CONTRACT/CONTRACTOR ____

	~~VOA~~	BNA	~~PEST~~	~~OTHER~~
1. HOLDING TIMES		O		
2. GC-MS TUNE/ GC PERFORMANCE		O		
3. INITIAL CALIBRATIONS		O		
4. CONTINUING CALIBRATIONS		X		
5. FIELD BLANKS ("F" = not applicable)		F		
6. LABORATORY BLANKS		X		
7. SURROGATES		O		
8. MATRIX SPIKE/DUPLICATES		O		
9. REGIONAL QC ("F" = not applicable)		F		
10. INTERNAL STANDARDS		O		
11. COMPOUND IDENTIFICATION		O		
12. COMPOUND QUANTITATION		O		
13. SYSTEM PERFORMANCE		O		
14. OVERALL ASSESSMENT		X		

O = No problems or minor problems that do not affect data usability.
X = No more than *about* 5% of the data points are qualified as either estimated or unusable.
M = More than *about* 5% of the data points are qualified as estimated.
Z = More than *about* 5% of the data points are qualified as unusable.

DPO ACTION ITEMS: ____

AREAS OF CONCERN: ____

554KU01

EPA SAMPLE NO.
Surface Soil

JL511

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0211.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 30 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	470	U
111-44-4	bis(2-Chloroethyl)Ether	470	U
95-57-8	2-Chlorophenol	470	U
541-73-1	1,3-Dichlorobenzene	470	U
106-46-7	1,4-Dichlorobenzene	470	U
95-50-1	1,2-Dichlorobenzene	470	U
95-48-7	2-Methylphenol	470	U
108-60-1	2,2'-oxybis(1-Chloropropane)	470	U
106-44-5	4-Methylphenol	470	U
621-64-7	N-Nitroso-di-n-propylamine	470	U
67-72-1	Hexachloroethane	470	U
98-95-3	Nitrobenzene	470	U
78-59-1	Isophorone	470	U
88-75-5	2-Nitrophenol	470	U
105-67-9	2,4-Dimethylphenol	470	U
111-91-1	bis(2-Chloroethoxy)methane	470	U
120-83-2	2,4-Dichlorophenol	470	U
120-82-1	1,2,4-Trichlorobenzene	470	U
91-20-3	Naphthalene	470	U
106-47-8	4-Chloroaniline	470	U
87-68-3	Hexachlorobutadiene	470	U
59-50-7	4-Chloro-3-Methylphenol	470	U
91-57-6	2-Methylnaphthalene	470	U
77-47-4	Hexachlorocyclopentadiene	470	JU
88-06-2	2,4,6-Trichlorophenol	470	U
95-95-4	2,4,5-Trichlorophenol	1100	U
91-58-7	2-Chloronaphthalene	470	U
88-74-4	2-Nitroaniline	1100	U
131-11-3	Dimethylphthalate	470	U
208-96-8	Acenaphthylene	470	U
606-20-2	2,6-Dinitrotoluene	470	U
99-09-2	3-Nitroaniline	1100	U
83-32-9	Acenaphthene	470	U

7-19-94

1C

SEMIVOLATILE GANICS ANALYSIS DATA SHE

SSUR09 EPA SAMPLE NO.

JL511

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.01

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0211.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 30 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1100	U
100-02-7	4-Nitrophenol	1100	U
132-64-9	Dibenzofuran	470	U
121-14-2	2,4-Dinitrotoluene	470	U
84-66-2	Diethylphthalate	470	U
7005-72-3	4-Chlorophenyl-phenylether	470	U
86-73-7	Fluorene	470	U
100-01-6	4-Nitroaniline	1100	U
534-52-1	4,6-Dinitro-2-methylphenol	1100	U
86-30-6	N-Nitrosodiphenylamine (1)	470	U
101-55-3	4-Bromophenyl-phenylether	470	U
118-74-1	Hexachlorobenzene	470	U
87-86-5	Pentachlorophenol	1100	U
85-01-8	Phenanthrene	470	U
120-12-7	Anthracene	470	U
86-74-8	Carbazole	470	U
84-74-2	Di-n-butylphthalate	470	U
206-44-0	Fluoranthene	470	U
129-00-0	Pyrene	470	U
85-68-7	Butylbenzylphthalate	470	U
91-94-1	3,3'-Dichlorobenzidine	470	U
56-55-3	Benzo(a)anthracene	470	U
218-01-9	Chrysene	470	U
117-81-7	bis(2-Ethylhexyl)phthalate	470 ~~98~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	470	U
205-99-2	Benzo(b)fluoranthene	470	U
207-08-9	Benzo(k)fluoranthene	470	U
50-32-8	Benzo(a)pyrene	470	U
193-39-5	Indeno(1,2,3-cd)pyrene	470	U
53-70-3	Dibenz(a,h)anthracene	470	U
191-24-2	Benzo(g,h,i)perylene	470	U

DV 7-19-94

5Y URURI

EPA SAMPLE NO.

JL511

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: SWL-TULSA   Contract: 68-D2-0013

Lab Code: SWOK   Case No.: 22170   SAS No.:   SDG No.: JL511

Matrix: (soil/water) SOIL   Lab Sample ID: 18854.01

Sample wt/vol: 30.0 (g/mL) G   Lab File ID: M0211.D

Level: (low/med) LOW   Date Received: 05/27/94

% Moisture: 30   decanted: (Y/N) N   Date Extracted:05/29/94

Concentrated Extract Volume: 500(uL)   Date Analyzed: 06/03/94

Injection Volume: 2.0(uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y   pH: 6.1

Number TICs found: 25

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.463~~	~~17000~~	~~NJAB~~
2.	UNKNOWN HYDROCARBON	12.741	580	N J
3.	UNKNOWN ORGANIC ACID	13.441	750	J
4.	UNKNOWN ORGANIC ACID	13.554	950	J
5.	UNKNOWN ALKANE	15.715	370	J
~~6.~~	~~UNKNOWN AMIDE~~	~~16.181~~	~~740~~	~~JB~~
7.	UNKNOWN HYDROCARBON	16.863	1100	J
8.	UNKNOWN CYCLOALKANE	17.945	2800	J
9.	UNKNOWN HYDROCARBON	18.127	1100	J
10.	UNKNOWN HYDROCARBON	18.321	390	J
~~11.~~	~~UNKNOWN AMIDE~~	~~18.435~~	~~1400~~	~~JB~~
12.	UNKNOWN	18.630	500	J
13.	UNKNKOWN ALKANE	18.915	1800	J
14.	Phosphonic acid, ester	18.961	1800	J
15.	UNKNOWN	19.041	480	J
16.	UNKNOWN ALKANE	19.865	1800	J
17.	UNKNOWN	20.014	500	J
18.	UNKNOWN ALKANE	20.918	450	J
19.	UNKNOWN	21.033	510	J
20.	UNKNOWN	21.113	460	J
21.	UNKNOWN	21.354	590	J
22. 83-47-6	.gamma.-Sitosterol	21.595	890	NJ
23.	UNKNOWN	21.698	590	J
24.	UNKNOWN	22.409	410	J
25. 1058-61-3	Stigmast-4-en-3-one	22.489	440	NJ
26.				
27.				
28.				
29.				
30.				

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SSUB002

EPA SAMPLE NO.

Subsurface Soil

JL512

Lab Name: SWL-TULSA

Contract: 68-D2-0013

Lab Code: SWOK

Case No.: 22170

SAS No.:

SDG No.: JL511

Matrix: (soil/water) SOIL

Lab Sample ID: 18854.02

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: M0214.D

Level: (low/med) LOW

Date Received: 05/27/94

% Moisture: 35

decanted: (Y/N) N

Date Extracted:05/29/94

Concentrated Extract Volume: 500(UL)

Date Analyzed: 06/03/94

Injection Volume: 2.0(uL)

Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y

pH: 5.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	510	U
111-44-4	bis(2-Chloroethyl)Ether	510	U
95-57-8	2-Chlorophenol	510	U
541-73-1	1,3-Dichlorobenzene	510	U
106-46-7	1,4-Dichlorobenzene	510	U
95-50-1	1,2-Dichlorobenzene	510	U
95-48-7	2-Methylphenol	510	U
108-60-1	2,2'-oxybis(1-Chloropropane)	510	U
106-44-5	4-Methylphenol	510	U
621-64-7	N-Nitroso-di-n-propylamine	510	U
67-72-1	Hexachloroethane	510	U
98-95-3	Nitrobenzene	510	U
78-59-1	Isophorone	510	U
88-75-5	2-Nitrophenol	510	U
105-67-9	2,4-Dimethylphenol	510	U
111-91-1	bis(2-Chloroethoxy)methane	510	U
120-83-2	2,4-Dichlorophenol	510	U
120-82-1	1,2,4-Trichlorobenzene	510	U
91-20-3	Naphthalene	510	U
106-47-8	4-Chloroaniline	510	U
87-68-3	Hexachlorobutadiene	510	U/J U
59-50-7	4-Chloro-3-Methylphenol	510	U
91-57-6	2-Methylnaphthalene	510	U
77-47-4	Hexachlorocyclopentadiene	510	J U
88-06-2	2,4,6-Trichlorophenol	510	U
95-95-4	2,4,5-Trichlorophenol	1200	U
91-58-7	2-Chloronaphthalene	510	U
88-74-4	2-Nitroaniline	1200	U
131-11-3	Dimethylphthalate	510	U
208-96-8	Acenaphthylene	510	U
606-20-2	2,6-Dinitrotoluene	510	U
99-09-2	3-Nitroaniline	1200	U
83-32-9	Acenaphthene	510	U

FORM I SV-1

3/90

DL
7-19-94

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO

JL512

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.02

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0214.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 35 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 5.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1200	U
100-02-7	4-Nitrophenol	1200	U
132-64-9	Dibenzofuran	510	U
121-14-2	2,4-Dinitrotoluene	510	U
84-66-2	Diethylphthalate	510	U
7005-72-3	4-Chlorophenyl-phenylether	510	U
86-73-7	Fluorene	510	U
100-01-6	4-Nitroaniline	1200	U
534-52-1	4,6-Dinitro-2-methylphenol	1200	U
86-30-6	N-Nitrosodiphenylamine (1)	510	U
101-55-3	4-Bromophenyl-phenylether	510	U
118-74-1	Hexachlorobenzene	510	U
87-86-5	Pentachlorophenol	1200	U
85-01-8	Phenanthrene	510	U
120-12-7	Anthracene	510	U
86-74-8	Carbazole	510	U
84-74-2	Di-n-butylphthalate	510	U
206-44-0	Fluoranthene	510	U
129-00-0	Pyrene	510	U
85-68-7	Butylbenzylphthalate	510	U
91-94-1	3,3'-Dichlorobenzidine	510	U
56-55-3	Benzo(a)anthracene	510	U
218-01-9	Chrysene	510	U
117-81-7	bis(2-Ethylhexyl)phthalate	510 ~~88~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	510	U
205-99-2	Benzo(b)fluoranthene	510	U
207-08-9	Benzo(k)fluoranthene	510	U
50-32-8	Benzo(a)pyrene	510	U
193-39-5	Indeno(1,2,3-cd)pyrene	510	U
53-70-3	Dibenz(a,h)anthracene	510	U
191-24-2	Benzo(g,h,i)perylene	510	U

FORM I SV-2

3/90

DL 7-19-94

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL512

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.02

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0214.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 35 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 5.8

Number TICs found: 25

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.475~~	~~13000~~	~~NJA~~
2.	UNKNOWN ALKANE	15.712	450	NJ
3.	UNKNOWN AMIDE	16.189	2800	J
4.	UNKNOWN ALKANE	16.303	370	J
5.	UNKNOWN ALDEHYDE	16.508	510	J
6.	UNKNOWN ALCOHOL	16.872	1200	J
7.	UNKNOWN	16.975	680	J
8.	UNKNOWN ALKANE	17.408	330	J
9.	UNKNOWN ALKANE	17.933	1500	J
10.	UNKNOWN	18.447	860	J
11.	UNKNOWN ALKANE	18.924	1000	J
12.	UNKNOWN	18.970	580	J
13.	UNKNOWN	19.050	340	J
14.	UNKNOWN	19.680	360	J
15.	UNKNOWN ALKANE	19.864	1500	J
16.	UNKNOWN	19.944	720	J
17.	UNKNOWN	20.013	580	J
18.	UNKNOWN	20.150	370	J
19.	UNKNOWN ALKANE	20.242	330	J
20.	UNKNOWN ALKANE	20.918	340	J
21.	UNKNOWN	21.124	370	J
22.	UNKNOWN	21.365	470	J
23. 83-47-6	.gamma.-Sitosterol	21.606	370	NJ
24.	UNKNOWN	21.721	500	J
25.	UNKNOWN	22.409	260	J
26.				
27.				
28.				
29.				
30.				

FORM I SV-TIC

3/90

JL
7-19-94

SDDRN1

EPA SAMPLE NO.

Storm Drain Sediment

JL513

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.03

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0448.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 29 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 5.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	4600	U
111-44-4	bis(2-Chloroethyl)Ether	4600	U
95-57-8	2-Chlorophenol	4600	U
541-73-1	1,3-Dichlorobenzene	4600	U
106-46-7	1,4-Dichlorobenzene	4600	U
95-50-1	1,2-Dichlorobenzene	4600	U
95-48-7	2-Methylphenol	4600	U
108-60-1	2,2'-oxybis(1-Chloropropane)	4600	U
106-44-5	4-Methylphenol	4600	U
621-64-7	N-Nitroso-di-n-propylamine	4600	U
67-72-1	Hexachloroethane	4600	U
98-95-3	Nitrobenzene	4600	U
78-59-1	Isophorone	4600	U
88-75-5	2-Nitrophenol	4600	U
105-67-9	2,4-Dimethylphenol	4600	U
111-91-1	bis(2-Chloroethoxy)methane	4600	U
120-83-2	2,4-Dichlorophenol	4600	U
120-82-1	1,2,4-Trichlorobenzene	4600	U
91-20-3	Naphthalene	4600	U
106-47-8	4-Chloroaniline	4600	J U
87-68-3	Hexachlorobutadiene	4600	U
59-50-7	4-Chloro-3-Methylphenol	4600	U
91-57-6	2-Methylnaphthalene	4600	U
77-47-4	Hexachlorocyclopentadiene	4600	J U
88-06-2	2,4,6-Trichlorophenol	4600	U
95-95-4	2,4,5-Trichlorophenol	11000	U
91-58-7	2-Chloronaphthalene	4600	U
88-74-4	2-Nitroaniline	11000	U
131-11-3	Dimethylphthalate	4600	U
208-96-8	Acenaphthylene	4600	U
606-20-2	2,6-Dinitrotoluene	4600	U
99-09-2	3-Nitroaniline	11000	U
83-32-9	Acenaphthene	4600	U

7-19-94

1C
SEMIVOLATIL RGANICS ANALYSIS DATA SH

SODRNI

EPA SAMPLE NO.:
JL513

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.03

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0448.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 29 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 5.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	11000	U
100-02-7	4-Nitrophenol	11000	U
132-64-9	Dibenzofuran	4600	U
121-14-2	2,4-Dinitrotoluene	4600	U
84-66-2	Diethylphthalate	4600	U
7005-72-3	4-Chlorophenyl-phenylether	4600	U
86-73-7	Fluorene	4600	U
100-01-6	4-Nitroaniline	11000	U
534-52-1	4,6-Dinitro-2-methylphenol	11000	U
86-30-6	N-Nitrosodiphenylamine (1)	4600	U
101-55-3	4-Bromophenyl-phenylether	4600	U
118-74-1	Hexachlorobenzene	4600	U
87-86-5	Pentachlorophenol	460	J
85-01-8	Phenanthrene	240	J
120-12-7	Anthracene	4600	U
86-74-8	Carbazole	4600	U
84-74-2	Di-n-butylphthalate	4600	U
206-44-0	Fluoranthene	400	J
129-00-0	Pyrene	750	J
85-68-7	Butylbenzylphthalate	650	J
91-94-1	3,3'-Dichlorobenzidine	4600	U
56-55-3	Benzo(a)anthracene	4600	U
218-01-9	Chrysene	320	J
117-81-7	bis(2-Ethylhexyl)phthalate	4600 ~~2200~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	520	J
205-99-2	Benzo(b)fluoranthene	4600	U
207-08-9	Benzo(k)fluoranthene	4600	U
50-32-8	Benzo(a)pyrene	4600	U
193-39-5	Indeno(1,2,3-cd)pyrene	4600	U
53-70-3	Dibenz(a,h)anthracene	4600	U
191-24-2	Benzo(g,h,i)perylene	380	J

FORM I SV-2 3/90

7-19-94

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL513

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.03

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0448.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 29 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 5.3

Number TICs found: 25

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.133~~	~~28000~~	~~NJA~~
2.	UNKNOWN ALKANE	16.421	12000	NJ
3.	UNKNOWN ALKANE	16.986	5000	J
4.	UNKNOWN ALKANE	17.274	6000	J
5.	UNKNOWN HYDROCARBON	17.494	3800	J
6.	UNKNOWN ALKANE	17.679	5800	J
7.	UNKNOWN HYDROCARBON	18.350	2300	J
8.	UNKNOWN HYDROCARBON	18.558	6400	J
9.	UNKNOWN	18.662	2100	J
10.	UNKNOWN	18.767	1800	J
11.	UNKNOWN ALKANE	18.836	5400	J
12.	UNKNOWN	19.021	2600	J
13.	UNKNOWN	19.091	2400	J
14.	UNKNOWN	19.207	3800	J
15.	UNKNOWN	19.300	5900	J
16.	UNKNOWN	19.392	1300	J
17.	UNKNOWN	19.427	1600	J
18.	UNKNOWN	19.508	3000	J
19.	UNKNOWN	19.636	2600	J
20.	UNKNOWN	19.682	1800	J
21.	UNKNOWN	20.065	2900	J
22.	UNKNOWN ALKANE	20.285	1400	J
23.	UNKNOWN	20.598	1800	J
24.	UNKNOWN ALKANE	20.865	2500	J
25.	UNKNOWN	21.039	2000	J
26.				
27.				
28.				
29.				
30.				

JL
7-19-94

SDSD EPA SAMPLE NO.

JL514

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: SWL-TULSA

Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL

Lab Sample ID: 18854.04

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: M0449.D

Level: (low/med) LOW

Date Received: 05/27/94

% Moisture: 77 decanted: (Y/N) N

Date Extracted: 05/29/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 06/20/94

Injection Volume: 2.0(uL)

Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 6.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	29000	U
111-44-4	bis(2-Chloroethyl)Ether	29000	U
95-57-8	2-Chlorophenol	29000	U
541-73-1	1,3-Dichlorobenzene	29000	U
106-46-7	1,4-Dichlorobenzene	29000	U
95-50-1	1,2-Dichlorobenzene	29000	U
95-48-7	2-Methylphenol	29000	U
108-60-1	2,2′-oxybis(1-Chloropropane)	29000	U
106-44-5	4-Methylphenol	2900	J
621-64-7	N-Nitroso-di-n-propylamine	29000	U
67-72-1	Hexachloroethane	29000	U
98-95-3	Nitrobenzene	29000	U
78-59-1	Isophorone	29000	U
88-75-5	2-Nitrophenol	29000	U
105-67-9	2,4-Dimethylphenol	29000	U
111-91-1	bis(2-Chloroethoxy)methane	29000	U
120-83-2	2,4-Dichlorophenol	29000	U
120-82-1	1,2,4-Trichlorobenzene	29000	U
91-20-3	Naphthalene	29000	U
106-47-8	4-Chloroaniline	29000	J U
87-68-3	Hexachlorobutadiene	29000	U
59-50-7	4-Chloro-3-Methylphenol	29000	U
91-57-6	2-Methylnaphthalene	3700	J
77-47-4	Hexachlorocyclopentadiene	29000	J U
88-06-2	2,4,6-Trichlorophenol	29000	U
95-95-4	2,4,5-Trichlorophenol	70000	U
91-58-7	2-Chloronaphthalene	29000	U
88-74-4	2-Nitroaniline	70000	U
131-11-3	Dimethylphthalate	29000	U
208-96-8	Acenaphthylene	29000	U
606-20-2	2,6-Dinitrotoluene	29000	U
99-09-2	3-Nitroaniline	70000	U
83-32-9	Acenaphthene	29000	U

FORM I SV-1

3/90

DV 7-19-94

1C

SEMIVOLATILE GANICS ANALYSIS DATA SHE

SDSD3

EPA SAMPLE NO.

JL514

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.04

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0449.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 77 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 6.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	70000	U
100-02-7	4-Nitrophenol	70000	U
132-64-9	Dibenzofuran	29000	U
121-14-2	2,4-Dinitrotoluene	29000	U
84-66-2	Diethylphthalate	29000	U
7005-72-3	4-Chlorophenyl-phenylether	29000	U
86-73-7	Fluorene	29000	U
100-01-6	4-Nitroaniline	70000	U
534-52-1	4,6-Dinitro-2-methylphenol	70000	U
86-30-6	N-Nitrosodiphenylamine (1)	29000	U
101-55-3	4-Bromophenyl-phenylether	29000	U
118-74-1	Hexachlorobenzene	29000	U
87-86-5	Pentachlorophenol	70000	U
85-01-8	Phenanthrene	1800	J
120-12-7	Anthracene	29000	U
86-74-8	Carbazole	29000	U
84-74-2	Di-n-butylphthalate	1700	J
206-44-0	Fluoranthene	29000	U
129-00-0	Pyrene	1800	J
85-68-7	Butylbenzylphthalate	29000	U
91-94-1	3,3'-Dichlorobenzidine	29000	U
56-55-3	Benzo(a)anthracene	29000	U
218-01-9	Chrysene	29000	U
117-81-7	bis(2-Ethylhexyl)phthalate	29000 ~~17000~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	29000	U
205-99-2	Benzo(b)fluoranthene	29000	U
207-08-9	Benzo(k)fluoranthene	29000	U
50-32-8	Benzo(a)pyrene	29000	U
193-39-5	Indeno(1,2,3-cd)pyrene	29000	U
53-70-3	Dibenz(a,h)anthracene	29000	U
191-24-2	Benzo(g,h,i)perylene	29000	U

DL 7-19-94

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL514

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.04

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0449.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 77 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 1000(uL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 6.5

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

Number TICs found: 25

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN ALKANE	8.664	66000	NJ
2.	UNKNOWN ALKANE	9.546	69000	J
3.	UNKNOWN ALKANE	13.371	57000	J
4.	UNKNOWN ALKANE	14.033	54000	J
5.	UNKNOWN	15.637	25000	J
6.	UNKNOWN	15.845	25000	J
7.	UNKNOWN ALCOHOL	16.202	19000	J
8.	UNKNOWN HYDROCARBON	16.363	18000	J
9.	UNKNOWN ALKANE	16.432	42000	J
10.	UNKNOWN	16.767	50000	J
11.	UNKNOWN ALKANE	16.986	27000	J
12.	UNKNOWN	17.148	30000	J
13.	UNKNOWN ALKANE	17.275	56000	J
14.	UNKNOWN	17.507	23000	J
15.	UNKNOWN	17.831	75000	J
16.	UNKNOWN ALKANE	18.352	120000	J
17.	UNKNOWN	18.561	120000	J
18.	UNKNOWN ALKANE	18.839	91000	J
19.	UNKNOWN ALKANE	19.210	81000	J
20.	UNKNOWN	19.303	98000	J
21.	UNKNOWN ALKANE	20.023	73000	J
22. 36728-72-0	28-Nor-17.beta.(H)-hopane	20.069	89000	NJ
23.	UNKNOWN ALKANE	20.290	130000	J
24.	UNKNOWN ALKANE	20:870	120000	J
25. 1058-61-3	Stigmast-4-en-3-one	21.854	75000	NJ
26.				
27.				
28.				
29.				
30.				

JL
7-19-94

SDSO2

EPA SAMPLE NO.

JL515

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.05

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0450.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 78 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 6.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	30000	U
111-44-4	bis(2-Chloroethyl)Ether	30000	U
95-57-8	2-Chlorophenol	30000	U
541-73-1	1,3-Dichlorobenzene	30000	U
106-46-7	1,4-Dichlorobenzene	30000	U
95-50-1	1,2-Dichlorobenzene	30000	U
95-48-7	2-Methylphenol	30000	U
108-60-1	2,2'-oxybis(1-Chloropropane)	30000	U
106-44-5	4-Methylphenol	2100	J
621-64-7	N-Nitroso-di-n-propylamine	30000	U
67-72-1	Hexachloroethane	30000	U
98-95-3	Nitrobenzene	30000	U
78-59-1	Isophorone	30000	U
88-75-5	2-Nitrophenol	30000	U
105-67-9	2,4-Dimethylphenol	30000	U
111-91-1	bis(2-Chloroethoxy)methane	30000	U
120-83-2	2,4-Dichlorophenol	30000	U
120-82-1	1,2,4-Trichlorobenzene	30000	U
91-20-3	Naphthalene	30000	U
106-47-8	4-Chloroaniline	30000	J U
87-68-3	Hexachlorobutadiene	30000	U
59-50-7	4-Chloro-3-Methylphenol	30000	U
91-57-6	2-Methylnaphthalene	1900	J
77-47-4	Hexachlorocyclopentadiene	30000	J U
88-06-2	2,4,6-Trichlorophenol	30000	U
95-95-4	2,4,5-Trichlorophenol	73000	U
91-58-7	2-Chloronaphthalene	30000	U
88-74-4	2-Nitroaniline	73000	U
131-11-3	Dimethylphthalate	30000	U
208-96-8	Acenaphthylene	30000	U
606-20-2	2,6-Dinitrotoluene	30000	U
99-09-2	3-Nitroaniline	73000	U
83-32-9	Acenaphthene	30000	U

JV
7-15-94

1C

SDS02

SEMIVOLATILE ANICS ANALYSIS DATA SHEE

EPA SAMPLE NO.

JL515

Lab Name: SWL-TULSA

Contract: 68-D2-0013

Lab Code: SWOK

Case No.: 22170

SAS No.:

SDG No.: JL511

Matrix: (soil/water) SOIL

Lab Sample ID: 18854.05

Sample wt/vol: 30.0 (g/mL) G

Lab File ID: M0450.D

Level: (low/med) LOW

Date Received: 05/27/94

% Moisture: 78

decanted: (Y/N) N

Date Extracted:05/29/94

Concentrated Extract Volume: 1000(UL)

Date Analyzed: 06/20/94

Injection Volume: 2.0(uL)

Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y

pH: 6.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	73000	U
100-02-7	4-Nitrophenol	73000	U
132-64-9	Dibenzofuran	30000	U
121-14-2	2,4-Dinitrotoluene	30000	U
84-66-2	Diethylphthalate	30000	U
7005-72-3	4-Chlorophenyl-phenylether	30000	U
86-73-7	Fluorene	30000	U
100-01-6	4-Nitroaniline	73000	U
534-52-1	4,6-Dinitro-2-methylphenol	73000	U
86-30-6	N-Nitrosodiphenylamine (1)	30000	U
101-55-3	4-Bromophenyl-phenylether	30000	U
118-74-1	Hexachlorobenzene	30000	U
87-86-5	Pentachlorophenol	73000	U
85-01-8	Phenanthrene	30000	U
120-12-7	Anthracene	30000	U
86-74-8	Carbazole	30000	U
84-74-2	Di-n-butylphthalate	30000	U
206-44-0	Fluoranthene	30000	U
129-00-0	Pyrene	2200	J
85-68-7	Butylbenzylphthalate	30000	U
91-94-1	3,3'-Dichlorobenzidine	30000	U
56-55-3	Benzo(a)anthracene	30000	U
218-01-9	Chrysene	30000	U
117-81-7	bis(2-Ethylhexyl)phthalate	30000 ~~15000~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	30000	U
205-99-2	Benzo(b)fluoranthene	30000	U
207-08-9	Benzo(k)fluoranthene	30000	U
50-32-8	Benzo(a)pyrene	30000	U
193-39-5	Indeno(1,2,3-cd)pyrene	30000	U
53-70-3	Dibenz(a,h)anthracene	30000	U
191-24-2	Benzo(g,h,i)perylene	30000	U

JV
7-19-94

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL515

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.05

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0450.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 78 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 1000(uL) Date Analyzed: 06/20/94

Injection Volume: 2.0(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) Y pH: 6.4

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

Number TICs found: 25

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.124~~	~~110000~~	~~NJA~~
2.	UNKNOWN ALKANE	8.669	60000	NJ
3.	UNKNOWN ALKANE	9.552	53000	J
4.	UNKNOWN ALKANE	13.374	51000	J
5.	UNKNOWN ALKANE	14.037	55000	J
6.	UNKNOWN ALKANE	15.645	26000	J
7.	UNKNOWN	15.853	40000	J
8.	UNKNOWN HYDROCARBON	16.210	30000	J
9.	UNKNOWN	16.383	26000	J
10.	UNKNOWN	16.441	39000	J
11.	UNKNOWN	16.776	63000	J
12.	UNKNOWN ALKANE	17.007	35000	J
13.	UNKNOWN ALKANE	17.157	37000	J
14.	UNKNOWN ALKANE	17.285	59000	J
15.	UNKNOWN	17.516	32000	J
16.	UNKNOWN ALKANE	17.701	62000	J
17.	UNKNOWN ALKANE	18.165	89000	J
18.	UNKNOWN ALKANE	18.362	100000	J
19.	UNKNOWN	18.583	96000	J
20.	UNKNOWN ALKANE	19.221	92000	J
21.	UNKNOWN	19.326	100000	J
22.	UNKNOWN	20.082	82000	J
23.	UNKNOWN ALKANE	20.303	110000	J
24.	UNKNOWN ALKANE	20.885	130000	J
25. 1058-61-3	Stigmast-4-en-3-one	21.873	81000	NJ
26.				
27.				
28.				
29.				
30.				

JR
7-19-94

SDUS4

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Union Slough

JL516

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.06

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0218.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	610	U
111-44-4	bis(2-Chloroethyl)Ether	610	U
95-57-8	2-Chlorophenol	610	U
541-73-1	1,3-Dichlorobenzene	610	U
106-46-7	1,4-Dichlorobenzene	610	U
95-50-1	1,2-Dichlorobenzene	610	U
95-48-7	2-Methylphenol	610	U
108-60-1	2,2'-oxybis(1-Chloropropane)	610	U
106-44-5	4-Methylphenol	610	U
621-64-7	N-Nitroso-di-n-propylamine	610	U
67-72-1	Hexachloroethane	610	U
98-95-3	Nitrobenzene	610	U
78-59-1	Isophorone	610	U
88-75-5	2-Nitrophenol	610	U
105-67-9	2,4-Dimethylphenol	610	U
111-91-1	bis(2-Chloroethoxy)methane	610	U
120-83-2	2,4-Dichlorophenol	610	U
120-82-1	1,2,4-Trichlorobenzene	610	U
91-20-3	Naphthalene	610	U
106-47-8	4-Chloroaniline	610	U
87-68-3	Hexachlorobutadiene	610	U
59-50-7	4-Chloro-3-Methylphenol	610	U
91-57-6	2-Methylnaphthalene	610	U
77-47-4	Hexachlorocyclopentadiene	610	J U
88-06-2	2,4,6-Trichlorophenol	610	U
95-95-4	2,4,5-Trichlorophenol	1500	U
91-58-7	2-Chloronaphthalene	610	U
88-74-4	2-Nitroaniline	1500	U
131-11-3	Dimethylphthalate	610	U
208-96-8	Acenaphthylene	610	U
606-20-2	2,6-Dinitrotoluene	610	U
99-09-2	3-Nitroaniline	1500	U
83-32-9	Acenaphthene	610	U

DL
7-19-94

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SDa54

EPA SAMPLE NO.

JL516

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.06

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0218.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1500	U
100-02-7	4-Nitrophenol	1500	U
132-64-9	Dibenzofuran	610	U
121-14-2	2,4-Dinitrotoluene	610	U
84-66-2	Diethylphthalate	610	U
7005-72-3	4-Chlorophenyl-phenylether	610	U
86-73-7	Fluorene	610	U
100-01-6	4-Nitroaniline	1500	U
534-52-1	4,6-Dinitro-2-methylphenol	1500	U
86-30-6	N-Nitrosodiphenylamine (1)	610	U
101-55-3	4-Bromophenyl-phenylether	610	U
118-74-1	Hexachlorobenzene	610	U
87-86-5	Pentachlorophenol	1500	U
85-01-8	Phenanthrene	610	U
120-12-7	Anthracene	610	U
86-74-8	Carbazole	610	U
84-74-2	Di-n-butylphthalate	610	U
206-44-0	Fluoranthene	610	U
129-00-0	Pyrene	610	U
85-68-7	Butylbenzylphthalate	610	U
91-94-1	3,3'-Dichlorobenzidine	610	U
56-55-3	Benzo(a)anthracene	610	U
218-01-9	Chrysene	610	U
117-81-7	bis(2-Ethylhexyl)phthalate	610 ~~400~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	610	U
205-99-2	Benzo(b)fluoranthene	610	U
207-08-9	Benzo(k)fluoranthene	610	U
50-32-8	Benzo(a)pyrene	610	U
193-39-5	Indeno(1,2,3-cd)pyrene	610	U
53-70-3	Dibenz(a,h)anthracene	610	U
191-24-2	Benzo(g,h,i)perylene	610	U

gr
7-19-94

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL516

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.06

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0218.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500 (uL) Date Analyzed: 06/03/94

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.0

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

Number TICs found: 19

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.548~~	~~97000~~	~~NJAB~~
2.	UNKNOWN ORGANIC ACID	12.256	770	NJ
3.	UNKNOWN ORGANIC ACID	12.728	720	J
4.	UNKNOWN	12.786	1600	J
5.	UNKNOWN HYDROCARBON	13.616	1700	J
6.	UNKNOWN ORGANIC ACID	13.731	2700	J
7.	UNKNOWN	13.917	880	J
8.	UNKNOWN	14.114	800	J
9.	UNKNOWN	14.357	560	J
10.	UNKNOWN	14.613	1300	J
11.	UNKNOWN	14.846	530	J
12.	UNKNOWN AMIDE	15.232	550	J
13.	UNKNOWN ALKANE	15.852	520	J
14.	UNKNOWN	16.062	1500	J
15.	UNKNOWN	16.203	610	J
~~16.~~	~~UNKNOWN AMIDE~~	~~16.367~~	~~1600~~	~~JB~~
17.	UNKNOWN	16.648	590	J
18.	UNKNOWN	17.035	1300	J
19.	UNKNOWN ALKANE	18.069	500	J
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I SV-TIC

DL
7-19-94

SSURBAK5

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
Surface background soil
JL517

Lab Name: SWL-TULSA   Contract: 68-D2-0013

Lab Code: SWOK   Case No.: 22170   SAS No.:   SDG No.: JL511

Matrix: (soil/water) SOIL   Lab Sample ID: 18854.07

Sample wt/vol: 30.0 (g/mL) G   Lab File ID: M0219.D

Level: (low/med) LOW   Date Received: 05/27/94

% Moisture: 24   decanted: (Y/N) N   Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL)   Date Analyzed: 06/03/94

Injection Volume: 2.0(uL)   Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y   pH: 4.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	430	U
111-44-4	bis(2-Chloroethyl)Ether	430	U
95-57-8	2-Chlorophenol	430	U
541-73-1	1,3-Dichlorobenzene	430	U
106-46-7	1,4-Dichlorobenzene	430	U
95-50-1	1,2-Dichlorobenzene	430	U
95-48-7	2-Methylphenol	430	U
108-60-1	2,2'-oxybis(1-Chloropropane)	430	U
106-44-5	4-Methylphenol	430	U
621-64-7	N-Nitroso-di-n-propylamine	430	U
67-72-1	Hexachloroethane	430	U
98-95-3	Nitrobenzene	430	U
78-59-1	Isophorone	430	U
88-75-5	2-Nitrophenol	430	U
105-67-9	2,4-Dimethylphenol	430	U
111-91-1	bis(2-Chloroethoxy)methane	430	U
120-83-2	2,4-Dichlorophenol	430	U
120-82-1	1,2,4-Trichlorobenzene	430	U
91-20-3	Naphthalene	430	U
106-47-8	4-Chloroaniline	430	U
87-68-3	Hexachlorobutadiene	430	U
59-50-7	4-Chloro-3-Methylphenol	430	U
91-57-6	2-Methylnaphthalene	430	U
77-47-4	Hexachlorocyclopentadiene	430	J U
88-06-2	2,4,6-Trichlorophenol	430	U
95-95-4	2,4,5-Trichlorophenol	1000	U
91-58-7	2-Chloronaphthalene	430	U
88-74-4	2-Nitroaniline	1000	U
131-11-3	Dimethylphthalate	430	U
208-96-8	Acenaphthylene	430	U
606-20-2	2,6-Dinitrotoluene	430	U
99-09-2	3-Nitroaniline	1000	U
83-32-9	Acenaphthene	430	U

FORM I SV-1   3/90

DL
7-19-94

1C
SEMIVOLATILE GANICS ANALYSIS DATA SHE

SSUR10AR?
(background surface soil)

EPA SAMPLE NO.
JL517

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.07

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0219.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 24 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 4.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1000	U
100-02-7	4-Nitrophenol	1000	U
132-64-9	Dibenzofuran	430	U
121-14-2	2,4-Dinitrotoluene	430	U
84-66-2	Diethylphthalate	430	U
7005-72-3	4-Chlorophenyl-phenylether	430	U
86-73-7	Fluorene	430	U
100-01-6	4-Nitroaniline	1000	U
534-52-1	4,6-Dinitro-2-methylphenol	1000	U
86-30-6	N-Nitrosodiphenylamine (1)	430	U
101-55-3	4-Bromophenyl-phenylether	430	U
118-74-1	Hexachlorobenzene	430	U
87-86-5	Pentachlorophenol	1000	U
85-01-8	Phenanthrene	430	U
120-12-7	Anthracene	430	U
86-74-8	Carbazole	430	U
84-74-2	Di-n-butylphthalate	32	J
206-44-0	Fluoranthene	430	U
129-00-0	Pyrene	430	U
85-68-7	Butylbenzylphthalate	430	U
91-94-1	3,3'-Dichlorobenzidine	430	U
56-55-3	Benzo(a)anthracene	430	U
218-01-9	Chrysene	430	U
117-81-7	bis(2-Ethylhexyl)phthalate	430 ~~160~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	430	U
205-99-2	Benzo(b)fluoranthene	430	U
207-08-9	Benzo(k)fluoranthene	430	U
50-32-8	Benzo(a)pyrene	430	U
193-39-5	Indeno(1,2,3-cd)pyrene	430	U
53-70-3	Dibenz(a,h)anthracene	430	U
191-24-2	Benzo(g,h,i)perylene	430	U

DL
7-19-94

1F
SEMIVOLATILE GANICS ANALYSIS DATA SHEE
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
JL517

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.07

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0219.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 24 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 4.4

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

Number TICs found: 21

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1.~~	~~UNKNOWN~~	~~2.079~~	~~1200~~	~~J~~
~~2. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.536~~	~~12000~~	~~NJAB~~
3.	UNKNOWN CYCLOALKANE	11.656	980	NJ
4.	UNKNOWN AMIDE	15.198	420	J
5.	UNKNOWN	15.742	1200	J
6.	UNKNONW ALKANE	15.823	670	J
7.	UNKNOWN	16.032	420	J
~~8.~~	~~UNKNOWN~~	~~16.333~~	~~2000~~	~~J~~
9.	UNKNOWN	16.624	480	J
10.	UNKNOWN	16.822	460	J
11.	UNKNOWN ALKANE	16.974	610	J
12.	UNKNOWN	17.020	920	J
13.	UNKNOWN	17.079	550	J
14.	UNKNOWN ALKANE	18.038	920	J
~~15.~~	~~UNKNOWN~~	~~18.460~~	~~670~~	~~J~~
16.	UNKNOWN AMIDE	18.601	1900	J
17.	UNKNOWN ALKANE	19.036	2100	J
18.	UNKNOWN	19.177	730	J
19.	UNKNOWN	20.000	4400	J
20.	UNKNOWN	21.294	410	J
21.	UNKNOWN	21.976	1200	J
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

DL 7-19-94

SSWODAK4

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

Background Sub soil

JL518

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.08

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0220.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 4.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	610	U
111-44-4	bis(2-Chloroethyl)Ether	610	U
95-57-8	2-Chlorophenol	610	U
541-73-1	1,3-Dichlorobenzene	610	U
106-46-7	1,4-Dichlorobenzene	610	U
95-50-1	1,2-Dichlorobenzene	610	U
95-48-7	2-Methylphenol	610	U
108-60-1	2,2'-oxybis(1-Chloropropane)	610	U
106-44-5	4-Methylphenol	610	U
621-64-7	N-Nitroso-di-n-propylamine	610	U
67-72-1	Hexachloroethane	610	U
98-95-3	Nitrobenzene	610	U
78-59-1	Isophorone	610	U
88-75-5	2-Nitrophenol	610	U
105-67-9	2,4-Dimethylphenol	610	U
111-91-1	bis(2-Chloroethoxy)methane	610	U
120-83-2	2,4-Dichlorophenol	610	U
120-82-1	1,2,4-Trichlorobenzene	610	U
91-20-3	Naphthalene	610	U
106-47-8	4-Chloroaniline	610	U
87-68-3	Hexachlorobutadiene	610	U
59-50-7	4-Chloro-3-Methylphenol	610	U
91-57-6	2-Methylnaphthalene	610	U
77-47-4	Hexachlorocyclopentadiene	610	J U
88-06-2	2,4,6-Trichlorophenol	610	U
95-95-4	2,4,5-Trichlorophenol	1500	U
91-58-7	2-Chloronaphthalene	610	U
88-74-4	2-Nitroaniline	1500	U
131-11-3	Dimethylphthalate	610	U
208-96-8	Acenaphthylene	610	U
606-20-2	2,6-Dinitrotoluene	610	U
99-09-2	3-Nitroaniline	1500	U
83-32-9	Acenaphthene	610	U

DL 7-19-94

1C

SEMIVOLATILE GANICS ANALYSIS DATA SHE

BSUBBAK EPA SAMPLE NO.

background subsurface soil

JL518

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.08

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0220.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 4.5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1500	U
100-02-7	4-Nitrophenol	1500	U
132-64-9	Dibenzofuran	610	U
121-14-2	2,4-Dinitrotoluene	610	U
84-66-2	Diethylphthalate	610	U
7005-72-3	4-Chlorophenyl-phenylether	610	U
86-73-7	Fluorene	610	U
100-01-6	4-Nitroaniline	1500	U
534-52-1	4,6-Dinitro-2-methylphenol	1500	U
86-30-6	N-Nitrosodiphenylamine (1)	610	U
101-55-3	4-Bromophenyl-phenylether	610	U
118-74-1	Hexachlorobenzene	610	U
87-86-5	Pentachlorophenol	1500	U
85-01-8	Phenanthrene	610	U
120-12-7	Anthracene	610	U
86-74-8	Carbazole	610	U
84-74-2	Di-n-butylphthalate	33	J
206-44-0	Fluoranthene	610	U
129-00-0	Pyrene	610	U
85-68-7	Butylbenzylphthalate	610	U
91-94-1	3,3'-Dichlorobenzidine	610	U
56-55-3	Benzo(a)anthracene	610	U
218-01-9	Chrysene	610	U
117-81-7	bis(2-Ethylhexyl)phthalate	610 ~~140~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	610	U
205-99-2	Benzo(b)fluoranthene	610	U
207-08-9	Benzo(k)fluoranthene	610	U
50-32-8	Benzo(a)pyrene	610	U
193-39-5	Indeno(1,2,3-cd)pyrene	610	U
53-70-3	Dibenz(a,h)anthracene	610	U
191-24-2	Benzo(g,h,i)perylene	610	U

DL
7-19-94

1F

SEMIVOLATILE GANICS ANALYSIS DATA SHE

TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL518

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.08

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0220.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 06/03/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 4.5

Number TICs found: 22

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

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.615~~	~~78000~~	~~NJA~~
2.	UNKNOWN	5.252	860	NJ
3.	UNKNOWN	11.640	1200	J
4.	UNKNOWN ALKANE	14.552	450	J
5.	UNKNOWN CYCLOALKANE	14.908	190	J
6.	UNKNOWN ALKANE	15.806	180	J
7.	UNKNOWN HYDROCARBON	16.025	270	J
~~8.~~	~~UNKNOWN~~	~~16.152~~	~~440~~	~~J~~
~~9.~~	~~UNKNOWN AMIDE~~	~~16.314~~	~~570~~	~~JB~~
10.	UNKNOWN ALDEHYDE	16.615	230	J
11.	UNKNOWN	16.870	200	J
12.	UNKNOWN ALKANE	18.031	340	J
13.	UNKNOWN ALKANE	19.035	1100	J
14.	UNKNOWN	19.163	430	J
15.	UNKNOWN ALKANE	19.984	380	J
16.	UNKNOWN	20.148	210	J
17.	UNKNOWN	20.324	270	J
18.	UNKNOWN ALKANE	21.087	220	J
19.	UNKNOWN	21.533	190	J
20.	UNKNOWN	21.873	180	J
21.	UNKNOWN	22.236	360	J
22.	UNKNOWN	22.482	400	J
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

DV
7-19-94

R01

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

JL519

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) WATER Lab Sample ID: 18854.09

Sample wt/vol: 1000 (g/mL) ML Lab File ID: HH3658.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: ______ decanted: (Y/N)___ Date Extracted: 05/28/94

Concentrated Extract Volume: 1000 (UL) Date Analyzed: 06/01/94

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis(2-Chloroethyl)Ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	1	J
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	2,2'-oxybis(1-Chloropropane)	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	6	J
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-Methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
99-09-2	3-Nitroaniline	25	U
83-32-9	Acenaphthene	10	U

FORM I SV-1

3/90

DL 7-17-94

300

1C

SEMIVOLATILE O NICS ANALYSIS DATA SHEET

JL519

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) WATER Lab Sample ID: 18854.09

Sample wt/vol: 1000 (g/mL) ML Lab File ID: HH3658.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: ______ decanted: (Y/N)___ Date Extracted:05/28/94

Concentrated Extract Volume: 1000(UL) Date Analyzed: 06/01/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.4

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
51-28-5	2,4-Dinitrophenol	25	U
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
534-52-1	4,6-Dinitro-2-methylphenol	25	U
86-30-6	N-Nitrosodiphenylamine (1)	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	25	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
86-74-8	Carbazole	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenz(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

7-19-94

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

ER01

EPA SAMPLE NO.

JL519

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) WATER Lab Sample ID: 18854.09

Sample wt/vol: 1000 (g/mL) ML Lab File ID: HH3658.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: ______ decanted: (Y/N)___ Date Extracted:05/28/94

Concentrated Extract Volume: 1000(uL) Date Analyzed: 06/01/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.4

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

Number TICs found: 7

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1.~~	~~UNKNOWN~~	~~2.042~~	~~6~~	~~JB~~
~~2.~~	~~UNKNOWN~~	~~2.084~~	~~4~~	~~JB~~
~~3.~~	~~UNKNOWN~~	~~2.198~~	~~2~~	~~JB~~
~~4.~~	~~UNKNOWN~~	~~2.229~~	~~3~~	~~JB~~
~~5.~~	~~UNKNOWN~~	~~2.322~~	~~3~~	~~JB~~
~~6.~~	~~UNKNOWN~~	~~4.116~~	~~8~~	~~JB~~
7.	UNKNOWN	10.326	2	NJ
8.				
9.				
10.				
11.				
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FORM I SV-TIC 3/90

302

7-19-94

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET SUSBK5

Union Slough Background

EPA SAMPLE NO.

JL520

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.10

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0241.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted: 05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/07/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	610	U
111-44-4	bis(2-Chloroethyl)Ether	610	U
95-57-8	2-Chlorophenol	610	U
541-73-1	1,3-Dichlorobenzene	610	U
106-46-7	1,4-Dichlorobenzene	610	U
95-50-1	1,2-Dichlorobenzene	610	U
95-48-7	2-Methylphenol	610	U
108-60-1	2,2'-oxybis(1-Chloropropane)	610	U
106-44-5	4-Methylphenol	140	J
621-64-7	N-Nitroso-di-n-propylamine	610	U
67-72-1	Hexachloroethane	610	U
98-95-3	Nitrobenzene	610	U
78-59-1	Isophorone	610	U
88-75-5	2-Nitrophenol	610	U
105-67-9	2,4-Dimethylphenol	610	U
111-91-1	bis(2-Chloroethoxy)methane	610	U
120-83-2	2,4-Dichlorophenol	610	U
120-82-1	1,2,4-Trichlorobenzene	610	U
91-20-3	Naphthalene	610	U
106-47-8	4-Chloroaniline	610	U
87-68-3	Hexachlorobutadiene	610	U
59-50-7	4-Chloro-3-Methylphenol	610	U
91-57-6	2-Methylnaphthalene	610	U
77-47-4	Hexachlorocyclopentadiene	610	J U
88-06-2	2,4,6-Trichlorophenol	610	U
95-95-4	2,4,5-Trichlorophenol	1500	U
91-58-7	2-Chloronaphthalene	610	U
88-74-4	2-Nitroaniline	1500	U
131-11-3	Dimethylphthalate	610	U
208-96-8	Acenaphthylene	610	U
606-20-2	2,6-Dinitrotoluene	610	U
99-09-2	3-Nitroaniline	1500	U
83-32-9	Acenaphthene	610	U

FORM I SV-1

3/90

DV 7-19-94

1C
SEMIVOLATILE GANICS ANALYSIS DATA SHE

EPA SAMPLE NO.

SBu33K5

JL520

Lab Name: SWL-TULSA Contract: 68-D2-0013

Clinton Slough Background

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.10

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0241.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(UL) Date Analyzed: 06/07/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.3

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1500	U
100-02-7	4-Nitrophenol	1500	U
132-64-9	Dibenzofuran	610	U
121-14-2	2,4-Dinitrotoluene	610	U
84-66-2	Diethylphthalate	34	J
7005-72-3	4-Chlorophenyl-phenylether	610	U
86-73-7	Fluorene	610	U
100-01-6	4-Nitroaniline	1500	U
534-52-1	4,6-Dinitro-2-methylphenol	1500	U
86-30-6	N-Nitrosodiphenylamine (1)	610	U
101-55-3	4-Bromophenyl-phenylether	610	U
118-74-1	Hexachlorobenzene	610	U
87-86-5	Pentachlorophenol	1500	U
85-01-8	Phenanthrene	74	J
120-12-7	Anthracene	610	U
86-74-8	Carbazole	610	U
84-74-2	Di-n-butylphthalate	42	J
206-44-0	Fluoranthene	110	J
129-00-0	Pyrene	130	J
85-68-7	Butylbenzylphthalate	610	U
91-94-1	3,3'-Dichlorobenzidine	610	U
56-55-3	Benzo(a)anthracene	610	U
218-01-9	Chrysene	610	U
117-81-7	bis(2-Ethylhexyl)phthalate	610 ~~540~~	U ~~JB~~
117-84-0	Di-n-octylphthalate	610	U
205-99-2	Benzo(b)fluoranthene	610	U
207-08-9	Benzo(k)fluoranthene	610	U
50-32-8	Benzo(a)pyrene	610	U
193-39-5	Indeno(1,2,3-cd)pyrene	610	U
53-70-3	Dibenz(a,h)anthracene	610	U
191-24-2	Benzo(g,h,i)perylene	610	U

9L
7-19-94

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

JL520

Lab Name: SWL-TULSA Contract: 68-D2-0013

Lab Code: SWOK Case No.: 22170 SAS No.: SDG No.: JL511

Matrix: (soil/water) SOIL Lab Sample ID: 18854.10

Sample wt/vol: 30.0 (g/mL) G Lab File ID: M0241.D

Level: (low/med) LOW Date Received: 05/27/94

% Moisture: 46 decanted: (Y/N) N Date Extracted:05/29/94

Concentrated Extract Volume: 500(uL) Date Analyzed: 06/07/94

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.3

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

Number TICs found: 25

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
~~1. 123-42-2~~	~~2-Pentanone, 4-hydroxy-4-met~~	~~3.745~~	~~18000~~	~~NJA~~
2.	UNKNOWN	13.084	1100	NJ
3.	UNKNOWN	13.402	1100	J
4.	UNKNOWN ORGANIC ACID	13.846	1300	J
5.	UNKNOWN ORGANIC ACID	13.960	2000	J
6.	UNKNOWN	15.203	1400	J
7.	2-Phenanthrenol, -octa	16.542	1200	J
8.	UNKNOWN	17.954	3200	J
9.	UNKNOWN ALKANE	18.345	4900	J
10.	UNKNOWN AMIDE	18.874	1000	J
11.	UNKNOWN ALDEHYDE	19.081	1700	J
12.	UNKNOWN ALKANE	19.334	1700	J
13.	UNKNOWN ALCOHOL	19.381	1100	J
14.	UNKNOWN ALDEHYDE	20.072	1000	J
15.	UNKNOWN	20.233	680	J
16.	UNKNOWN	20.325	680	J
17.	UNKNOWN	20.394	1400	J
18.	UNKNOWN	20.728	980	J
19.	UNKNOWN	20.982	1200	J
20.	UNKNOWN	21.074	820	J
21.	UNKNOWN	21.269	910	J
22.	UNKNOWN	21.695	1100	J
23.	UNKNOWN	21.891	1100	J
24.	UNKNOWN	22.294	4600	J
25.	UNKNOWN	22.386	1100	J
26.				
27.				
28.				
29.				
30.				

DL
7-19-94

64160.11.60.641
27.a

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

RECEIVED
AUG - 5 1994
URS CONSULTANTS

REPLY TO
ATTN OF: ES-095

August 4, 1994

MEMORANDUM

SUBJECT: Data Validation for Buse Timber SI, SAS No. 8404J-01, SDG No. 94214115, Chlorinated Phenols Analysis

FROM: Donald Matheny, Chemist
Quality Assurance Office, ESD

TO: Dave Bennett, Site Manager
Superfund Response & Investigations Branch, HWD

The QA Office has received and is transmitting the above ESAT data validation report.

CC: Porter Lombard, ESAT-RSCC
✓ Jeff Kesner, Site Lead, URS
Bruce Woods, TPO, Region 10

ENVIRONMENTA SERVICE ASSISTANCE EAMS - ZONE 2

ICF Technology Inc.
ManTech Environmental

ESAT Region 10
ICF Technology Inc.
Suite 1510
1200 6th Avenue
Seattle, WA 98101
Phone (206) 224-4161

MEMORANDUM

DATE: July 28, 1994

TO: Jerry Muth, RPO, USEPA, Region 10

Donald Matheny, Task Monitor, USEPA, Region 10

THROUGH: Barry Pepich, ESAT Team Manager, Region 10

David J. Lindquist

FROM: David J. Lindquist, ESAT Data Reviewer

SUBJECT: Data Validation Report of Chlorinated Phenols Analyses of Samples from Buse Timber Site Investigation
SAS: 8404J-01 SDG: 94214115

TID#: 10-9404-430
DOC#: ESAT-10B-7502
WUD#: 2351

The quality assurance (QA) review of nine (9) soil samples and one water sample collected from the above referenced site has been completed. These samples were analyzed for phenol, 2-chlorophenol, 2,6-dichlorophenol, 4-chloro-3-methylphenol, 2,4-dichlorophenol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, o-phenylphenol and pentachlorophenol via Method 8040A, "Phenols by Gas Chromatography" by Pacific Analytical, Inc. of Carlsbad, California. The samples were numbered as follows:

94214115	94214116	94214117	94214118	94214119
94214120	94214121	94214122	94214123	94214124

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in Method 8040A, "Phenols by Gas Chromatography" found in "Test Methods for Evaluating Solid Waste (SW-846)", the technical instructions specified in Special Analytical Services (SAS) Request 8404J-01 and the "National Functional Guidelines for Organic Data Review, 2/94".

The conclusions presented herein are based on the information provided for the review.

1. Timeliness - Acceptable

All of the samples were extracted and analyzed within the SAS specified holding times. In addition, the water sample met the technical (40 CFR 136 water criteria) holding time criteria.

The Extraction Logs indicate that the samples underwent extraction, acid/base cleanup, pentafluorobenzylbromide derivatization, GPC and silica gel cleanup as specified by the SAS request.

Listed below are pertinent sample collection, extraction and analysis dates.

Sample Number	Collection Date	Rec'd. Date	Extraction Date	Preparation* Date	Sample Analysis
94214115	052594	052794	060694	062794	070794
94214116	052594	052794	060694	062794	070794
94214117	052594	052794	060694	062794	070794
94214118	052594	052794	060694	062794	070794
94214119	052594	052794	060694	062794	070794
94214120	052594	052794	060694	062794	070794
94214121	052594	052794	060694	062794	070794
94214122	052594	052794	060694	062794	070794
94214123	052594	052794	060194	062794	070894
94214124	052594	052794	060694	062794	070794

* Silica gel cleanup. Acid/base partition and derivatization were performed on 062194 and 062394.

2. Initial Calibration

The SAS specified QC criteria were met for the initial calibration.

A five point initial calibration curve was analyzed for all target compounds and surrogates in accordance with the SAS request. The percent relative standard deviations (%RSDs) were within the SAS specified level (<30%) and ranged from 6.7 - 24.8% for all target compounds and surrogates for both of the columns used.

The %RSDs between the retention times of the different standards ranged from 0.05 - 0.12%.

For the surrogate, 2,4,6-tribromophenol, the low standard response factor associated with the DB-608 Megabore column was not used. Therefore, the 2,4,6-tribromophenol quantitation limit warrants elevation for this column.

2,6-Dichlorophenol and 4-chloro-3-methylphenol co-eluted on the DB-608 column (see section 7 for qualifications).

3. Continuing Calibration

The SAS specified the analysis of a continuing calibration verification (CCV) standard every ten samples at a concentration approximately equal to half the instrument calibration range. The relative percent difference (RPD) between the CCV response factors (RFs) and the mean RF associated with the initial calibration was required to be less than 25%.

Two CCVs were performed meeting the above continuing calibration criteria. However, the RPDs were calculated using the mid-range standard (.01 ppm) RF from the initial calibration rather than the mean RF. The data was not qualified on this basis.

2,6-Dichlorophenol and 4-chloro-3-methylphenol co-eluted on the DB-608 column (see section 7 for qualifications) .

The RPDs for all compounds ranged from 3 - 23% on the DB-608 column and 1 - 24% on the DB-5 column.

4. Blanks

The method blank frequency of analysis criterion was met. The target compounds were not detected in the method blanks at levels greater than the detection limits with the following exceptions:

Soil Sample Method Blank	Compound
5394PB	pentachlorophenol

Water Sample Method Blanks	Compound
5370PB 5371PB	2,6-dichlorophenol

Detected pentachlorophenol and 2,6-dichlorophenol results were qualified as non-detected, "U", if the sample result area integration was below five times that of the associated method blank. The following detected target compound results are qualified as non-detected, "U", based on the associated method blank results:

pentachlorophenol -	94214115	94214116	94214120
2,6-dichlorophenol -	94214123		

5. Surrogate Recovery

The raw data was compared with the data presented in the surrogate recovery form. All of the surrogate recoveries were within the control limits (50-150%) with the following exceptions:

Sample	2-fluorophenol %R	2,4,6-tribromophenol %R
94214116	210	160
94214120	240	170
94214123		46

The high surrogate recoveries indicate the possibility of high bias. Therefore, the following compounds detected in samples 94214116 and 94214120 are qualified estimated (J):

Sample		
94214116	-	2,6-dichlorophenol
94214120	-	2,6-dichlorophenol, 2,4,6-trichlorophenol, o-phenylphenol

The reviewer deemed not to qualify compounds associated with the low surrogate recovery of 2,4,6-tribromophenol on the basis that the percent recovery was just slightly lower than the control limit and the 2-fluorophenol percent recovery was within the control limits.

For the remaining samples the 2-fluorophenol recoveries ranged from 70 - 130% and the 2,4,6-tribromophenol recoveries ranged from 60 - 90%.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) - Acceptable

The frequency and percent recovery criteria for MS/MSD analysis were met. The values reported on the matrix spike/matrix spike duplicate recovery form were verified with the raw data. The MS and MSD analyses yielded recovery results that were within the SAS specified control limits for all target compounds. The recoveries ranged from 70% to 130% and the RPDs between matrix spike duplicate results ranged 0% to 55%.

7. Compound Identification

The chromatograms and quantitation lists were inspected.

2,6-Dichlorophenol and 4-chloro-3-methylphenol co-eluted on the DB-608 column. Positive results for these compounds cannot be confirmed due to co-elution on the confirmation column. Therefore, the following sample results are qualified, "JN" (tentatively identified at an estimated concentration):

2,6-dichlorophenol -	94214115	94214116	94214117	94214119
	94214120	94214121	94214122	94214124
p-chloro-m-cresol -	94214117	94214119	94214123	

Calculations were checked with the raw data. Calculations were correct. There were no transcription errors observed between the raw data and the reported results.

8. Compound Quantitation and Detection Limits

The response factor from the mid-range initial calibration was used for quantitation. Both columns were used for quantitation and confirmation of the compounds.

A method detection limit (MDL) study prior to sample analysis indicated that the SAS specified detection limits were achievable.

The raw data was examined to verify the calculations of sample results and the reported detection limits. The calculations were correct and conformed with the SAS and method required detection limits.

9. Laboratory Contact

The laboratory was contacted on 07/28/94 requesting that the Form 1s be re-submitted with the sample results reported on a dry weight basis.

The Form 1s were received on 08/02/94 and included with the CSF (purge file).

10. Overall Assessment

Approximately fifteen percent of the total data points were qualified as estimated due to high surrogate recoveries and/or identification problems. All of the standards, samples and QC samples were analyzed in accordance with the SAS specified method with exceptions previously noted.

DATA QUALIFIER DEFINITIONS

U- The analyte was analyzed for and is <u>not present</u> above the level of the associated value. The associated numerical value indicates the approximate concentration necessary to detect the analyte in this sample.

If a decision requires quantitation of the analyte below the associated numerical level, reanalysis or alternative analytical methods should be considered. The technical staff is available to discuss available options.

J- The analyte was analyzed for and was <u>positively identified</u>, but the associated numerical value may not be consistent with the amount actually present in the environmental sample. <u>The data should be seriously considered for decision making and are usable for many purposes.</u>

A subscript may be appended to the "J" that indicates which of the following quality control criteria were not met:

1 Blank contamination: indicates <u>possible</u> high bias and/or false positives.

2 Calibration range exceeded: indicates possible low bias.

3 Holding times not met: indicates low bias for most analytes with the exception of common laboratory contaminants and chlorinated ethenes (i.e.: trichloroethene, 1,1-dichloroethene, vinyl chloride).

4 Other QC outside control limits: bias not readily determined.

R- <u>The data are unusable for all purposes</u>. The analyte was analyzed for, but the presence or absence of the analyte has not been verified.

Resampling and reanalysis are necessary to confirm or deny the presence of the analyte.

UJ - A combination of the "U" and "J" qualifier. The analyte was analyzed for and was not present above the level of the associated value. The associated numerical value may not accurately or precisely represent the concentration necessary to detect the analyte in this sample.

If a decision requires quantitation of the analyte close to the associated numerical level, reanalysis or alternative analytical methods should be considered.

N- The analysis indicates that <u>an</u> analyte is present, and there are strong indications that the identity is correct.

Confirmation of the analyte requires further analysis.

NJ- A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

A subscript may be appended to the "NJ" that indicates which of the following situations applies:

1 DDT/Endrin breakdown evident.

2 Interference from other sample components.

3 Non-Target Compound List (TCL) compounds (Confirmation is necessary using specific target compound methodology to accurately determine the concentration and identity of the detected compound).

4 A confirmation analysis was missing or quality control criteria were not met for the confirmation analysis.

NOTE: Data users are encouraged to contact their Regional representative within ESD to clarify or obtain further information on the appropriate use of analytical data.

FORM 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

94214115

SSURO01

on site
shallow
soil

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ___ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL

Lab Sample ID: 89401

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 26

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	74	
108-95-2	Phenol	14	U
95-57-8	2-Chlorophenol	14	U
87-65-0	2,6-Dichlorophenol	27	JN
59-50-7	p-Chloro-m-Cresol	14	U
120-83-2	2,4-Dichlorophenol	14	U
88-06-2	2,4,6-Trichlorophenol	14	U
95-95-4	2,4,5-Trichlorophenol	14	U
90-43-7	o-Phenylphenol	14	U
96-11-7	2,4,6-Tribromophenol	61	
87-86-5	Pentachlorophenol	7	~~J~~ U

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

JV
8-2-94

FORM 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

94214116

SSUB

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: _____ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL Lab Sample ID: 89402

Dec [illegible] Soil

Sample weight: 50.0 (G/mL) Grams Date Received: 05/27/94

Final Extract Volume: 250 (mL) Date Extracted: 06/06/94

Injection Volume: 2 (uL) Date Analyzed: 07/07/94

% Moisture: 35

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	162	
108-95-2	Phenol	15	U
95-57-8	2-Chlorophenol	15	U
87-65-0	2,6-Dichlorophenol	8 ~~8~~ ~~15~~ gr	NJ ~~J~~ ~~U~~ gr
59-50-7	p-Chloro-m-Cresol	15	U
120-83-2	2,4-Dichlorophenol	15	U
88-06-2	2,4,6-Trichlorophenol	15	U
95-95-4	2,4,5-Trichlorophenol	15	U
90-43-7	o-Phenylphenol	15	U
96-11-7	2,4,6-Tribromophenol	123	
87-86-5	Pentachlorophenol	8	~~J~~ U

Flags:
U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

FORM I

gr 8-4-94

FORM 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

94214117

SDPRNI

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ______ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL

Lab Sample ID: 89403

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 37

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	79	
108-95-2	Phenol	16	U
95-57-8	2-Chlorophenol	16	U
87-65-0	2,6-Dichlorophenol	16	JN
59-50-7	p-Chloro-m-Cresol	8	JN
120-83-2	2,4-Dichlorophenol	16	J
88-06-2	2,4,6-Trichlorophenol	16	U
95-95-4	2,4,5-Trichlorophenol	16	J
90-43-7	o-Phenylphenol	32	
96-11-7	2,4,6-Tribromophenol	63	
87-86-5	Pentachlorophenol	71	

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

94214118

5P503

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: _____ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL

Lab Sample ID: 89404

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 82

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	194	
108-95-2	Phenol	56	U
95-57-8	2-Chlorophenol	56	U
87-65-0	2,6-Dichlorophenol	56	U
59-50-7	p-Chloro-m-Cresol	56	U
120-83-2	2,4-Dichlorophenol	56	U
88-06-2	2,4,6-Trichlorophenol	56	U
95-95-4	2,4,5-Trichlorophenol	56	U
90-43-7	o-Phenylphenol	56	U
96-11-7	2,4,6-Tribromophenol	167	
87-86-5	Pentachlorophenol	56	U

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.
94214119
SDSD2

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ____ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL

Lab Sample ID: 89405

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 77

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	217	
108-95-2	Phenol	43	U
95-57-8	2-Chlorophenol	43	U
87-65-0	2,6-Dichlorophenol	109	J N
59-50-7	p-Chloro-m-Cresol	22	J N
120-83-2	2,4-Dichlorophenol	43	U
88-06-2	2,4,6-Trichlorophenol	43	U
95-95-4	2,4,5-Trichlorophenol	43	U
90-43-7	o-Phenylphenol	43	J
96-11-7	2,4,6-Tribromophenol	130	
87-86-5	Pentachlorophenol	109	

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM I

FO... 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.
4120
9421~~420~~
SDUS4

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ______ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL

Lab Sample ID: 89406

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 50

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	240	
108-95-2	Phenol	20	U
95-57-8	2-Chlorophenol	20	U
87-65-0	2,6-Dichlorophenol	40	J N
59-50-7	p-Chloro-m-Cresol	20	U
120-83-2	2,4-Dichlorophenol	20	U
88-06-2	2,4,6-Trichlorophenol	10	J
95-95-4	2,4,5-Trichlorophenol	20	U
90-43-7	o-Phenylphenol	20	J
96-11-7	2,4,6-Tribromophenol	170	
87-86-5	Pentachlorophenol	10	~~J~~ U

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM I

FO 1

METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

4121
9421~~421~~

SURBAK3

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ______ SAS No.: 8404J01 SDG No.: 94214115

Finder 6"

Matrix Type: SOIL

Lab Sample ID: 89407

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 25

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	73	
108-95-2	Phenol	13	U
95-57-8	2-Chlorophenol	13	U
87-65-0	2,6-Dichlorophenol	27	JN
59-50-7	p-Chloro-m-Cresol	13	U
120-83-2	2,4-Dichlorophenol	13	U
88-06-2	2,4,6-Trichlorophenol	13	U
95-95-4	2,4,5-Trichlorophenol	13	U
90-43-7	o-Phenylphenol	13	U
96-11-7	2,4,6-Tribromophenol	60	
87-86-5	Pentachlorophenol	13	U

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM I

FC 1

METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

4122
9421~~422~~

SuBBAK4

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ______ SAS No.: 8404J01 SDG No.: 94214115 (18' to 20'

Matrix Type: SOIL

Lab Sample ID: 89408

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 65

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	129	
108-95-2	Phenol	29	U
95-57-8	2-Chlorophenol	29	U
87-65-0	2,6-Dichlorophenol	14	J N
59-50-7	p-Chloro-m-Cresol	29	U
120-83-2	2,4-Dichlorophenol	29	U
88-06-2	2,4,6-Trichlorophenol	29	U
95-95-4	2,4,5-Trichlorophenol	29	U
90-43-7	o-Phenylphenol	29	U
96-11-7	2,4,6-Tribromophenol	100	
87-86-5	Pentachlorophenol	29	U

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM I

METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.

4123
9421~~423~~

ER01

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF ~~Case~~ No.: ______ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: WATER

Lab Sample ID: 89409

Sample weight: ~~1000~~.0 (G/mL) mL

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/01/94

Injection Volume: 2 (uL)

Date Analyzed: 07/08/94 esp

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/L	Q
367-12-4	2-Fluorophenol	4.0	
08-95-2	Phenol	0.3	J
95-57-8	2-Chlorophenol	0.5	U
87-65-0	2,6-Dichlorophenol	0.3	~~J~~ U
59-50-7	p-Chloro-m-Cresol	0.3	J N
20-83-2	2,4-Dichlorophenol	0.5	U
8-06-2	2,4,6-Trichlorophenol	0.5	U
5-95-4	2,4,5-Trichlorophenol	0.5	U
0-43-7	o-Phenylphenol	0.5	U
6-11-7	2,4,6-Tribromophenol	~~2.3~~	
7-86-5	Pentachlorophenol	0.5	U

ug/L

Flags:
U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

8-4-94

FORM 1
METHOD 8040A - PFBBr DERIVATIVES OF PHENOLS

EPA SAMPLE NO.
94214124
5 BUSBKS

Lab Name: Pacific Analytical, Inc.

Lab Code: PACIF Case No.: ________ SAS No.: 8404J01 SDG No.: 94214115

Matrix Type: SOIL

Lab Sample ID: 89410

Sample weight: 50.0 (G/mL) Grams

Date Received: 05/27/94

Final Extract Volume: 250 (mL)

Date Extracted: 06/06/94

Injection Volume: 2 (uL)

Date Analyzed: 07/07/94

% Moisture: 44

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kG) uG/kG	Q
367-12-4	2-Fluorophenol	89	
108-95-2	Phenol	18	U
95-57-8	2-Chlorophenol	18	U
87-65-0	2,6-Dichlorophenol	18	J N
59-50-7	p-Chloro-m-Cresol	18	U
120-83-2	2,4-Dichlorophenol	18	U
88-06-2	2,4,6-Trichlorophenol	18	U
95-95-4	2,4,5-Trichlorophenol	18	U
90-43-7	o-Phenylphenol	18	U
96-11-7	2,4,6-Tribromophenol	45	
87-86-5	Pentachlorophenol	18	U

Flags: U - Undetected at or above the listed value.
P - Value differs by more than 25% for confirmation analysis.

gl
8-4-94

FORM I

APPENDIX D

DATA QUALITY OBJECTIVES

Appendix D
Table D-1
Data Quality Objectives for RAS Soil Samples

Analysis	Method[a]	Targeted Detection Limit[b]	Actual Detection Limits	Units[c]	Target Accuracy[d]	Actual Accuracy	Target Precision[e]	Actual Precision	Target Completeness[f]	Actual Completeness
SVs	CLP-RAS	330-800	430-73,000	μg/kg	11-142%	38-120%	50%	26%[i]	90%	90%
PCBs	CLP-RAS	1.7-170	55-150	μg/kg	23-139%	48-170%	50%	8%	90%	90%
Inorganics	CLP-RAS	0.6-100	0.05-6	mg/kg	75-125%	75-125%	20%	20%	90%	90%
Mercury[g]	CLP-RAS	0.10	0.02	mg/kg	75-125%	75-125%	20%	20%	90%	90%

[a] Methods for analyses as defined in U.S. EPA 1990a, 1990b.
[b] Calculated from laboratory reporting limits.
[c] Units reported in mass/mass unless otherwise indicated.
[d] Calculated from laboratory attainable control limits through analytical surrogate or matrix spike recovery and laboratory QC.
[e] Calculated from laboratory relative percent difference between results of field replicate samples or through matrix duplicates.
[f] Calculated from comparing planned and actual analytical results, including analyte rejections and work plan deviations.
[g] Mercury listed separately due to specific target detection limit.
[h] Antimony recovery was 0 percent in both quality assurance samples. Data were qualified appropriately.
[i] Data were not qualified on this basis.

RAS soil sample data quality objectives were met or exceeded for all inorganics and mercury analyses. RAS soil sample data quality objectives for SVs and PCBs were met for completeness and exceeded for precision. Target detection limits were not met by the laboratory for either SVs or PCBs. The detection limits also had high variability within and among samples. Higher than expected detection limits make comparison of relatively low detections with sample results for which analytes were not detected at higher detection limits difficult. PCB accuracy targets were not met for RAS soil samples. Surrogate recoveries were high for some of the samples; however, data quality is not believed to have been affected.

Appendix D
Table D-2
Data Quality Objectives for RAS Water Samples

Analysis	Method[a]	Targeted Detection Limit[b]	Actual Detection Limit	Units[c]	Target Accuracy[d]	Actual Accuracy	Target Precision[e]	Actual Precision	Target Completeness[f]	Actual Completeness
SVs	CLP-RAS	10-25	10-25	μg/L	9-145%	No data quality information provided by laboratory	50%	No data quality information provided by laboratory	90%	No data quality information provided by laboratory
PCBs	CLP-RAS	0.05-1.0	0.11-0.20	μg/L	38-127%	96-100%	30%	4.1%	90%	100%
Inorganics	CLP-RAS	0.003-5.0	0.05-6.0	mg/L	75-125%	75-125%[h]	20%	20%	90%	100%
Mercury[g]	CLP-RAS	0.0002	0.02	mg/L	75-125%	75-125%	20%	20%	90%	100%

[a] Methods for analyses as defined in U.S. EPA 1990a, 1990b.
[b] Calculated from laboratory reporting limits.
[c] Units reported in mass/mass unless otherwise indicated.
[d] Calculated from laboratory attainable control limits through analytical surrogate or matrix spike recovery and laboratory quality control (QC).
[e] Calculated from laboratory relative percent difference between results of field replicate samples or through matrix duplicates.
[f] Calculated from comparing planned and actual analytical results, including analyte rejections and work plan deviations.
[g] Mercury listed separately due to specific target detection limit.
[h] Antimony recovery was 0 percent in both quality assurance samples. Data were qualified appropriately.

Data quality objectives were met for RAS water samples with the exception of the inorganics and mercury detection limits. The laboratory reported all inorganics detection limits within targets except for selenium. The mercury detection limit was reported by the laboratory at 0.020 mg/L, 100 times the target detection limit. Data quality was not apparently affected.

Appendix D
Table D-3
Data Quality Objectives for SAS Soil and Water Samples

Matrix	Analysis	Method	Target Detection Limit[a]	Actual Detection Limit	Target Precision[b]	Actual Precision	Target Accuracy[c]	Actual Accuracy	Target Completion[d]	Actual Completeness
Soil	SV	CLP-SAS	4.0-600 μg/kg	13-56 μg/kg	60%	0-55%	20-140%	46-240%[e]	90%	90%
Water	SV	CLP-SAS	0.6-10 μg/L	0.5 μg/L	60%	No data quality information provided by laboratory	20-140%	No data quality information provided by laboratory	90%	100%

[a] Calculated from laboratory reporting limits.
[b] Calculated from laboratory relative percent difference between results of field duplicate samples or through matrix duplicates.
[c] Calculated from laboratory attainable control limits through analytical surrogate or MS recovery and laboratory QC.
[d] Calculated from comparing planned and actual analytical results, including analyte rejections and work plan deviations.
[e] Data outside laboratory control limits were qualified appropriately.

Data quality objectives were met or exceeded for all soil targets. Water sample data quality objectives were met for detection limit, but information concerning the other aspects of data quality was not provided by the laboratory. Target completeness is exceeded.

Attachment C

Britewood^{TM} XL Sapstain Control Safety Data Sheet

Section 1 – Product and Company Information

Product Identifiers	
Name	BRITEWOOD™ XL, Sapstain Control, EPA Registration #57227-3
Brand	Contechem
Product Use	Formulated for Industrial Use Only
Supplier	
Name	U-C Coatings, LLC
Address	P.O. Box 1066, Buffalo, NY 14215 www.uccoatings.com
Telephone	(716) 833-9366
Emergency Phone	**(888) 363-2628**

Section 2 – Hazard Identification

Classification of the substance or mixture	
Physical Hazards	Flammable liquids (Category 4), Combustible liquid.
Health Hazards	Acute toxicity, Oral (Category 3), Toxic if swallowed. Skin Corrosion / Irritation (Category 2), Causes skin irritation. Eye Damage / Irritation (Category 2A), Causes serious eye irritation.
Environmental Hazards	Acute aquatic toxicity (Category 2), Toxic to aquatic life. Chronic aquatic toxicity (Category 3), Harmful to aquatic life with long lasting effects.
GHS label elements and precautionary statements	
Pictograms	Corrosive - Exclamation Mark - Environment
Signal word	**WARNING**
Prevention	Keep away from heat, sparks, open flames and hot surfaces. No smoking. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands or other contact areas thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. IF SWALLOWED: Immediately call a POISON CENTER/doctor/ Seek immediate medical attention if you feel unwell. Rinse mouth. Specific treatment is shown in Section 4: First Aid Measures. Rinse mouth. IF ON SKIN: Wash with plenty of water. If skin irritation persists: Get medical advice/ attention. Take off contaminated clothing and wash it before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/ attention. In case of fire: Use dry chemical, foam or water fog to extinguish. Do not use direct water stream. Collect spillage.
Storage	Store locked up. Store in a well-ventilated place.
Disposal	Dispose of container or contents in accordance with all regulations.
Hazards not otherwise classified (HNOC) or not covered by GHS.	
	HMIS Rating: Health hazard: 3 Chronic Health Hazard: Flammability: 1 Physical Hazard 0 NFPA Rating: Health hazard: 3 Fire Hazard: 2 Reactivity Hazard: 0
Supplemental information.	
	Alphanumeric H-Statements and P-Statements in Section 16.

Section 3 – Composition/Information on Ingredients

Component	**CAS Number**	**Wt. %**
Didecyl dimethyl ammonium chloride	7173-51-5	46.25
Propiconazole	60207-90-1	4.94
Ethyl alcohol	64-17-5	3-5

Section 4 – First Aid Measures

Description of first aid measures

General advice: Move out of dangerous area. Consult a physician. Show this safety data sheet to the doctor and first responders. Added information for exposure:

In case of eye contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/ attention.

In case of skin contact: Wash with plenty of water. Take off all contaminated clothing. Wash contaminated clothing before reuse. Seek immediate medical attention if you feel unwell.

If inhaled: Remove person to fresh air and keep comfortable for breathing. Contact a POISON CENTER/doctor/see immediate medical attention.

If swallowed: Immediately call a POISON CENTER/doctor/ Seek immediate medical attention. Specific treatment is shown. Rinse mouth.

Most important symptoms and effects, both acute and delayed: See Sections 2 and 11.
Indication of any immediate medical attention and special treatment needed: No data available.

Section 5 – Firefighting Measures

Extinguishing Media
Suitable Extinguishing Media: Use dry chemical, foam or water fog to extinguish.
Unsuitable Extinguishing Media: Do not use direct water stream.
Special hazards arising from the substance or mixture: Use water spray to cool fire exposed container surfaces and to protect personnel. Thermal decomposition can produce carbon monoxide (highly toxic) and carbon dioxide (an asphyxiant at sufficient concentrations).
Advice for firefighters: Wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. (MSHA/NIOSH approved or equivalent).
Further information: If employees are expected to fight fires, training and equipment information can be found in OSHA Fire Brigades Standard (29 CFR 1910.156).

Section 6 – Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Avoid breathing dust, fume/gas/mist/spray.
Environmental precautions: Avoid release to the environment.
Methods and materials for containment and cleaning up: Contain spilled material if possible. Cover large spills for removal with earth moving equipment. Vacuum small spills. Use suitable and properly labeled containers. Dispose of contents/container to an approved waste disposal plant.
Reference to other sections-resources: For additional information, refer to Section 8: Exposure Controls and Personal Protection, Section 7: Handling, Section 12: Ecological Information, Section 13: Disposal Considerations and OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120).

Section 7 – Handling and Storage

Precautions for safe handling
Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Avoid contact with skin and eyes. Do not breathe dust/gas/fume/mist/vapors/spray. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. If exposed or concerned: CALL A POISON CENTER.
Conditions for safe storage, including any incompatibilities
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in a well-ventilated place.
Specific end use: See Section 1.

Section 8 – Exposure Control and Personal Protection

Control parameters
Guidelines may not apply to every situation. Industrial hygiene evaluations should be completed at each work place. Exposure limits are for air levels only. When skin contact also occurs, workers may be overexposed, even though air levels are less than the limits when provided.
Component Workplace Exposure Limits
Didecyl dimethyl ammonium chloride (7173-51-5) and Propiconazole (60207-90-1) have no established occupational exposure limits. This does not mean that these substances are not harmful. Safe work practices should always be followed.
Ethanol (64-17-5): OSHA: The legal airborne permissible exposure limit (PEL) is 1,000 ppm averaged over an 8-hour work shift. NIOSH: The recommended airborne exposure limit (REL) is 1,000 ppm averaged over a 10-hour work shift. ACGIH: The threshold limit value (TLV) is 1,000 ppm as a STEL (short-term exposure limit).
Exposure controls
Appropriate engineering controls: Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. Maintain airborne levels below exposure limit requirements or guidelines. If local exhaust ventilation or enclosure is not used respirators should be worn. Wear protective work clothing. Facilities storing, packaging or utilizing product should be equipped with an eyewash and a safety shower facility. Wash thoroughly immediately after exposure, before breaks and the end of the work shift. Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards to potentially exposed workers.
Personal protective equipment
Safety glasses and chemical resistant gloves are recommended whenever chemicals are handled. Obtain detailed information from OSHA Personal Protective Equipment Standard (29 CFR 1910.132) and equipment suppliers.
Eye/face protection: Face shield and, or safety glasses are recommended. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).
Skin protection: Wear protective gloves/protective clothing. Dispose of contaminated gloves after use in accordance with applicable regulations and good practices. Wash and dry hands. Wash contaminated clothing and decontaminate shoes before reuse.

Respiratory protection: Use when overexposure potential. Improper use of respirators is dangerous. Respirators should only be used with a written program as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

Control of environmental exposure

Avoid release to the environment. Collect spillage. Dispose of contents/container in accordance with regulations.

Section 9 – Physical and Chemical Properties

Information on basic physical and chemical properties

Physical State

Form: Liquid
Color: Clear
Odor: Mild Phenolic
pH: 6-8 (6-8 @1%)
Boiling Point / Range: >165°F / Not Determined
Flash Point: 142°F
Auto Ignition Temp: Not Combustible
Lower Flammability Limit: Not Combustible
Upper Flammability Limit: Not Combustible
Vapor Pressure (psi @100°F): Not Determined
Vapor Density: Not Determined
Freezing Point/Melting Point: Not Determined
Solubility (Water): Soluble
Specific Gravity: 0.95 g/cc
Evaporation Rate: Not Determined
Viscosity (SSU@ 100°F): Not Determined

Other Safety Info

Volatility: Not Determined
Density: 7.9 lbs. / gal.

Note

Physical Data is typical values based on material tested, but may vary based on composition. Values should not be accepted as guaranteed for every lot or as specifications for this product.

Section 10 – Stability and Reactivity

Reactivity: Not reactive under normal conditions.
Chemical stability: Stable under recommended storage conditions.
Possibility of hazardous reactions: When in contact with incompatible materials.
Conditions to avoid: Avoid incompatible materials and excessive heat or cold.
Incompatible materials: Strong oxidizing agents.
Hazardous decomposition products: Does not decompose under normal conditions.
Other decomposition products: During fire, thermal decomposition can produce carbon monoxide (highly toxic) and carbon dioxide (an asphyxiant at sufficient concentrations).

Section 11 – Toxicological Information

Information on Toxicological Effects

Component toxicity

Didecyldimethylammonium chloride (7173-51-5): Acute toxicity LD50 Oral - Rat - 84 mg/kg Remarks: Behavioral: Somnolence (general depressed activity). LD50 Dermal - Rat - male and female - > 2,000 mg/kg Skin – Rabbit Result: Causes burns. Guinea pig Result: Did not cause sensitization on laboratory animals. Ames test Salmonella typhimurium Result: Not mutagenic in Ames Test. Additional Information: Repeated dose toxicity - Rat - male and female - Oral - No observed adverse effect level - 45.5 mg/kg. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin., spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, Cough, wheezing, laryngitis, Shortness of breath, Headache, Nausea.

Propiconazole (60207-90-1): Acute toxicity LD50 Oral - rat - 1,517 mg/kg LC50 Inhalation - rat - 4 h - 1,264 mg/m3 LD50 Dermal - rat - > 4,000 mg/kg - Reproductive toxicity - rat – Oral: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Ethanol (64-17-5): Acute toxicity LD50 Oral - Rat - 10,470 mg/kg LC50 Inhalation - Rat - 4 h - 30,000 mg/l LD50 Dermal - Rabbit - 15,800 mg/kg - Rabbit Result: No skin irritation - 24 h Eyes – Rabbit Result: Moderate eye irritation

Mixture toxicity

Inhalation – Dermal - Skin corrosion/irritation - Eye damage/eye irritation – Respiratory/skin sensitization - Germ cell mutagenicity – Reproductive toxicity - Specific target organ toxicity - single exposure - Specific target organ toxicity - repeated exposure - Aspiration hazard - Carcinogenicity: No data available for mixture.

Additional Information

None known.

Section 12 – Ecological Information

Ecotoxicity

Component ecotoxicity

Didecyldimethylammonium chloride (7173-51-5): Toxicity to fish LC50 - Brachydanio rerio (zebrafish) - 0.49 mg/l - 96 h Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 0.094 mg/l - 48 h.
Persistence and degradability: Biodegradability aerobic - Exposure time 28 d Result: 69 % - Readily biodegradable. (OECD Test Guideline 301D) Other adverse effects: Very toxic to aquatic life.
Propiconazole (60207-90-1): Toxicity to fish LC50 - Oncorhynchus mykiss (rainbow trout) - 0.9 - 1.2 mg/l - 96.0 h Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 4.8 mg/l - 48 h Toxicity to algae EC50 - Pseudokirchneriella subcapitata (green algae) - 5 mg/l - 72 h Other adverse effects: Very toxic to aquatic life.
Ethanol (64-17-5): Toxicity to fish LC50 - Pimephales promelas (fathead minnow) - 14,200 mg/l - 96 h Toxicity to daphnia and other aquatic invertebrates LC50 - Ceriodaphnia dubia (water flea) - 5,012 mg/l - 48 h NOEC - Daphnia magna (Water flea) - 9.6 mg/l - 9 d Toxicity to algae EC50 - Chlorella vulgaris (Fresh water algae) - 275 mg/l - 72 h (OECD Test Guideline 201) Persistence and degradability: Biodegradability Result: 95 % - Readily biodegradable - Bioaccumulative potential: Due to the distribution coefficient n-octanol/water, accumulation in organisms is not expected. Other adverse effects: Very toxic to aquatic life with long lasting effects.

Mixture ecotoxicity

Toxicity to Fish - Persistence and Biodegradability - Bioaccumulative Potential - Mobility in Soil: No data available for mixture.

Other adverse effects

None known.

Section 13 – Disposal Consideration

Waste treatment methods

Product: Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging: Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

Section 14 – Transport Information

DOT: UN 1760, corrosive liquid, n.o.s (quaternary ammonium chloride), 8, PG II

Section 15 – Regulatory Information

Federal

This is an EPA registered product. It is a violation of federal law to use this product in a manner inconsistent with its labeling Hazardous by definition of OSHA Hazard Communication Standard (29 CFR 1900.1200). This product is intended for industrial use only. Keep away from children and unauthorized personnel. Dodecyl Dimethyl Ammonium Chloride is an
TSCA (Toxic Substance Control Act): Components of this product are listed on the TSCA Inventory.
CERCLA: Product is not found in "List of Hazardous Substances and Reportable Quantities" (40 CFR 302.4)
SARA TITLE III**:** (Superfund Amendments and Reauthorization Act)
SARA 302 Components: None are subject to the reporting requirements of SARA Title III, Section 302.
SARA 313 Components: Propiconazole (60207-90-1) is subject to reporting levels established by Section 313.
SARA 311/312 Hazards: Fire, Acute Health Hazard and Chronic Health

States

Right to Know Components
PA and NJ: Didecyl dimethyl ammonium chloride (7173-51-5) – Propiconazole (60207-90-1) and Ethyl alcohol (64-17-5).
California Prop. 65 Components: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Canada

DSL: This product, or its components, are listed on or are exempt from the Canadian Domestic Substances List (DSL).
WHMIS: Not regulated.

Section 16 – Other Information

Alphanumeric H (Hazard) and P (Precautionary) statements.
H227 Combustible liquid
H301 Toxic swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H401 Toxic to aquatic life.
H412 Harmful to aquatic life with long lasting effects.
P210 Keep away from heat, sparks, open flames and hot surfaces. No smoking.
P264 Wash hands or other contact areas thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P273 Avoid release to the environment.
P280 Wear eye protection/ face protection/protective gloves or clothing.
P301+P312 IF SWALLOWED: Immediately call a POISON CENTER/doctor/ Seek immediate medical attention if you feel unwell.
P302+P352 IF ON SKIN: Wash with plenty of water.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P321 Specific treatment see instructions on this label.
P330 Rinse mouth.
P332 + P313 If skin irritation persists: Get medical advice/ attention.
P337 + P313 If eye irritation persists: Get medical advice/ attention.
P362+364 Take off contaminated clothing and wash it before reuse.
P370+P378 In case of fire: Use dry chemical, foam or water fog to extinguish. Do not use direct water stream.
P391 Collect spillage.
P403 Store in a well-ventilated place.
P405 Store locked up.
P501 Dispose of container or contents in accordance with all regulations.

Disclaimer: The information presented herein is based on data considered to be accurate as of the date of preparation of this Safety Data Sheet. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by the vendor for any damage or injury resulting from abnormal use, from failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

Attachment D

Historical Aerial Photographs

ERIS

HISTORICAL AERIALS

Project Property: Alterra - Buse
Buse
Everett WA 98201
Requested By: Apex Companies, LLC
Order No: 21061500391
Data Completed: June 16,2021

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Date	Source	Scale	Comments
2019	National Agriculture Information Program	1" to 500'	
2017	National Agriculture Information Program	1" to 500'	
2015	National Agriculture Information Program	1" to 500'	
2013	National Agriculture Information Program	1" to 500'	
2011	National Agriculture Information Program	1" to 500'	
2009	National Agriculture Information Program	1" to 500'	
2005	National Agriculture Information Program	1" to 500'	
1990	US Geological Survey	1" to 500'	
1981	National High Altitude Photography	1" to 500'	
1975	National Aeronautics Space Administration	1" to 500'	
1968	US Geological Survey	1" to 500'	
1956	Army Mapping Service	1" to 500'	Best Copy Available
1952	US Geological Survey	1" to 500'	
1941	US Geological Survey	1" to 500'	

Year: 2019
Source: NAIP
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

Year: 2017
Source: NAIP
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

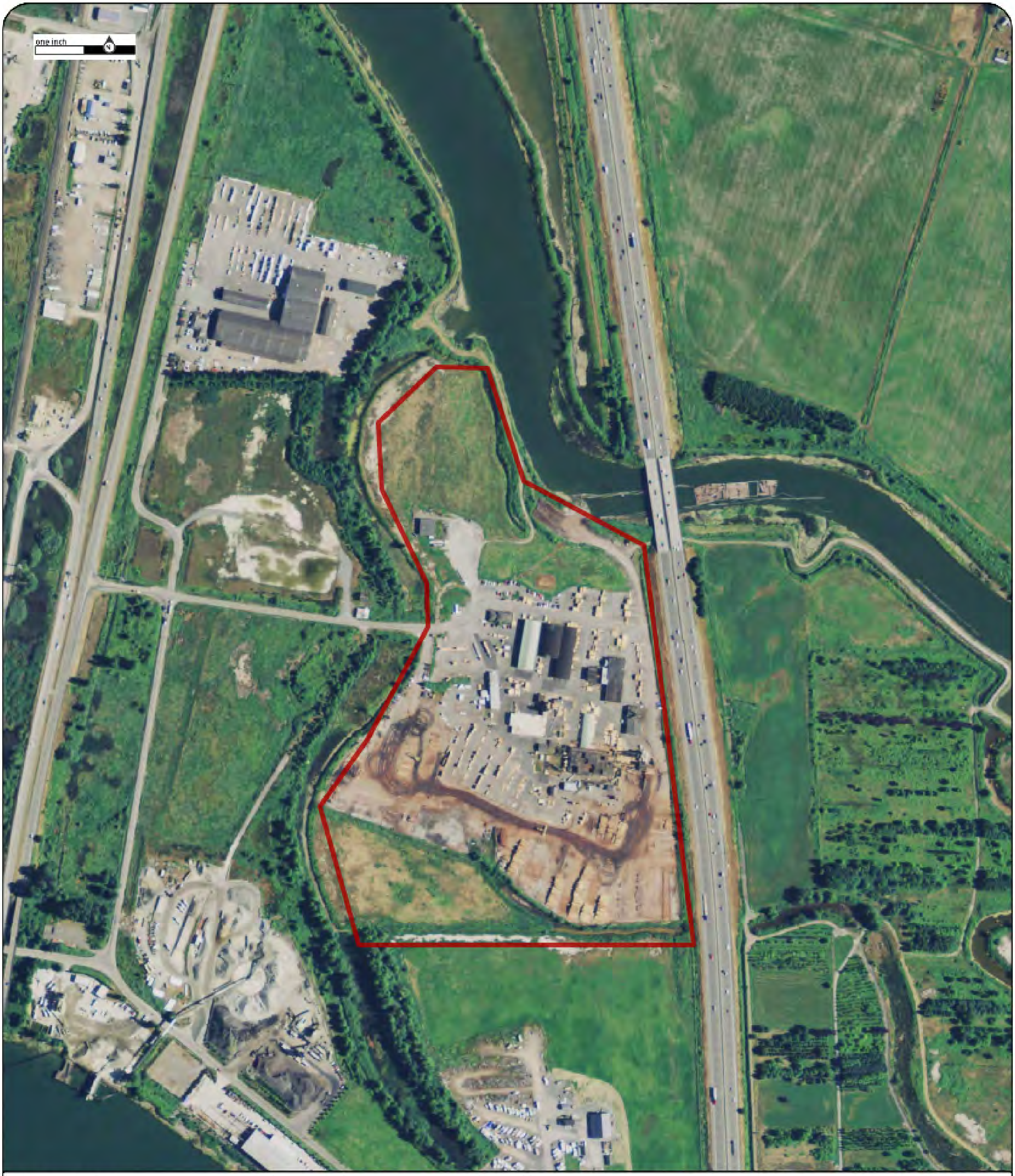
Order No: 21061500391

Year: 2015
Source: NAIP
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

ERIS



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Order No: 21061500391

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Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

Year: 2009
Source: NAIP
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

ERIS

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Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

Year: 1990
Source: USGS
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

Year: 1981
Source: NHAP
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

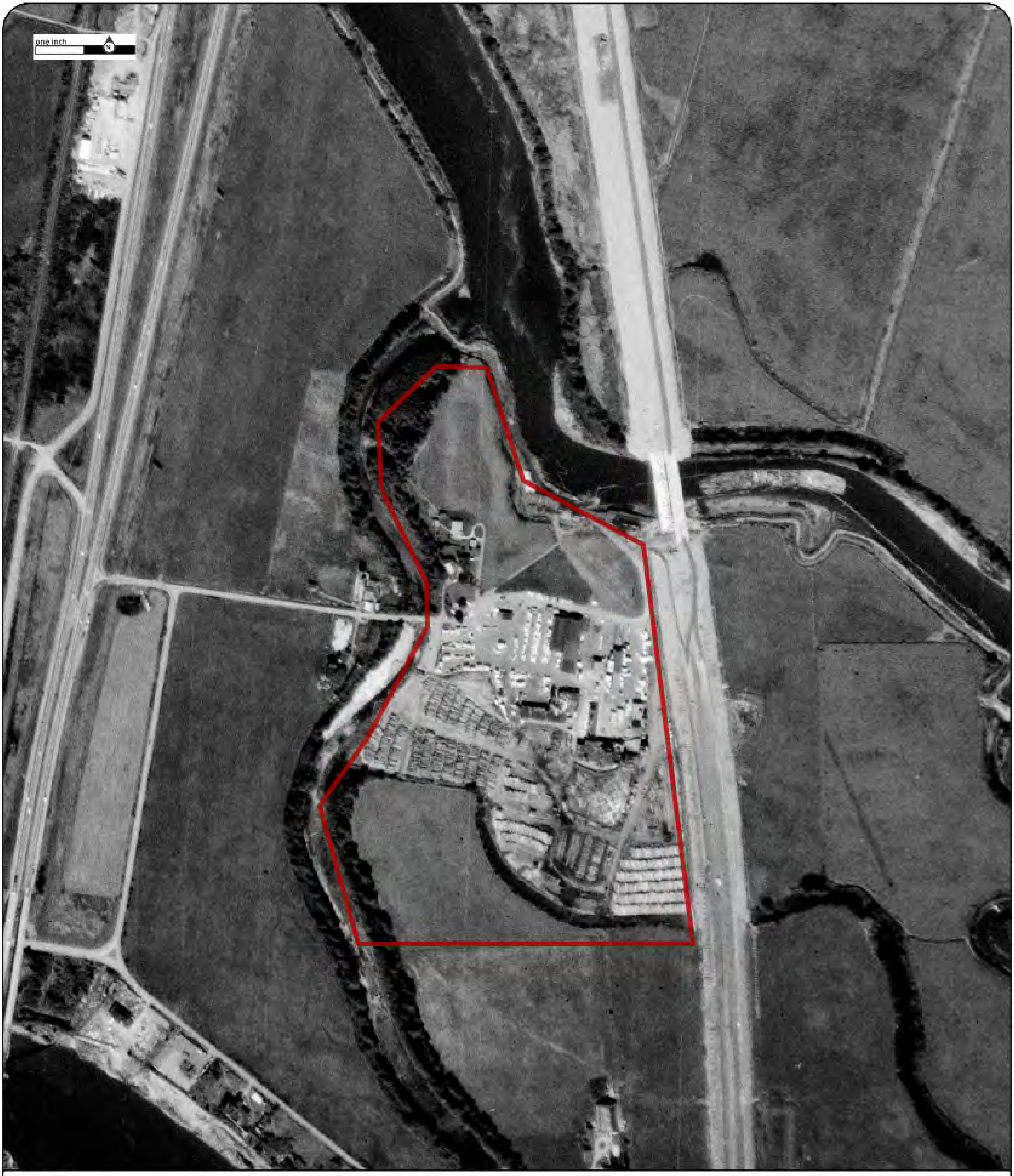
Order No: 21061500391

ERIS

Year: 1975
Source: NASA
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391



Year: 1968
Source: USGS
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

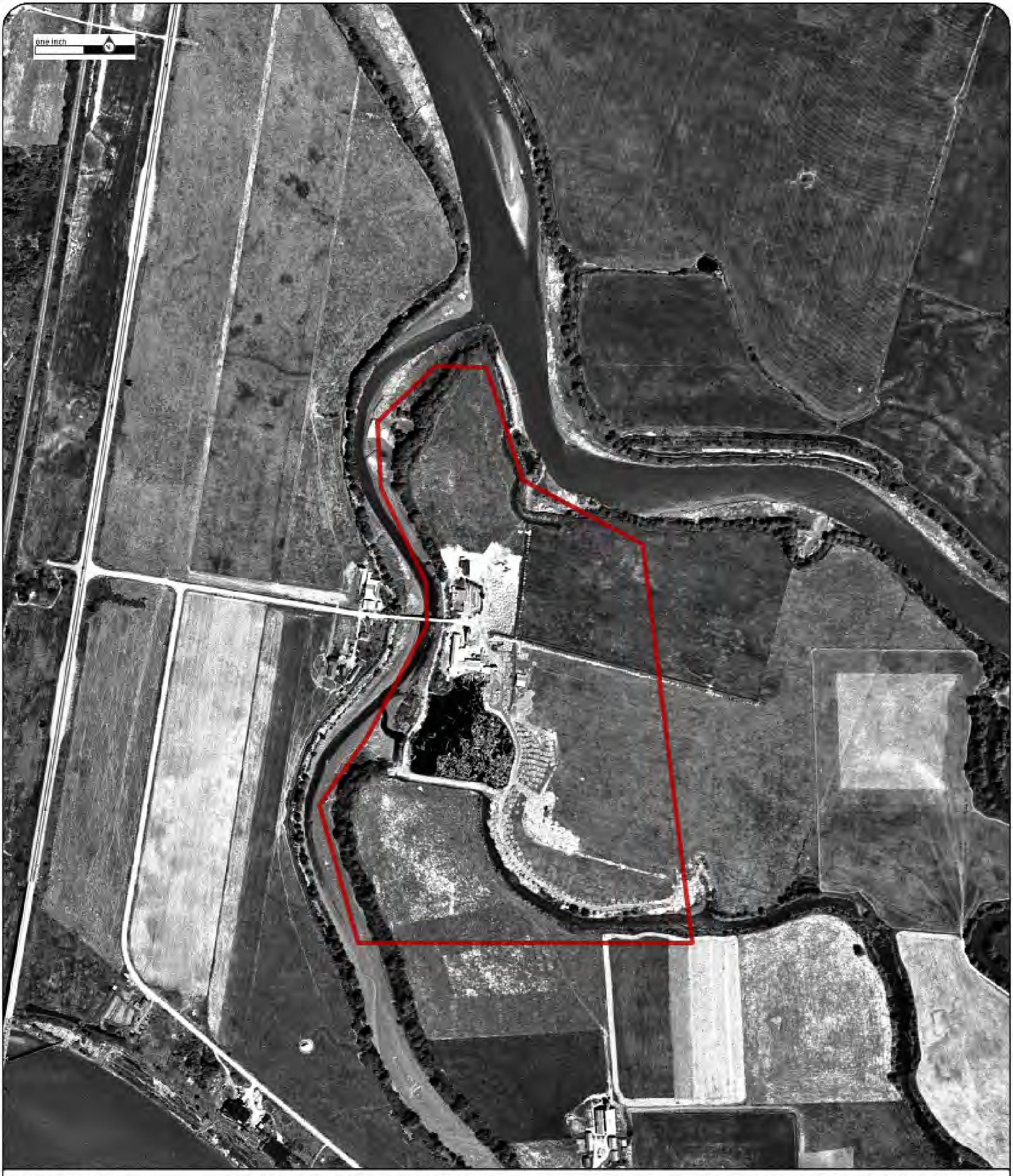
Order No: 21061500391

ERIS

Year: 1956
Source: AMS
Scale: 1" to 500'
Comment: Best Copy Available

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391



Year: 1952
Source: USGS
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

ERIS

Year: 1941
Source: USGS
Scale: 1" to 500'
Comment:

Address: Buse, Everett, WA
Approx Center: -122.17840849,48.02127966

Order No: 21061500391

Attachment E

1998 Draft Phase II ESA by Exponent

Exponent

Draft

Phase II Environmental Site Assessment
Buse Timber & Sales, Inc.
Everett, Washington

Prepared for

Koncor Forest Products Company
Tacoma, Washington

Draft

Phase II Environmental Site Assessment Buse Timber & Sales, Inc. Everett, Washington

Prepared for

Koncor Forest Products Company
Transpacific Trade Center, Suite 418
3700 Pacific Highway East
Tacoma, WA 98424

Prepared by

Exponent
4000 Kruse Way Place
Building Two, Suite 285
Lake Oswego, Oregon 97035

August 1998

Contract No.: 8601011.001 03F1

CONTENTS

LIST OF FIGURES

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ACRONYMS AND ABBREVIATIONS

AST	aboveground storage tank
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	environmental site assessment
KFP	Koncor Forest Products Company
MRL	method reporting limit
MTCA	Model Toxics Control Act
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
TDS	total dissolved solids
TeCP	tetrachlorophenol
TPH	total petroleum hydrocarbon
TSCA	Toxic Substances Control Act
UST	underground storage tank
VOC	volatile organic compound
WA-EPH	Washington extractable petroleum hydrocarbon
WA-VPH	Washington volatile petroleum hydrocarbon

INTRODUCTION

This report presents the results of the Phase II Environmental Site Assessment (ESA) for the Buse Timber & Sales Inc., (Buse Mill) site in Everett, Washington. Koncor Forest Products Company (KFP) is considering purchasing the mill and has retained Exponent to evaluate potential environmental liabilities at the facility. Exponent completed a focused Phase I ESA in April 1998, which listed potential areas of concern. The Phase II ESA was conducted to address specific issues identified in Exponent's April 10, 1998 letter to Stan Doi of KFP and additional data requested by KFP.

The following sections summarize site background, objectives of the investigation, field sampling procedures, laboratory analyses, investigation results, conclusions, and an update of the engineering cost estimate.

SITE BACKGROUND

Location

The Buse Mill is located at 3812 28th Place NE in Everett, Washington (see Figure 1). The Buse Mill is located on Smith Island, which is bordered by the Snohomish River (on the south), Possession Sound (on the west), and Union Slough (on the north and east). Interstate 5 is located adjacent to and east of the operating areas of the mill. The lands proposed for purchase include the operating areas of the mill and land on the east side of Interstate 5 that is used for growing hay and corn. The City of Everett is located approximately 1 mile south of the site across the Snohomish River. The City of Marysville is located approximately 1.5 miles north of the site across Steamboat and Ebey Slough.

Environmental Setting

The operating areas of the Buse Mill are asphalt-paved. Other portions of the site include mowed fields on the north edge of the mill and agricultural fields to the east of the mill (east of Interstate 5) and at the southwest corner of the site. Drainage ditches surround the site and discharge to Union Slough on the north side.

The site is located on Smith Island in the Snohomish River Delta. The site is generally level, except for levies located along Union Slough and some drainage ditches. Soils consist of clay and silt alluvial deposits overlain by shallow fill beneath the pavement in some areas of the mill. Groundwater is generally not present in the clay/silt beneath the site, although groundwater may be encountered in deeper units.

History

The mill began operations in 1942. Facility personnel reported that the land was previously used as a dairy farm, and was a golf course in the 1920s. The facility expanded in the 1950s and the current mill was constructed in 1960. Major facility changes include the construction of Interstate 5 across the site in the late 1960s and early 1970s. A log pond formerly located at the south end of the facility was filled in the late 1960s and early 1970s, partly as a result of freeway construction. Several buildings have been added since the current mill was constructed in 1960, including the current dry kiln.

Regulatory History

As part of the Phase I ESA, Exponent conducted a review of documents provided by Buse Timber and also documents available from the Washington State Department of Ecology's (Ecology's) Northwest Regional office. A summary of those documents is provided below:

- October 1990—Preliminary assessment report for Buse Timber & Sales prepared by Ecology. The report concludes that the use of wood preservatives at the site does not present a significant threat to nearby human populations and the environment, and thus no further federally funded action should be pursued. However, the report does cite elevated concentrations of pentachlorophenol (PCP) and tetrachlorophenol (TeCP) in sediment samples collected from a storm drain near an onsite dip tank and in a nearby slough. The report recommends that Ecology conduct further evaluations of the site.

- October 19, 1990—Letter to Buse Timber & Sales from the U.S. Environmental Protection Agency (EPA) describing violations of the Toxic Substances Control Act (TSCA). These violations concern the use and labeling of electrical equipment containing polychlorinated biphenyls (PCBs). Other supporting correspondence includes EPA inspection reports from June and July 1990.

- March 25, 1991—Letter to Julian Dewell, who is apparently an attorney for Buse Timber & Sales. The letter is in regard to a Consent Agreement and Consent Order for Payment of Civil Penalties. The order specifies violations of TSCA regulations for the use and handling of PCBs. The matter appears to have been resolved, because Dave Buse and EPA signed the attached order, which provides instructions for payment of penalties.

- March 13, 1992—Letter from Ecology stating that the Buse Timber & Sales site has been added to Ecology's list of known or suspected contaminated sites. Attached materials indicate that the listing was due to the historical use of wood preservatives at the site.

- October 19, 1992—Letter to Buse Timber & Sales from Ecology indicating that the site was ranked as requiring "No Further Action."

- December 24, 1992—Letter to Buse Timber & Sales from Ecology regarding coverage under the storm water general permit. The letter grants coverage of the mill under the basic permit and describes some of the requirements of the permit, including the preparation of a storm water pollution prevention plan.

- August 29, 1994—Letter to Buse Timber & Sales from EPA, transmitting a copy of a "Site Investigation Report" prepared by URS Consultants on behalf of EPA. The attached report describes limited collection of soil and sediment samples at the site. The samples were analyzed for semivolatile compounds, PCBs, chlorinated phenols, mercury, and inorganic compounds. No samples were analyzed for total petroleum hydrocarbon (TPH) or volatile organic compounds (VOCs) (i.e., solvents). No exceedances of background concentrations were found for surface or subsurface soils. Samples collected from catch basins and in the North Ditch (near the storm drain outfall) exceeded background concentrations for PCBs, lead, and mercury. None of these concentrations was significantly increased above background or above Ecology's generic cleanup levels for soil at sites with unrestricted land use (MTCA Method A cleanup levels). PCP was detected at concentrations exceeding background levels in the storm drains and storm drain outfall. A sample collected from a storm drain located approximately 100 ft east of the former dip tank was found to contain 0.07 mg/kg PCP. A sample collected in the North Ditch near the storm drain outfall was found to contain 0.11 mg/kg, but PCP was *not* detected in a duplicate sample collected from the same location. The cover letter states that EPA does not anticipate further investigation of the site under the Superfund program.

- December 18, 1997—Draft Letter of Findings for Phase II ESA, prepared for Lone Star Northwest by Environmental Partners. This letter is a Phase II ESA for a parcel owned by Buse Timber & Sales. The subject property is separate from the mill facility being considered for purchase by Koncor Forest Products.

OBJECTIVES OF THE INVESTIGATION

- The goal of the sediment sampling program was to determine whether sediments in the drainage ditches that surround the facility have been affected by mill operations or other sources, including runoff from Interstate 5 and other nearby (upgradient) facilities. Where impacts were observed, (e.g., the north ditch), samples were collected to determine the extent of impact.
- The goal of the storm drain sampling program was to determine whether contaminants may have been released to the storm drain system from mill activities, including the maintenance shop and the former PCP dip tank. Contaminants released to the storm drains could affect receiving waters and also affect soils and groundwater as a result of leakage from the catch basins and wooden drain lines.
- The goals of the soil and groundwater investigation were to assess soil and fill stratigraphy, evaluate the vertical and horizontal extent of contamination (if any) that may have resulted from various mill operations, identify potential exposure pathways, and evaluate the potential effect of contaminated soils, if any, on groundwater.

Other tasks performed as part of the Phase II ESA included the review of historical aerial photographs and visual inspection of the Buse Mill lands located east of the freeway. Observations regarding the historical aerial photos are provided in Attachment A.

Subsequent sections of this report describe the field sampling procedures and laboratory analytical methods and summarize the results of the current investigation.

FIELD SAMPLING PROCEDURES

Field work was conducted May 18, June 18-19, and June 29, 1998. The initial round of sediment sampling in the North Ditch (May 18, 1998) was conducted in accordance with the scope of work presented in a letter dated April 14, 1998 to Stan Doi of Koncor Forest Products. All subsequent field work was conducted in accordance with the *Draft Work Plan for Phase II Environmental Site Assessment, Buse Timber & Sales* (Exponent 1998). Additional details on field sampling procedures, including standard operating procedures, can be found in the work plan. Copies of the field logbooks, borehole logs, and chain-of-custody records prepared during the field survey are on file at Exponent's Bellevue office.

SAMPLE COLLECTION

The following sections describe the procedures for collection of sediment, storm drain, soil, and groundwater samples.

Sediment Samples

Sediment sampling was conducted in two phases. Phase 1 sampling was conducted on May 18, 1998. During Phase 1, sediment samples were collected only from the North Ditch. Phase 2 sampling was conducted on June 29, 1998 and sediment samples were collected from multiple areas surrounding the site (i.e., South, East, and West ditches and Union Slough). A total of 15 sediment samples were collected during both phases of sampling. Station locations are presented on Figure 2.

The top 4 in. of the sediment column were collected at each station. Table 1 provides a description of the physical characteristics of the sediment and the type of sampling equipment used at each station. As specified in the work plan, appropriate measures were taken to ensure the quality of sediment samples. Two sediment equipment rinsate samples were collected and submitted for laboratory analysis. Equipment rinsate blanks are used to identify possible contamination from the environment or from the sampling equipment.

Storm Drain Samples

Sediment samples were collected from four storm drain sumps to evaluate the potential migration of contaminants from known or suspected source areas to nearby surface waters and soils via the storm water drainage system. Storm drain sample locations are shown on Figure 3. Because each storm drain is of a different configuration (i.e., type of construction, depth, location of sediment available for sampling), detailed descriptions of the storm drains and sample collection locations are provided below.

Storm Drain FDT-9

This storm drain is located approximately 15 ft southeast of the former dip tank. The catch basin is covered by a 2-ft by 2-ft square steel plate. The drain is surrounded by asphalt pavement. Beneath the steel cover is a sump formed by a four-sided wood frame. In the center of the wood frame is a vertical 8-in.-diameter concrete pipe that carries runoff from the sump to a culvert buried below the catch basin. That culvert discharges to the North Ditch. Soil and accumulated sediment fill the area between the wood frame and the concrete pipe. Samples were collected from the following locations:

- Sample SD0010: This sample was collected from the upper 0 to 6 in. of soil and accumulated sediment located between the wood frame and the culvert. This sample was collected with a pre-cleaned stainless steel spoon. Sediments were collected from all four quarters of the sump. The sediments were placed into a stainless-steel bowl, homogenized, and then placed into a labeled glass jar for analysis. The sample consisted of a mixture of silt and sawdust.

- Sample SD00B: This sample was collected from an approximately 2- to 3-in.-thick layer of sediments that had accumulated in the culvert beneath the sump. This sample was collected by reaching down through the vertical pipe and scooping the sediment with a pre-cleaned stainless-steel spoon. The sediment was placed into a stainless-steel bowl, homogenized, and then placed into a glass jar. This sample consisted of sands and silts.

Storm Drain FDT-10

This storm drain is located approximately 75 ft north of the former dip tank, in the roadway on the south side of the Buse Timber & Sales Company office. The drain is covered with an approximately 18-in.-diameter steel plate, surrounded by asphalt pavement. Beneath the plate is an approximately 12-in.-diameter steel sleeve set in concrete. In the center of the 12-in.-diameter steel sleeve is an approximately 9-in.-diameter vertical pipe, which discharges runoff to the underlying culvert. According to Buse personnel, drain FDT-10 connects to the same culvert as FDT-9, which discharges to the North Ditch. Coarse sediment had accumulated in the area between the asphalt pavement and steel sleeve. Sample SD0011 was collected from this accumulated sediment at a depth of 0 to 1 in. using a pre-cleaned stainless-steel spoon. This sample consisted of coarse sand and grit. No sediment was observed in the culvert beneath the catch basin.

Storm Drain FDT-11

This storm drain is located in the grass field north of the Buse Mill office. The drain is located approximately 100 ft north of the pavement, generally in line with the eastern end of the office building. The drain consists of a small wood box (less than 1 ft × 1 ft) covered with steel plate. The drain is surrounded by mown grass. The depth to water inside the wood box is approximately 2 ft. According to Buse personnel, this catch basin is connected to the same culvert as catch basins FDT-9 and FDT-10, which discharges to the North Ditch. A 1- to 2-in.-thick layer of sediment was found in the bottom of the wood catch basin. Sediment sample SD000A was collected from the bottom of the catch basin using a pre-cleaned stainless-steel spoon. This sample consisted of coarse sand and grit.

Storm Drain MSA-4

This storm drain is located on the east side of the maintenance shop. According to Buse personnel, this drain has been affected by releases of hydraulic, lubricating, and motor oils from nearby equipment maintenance operations. The catch basin is surrounded by asphalt pavement, is covered with a steel grate, and consists of a vault approximately 2 ft by 2 ft. (Due to the heavy accumulation of oil and dirt in the basin, field staff did not determine whether the catch basin was made of wood or concrete.) Approximately 10 to 12 in. of sediment were present in the bottom of the basin, overlain by 12 in. of water. According to Buse personnel, this catch basin discharges to the North Ditch. Sediment sample SD0012 was collected from the bottom of the catch basin using a pre-cleaned stainless-steel soil auger. This sample consisted of oily sediment.

Soil Samples

Soil samples were collected from 13 boreholes at depths of 2–4 ft below ground surface (bgs), or the groundwater-vadose zone interface. The boreholes were placed in potential source areas and/or at downgradient locations, based on historical operations. Sampling stations were chosen to bracket potential contaminant concentrations throughout the subject area. Soil sampling locations are shown on Figure 4.

Subsurface soil samples were collected using Geoprobe® techniques that advance a stainless-steel sample corer into the ground with truck-mounted hydraulics. The Geoprobe® was generally advanced to 2–4 ft bgs to intersect the groundwater interface. Soil samples were collected from the boreholes using a 1.5-in.-diameter, 2-ft-long, stainless-steel, split-spoon sampler. At the burn area (FBA-1), subsamples from three boreholes (1-4 ft) were composited as one sample. At four of the stations (MSA-3, FDP-3, FDT-4, and FDT-6) the Geoprobe® was advanced to its maximum depth (10–22 ft bgs) beyond the shallow sample collection interval (2–4 ft bgs) to determine subsurface lithology. Soil lithology was logged, and the color, texture, and grain size were characterized in the field, consistent with the Unified Soil Classification System. Borehole logs are presented in Attachment B.

In addition to samples collected using the Geoprobe®, one additional composite sample was collected from the stockpile containing dredged fire pond sediments. Five grab samples were collected from the surface of the stockpile, and composited into one sample using a stainless-steel bowl and spoon.

As specified in the work plan, appropriate measures were taken to ensure the quality of soil samples. One soil equipment rinsate sample was collected and submitted for laboratory analysis.

Groundwater Samples

Groundwater samples were generally collected from stations near potentially affected areas. These screening-level samples were intended to determine whether contaminants had migrated from soil to groundwater at the site. Groundwater sampling locations are shown on Figure 4.

Eight groundwater samples were collected from a temporary well screen advanced by the Geoprobe® rig at the locations shown on Figure 4. The water table was encountered at depths ranging between 3–6 ft bgs over a 2-day period. The bottom of the Geoprobe® well-screen sampler was driven below the groundwater interface and opened to allow the groundwater to flow into the well screen. Once groundwater had recharged with enough volume to allow sample collection, groundwater samples were collected for chemical analyses of VOCs using a decontaminated, 7/16-in.-outside-diameter stainless-steel bailer. Once all of the VOC vials were filled, a peristaltic pump and new, dedicated polyethylene tubing were used to fill remaining sample containers (i.e., for non-VOC chemical analyses).

Following completion of each Geoprobe® borehole, the hole was abandoned and backfilled with bentonite chips from the bottom of the borehole to approximately 1 ft bgs and hydrated with water. The upper 1 ft was backfilled with native soil or patched with asphalt, as appropriate. The sampling stations were measured from utility lines, streets, and other permanent features and recorded into the field logbook.

SAMPLE HANDLING

All soil, sediment, and storm drain samples were collected in sample containers provided by the laboratory. Representative soil and sediment samples were collected and transferred directly to a 2-oz. sample jar with no headspace for potential analysis of VOCs.

The remaining soil from each station or interval was then homogenized and placed into the appropriate sample jar, sealed, placed in Ziploc® bags to minimize breakage, and stored on ice in coolers. Sediment and soil samples were submitted for laboratory analysis without preservatives.

Groundwater samples submitted for petroleum hydrocarbon and VOC analyses were preserved with hydrochloric acid. Samples submitted for chlorinated phenol analyses and total dissolved solids (TDS) were collected in bottles that contained no preservative. The samples were stored on ice in coolers and shipped to the analytical laboratory within 48 hours after collection under appropriate chain-of-custody procedures.

DECONTAMINATION PROCEDURES

Before collecting samples, all non-dedicated sampling equipment was scrubbed with Alconox®, rinsed with distilled water, rinsed with acetone and hexane, and then rinsed thoroughly with deionized water. The small volume of acetone and hexane rinsates was collected in an open container and allowed to evaporate in a well-ventilated area.

DEVIATIONS FROM THE WORK PLAN

Although the work was generally conducted according to the draft work plan (Exponent 1998), the following deviations were noted:

- Due to the varying compositions of the sediment at the site, the Ekman grab sampler could not always be used to collect the sample. Table 1 provides clarification of the type of sampling equipment used at each station.

- Due to the convergent topography of the mudflat surrounding the tide gate at the north end of the property (i.e., both tide gates discharged to Union Slough via the same channel), it was decided that the samples collected at Stations USG-1 and USG-2, respectively, would consist of a composite of three grabs from each side of the channel that enters Union Slough.

- An additional sample was collected in the West Ditch (i.e., Station WDM-1). This station was located upstream of the confluence of the West Ditch and another smaller ditch that drains onto the site. Because this station was added to the sampling program, the sample collected at Station WDM-3 was not analyzed, but archived at 4 °C for possible future analysis.

- Due to the narrowness of the ditch and the relatively low water level, the sediment sample at Station SDM-1 was not collected from a boat.

- An archive sample was collected at each of the sediment stations. These archive samples are being held at –20 °C for possible future analysis.

- Three field duplicate sediment samples were collected during sediment sampling.

- Because of the configuration of the storm drain at FDT-9, two samples were collected from this location. One sample was collected from sediments that had accumulated within culvert and one sample was collected from soils/sediments between the wood frame and the vertical pipe.

- Because no sediment was found in the culvert at FDT-10, a sample was instead collected from coarse sands and silts that had accumulated under the steel plate around the top of the catch basin.

- Because of the absence of submerged sediment in storm drain FDT-10, a sample was collected at the next downstream storm drain, FDT-11. This sample was submitted to the laboratory for possible future analysis.

- The soil sample from Station FDT-2 was collected from the 3–6 ft interval because there was insufficient recovery at the 2–4 ft depth.

- Due to insufficient recovery within the upper 0–2 ft interval at Station AST-2, the available volume was submitted for only heavier-range petroleum hydrocarbon analysis (NWTPH-G extended).

- Archive soil samples were collected at stations FDT-3 and FDT-6 for possible future analysis.

- Due to very slow recharge, groundwater samples could be collected from only 8 of the proposed 17 stations.

- Groundwater volumes from Station MSA-2 were sufficient to allow the collection of only one VOC vial. This sample was submitted for analysis of VOCs as described above.

- Grain size was analyzed on four soil samples to confirm the subsurface stratigraphy.

- Laboratory analyses of four soil samples included the new analytical methods (i.e., Washington extractable petroleum hydrocarbons [WA-EPH] and Washington volatile petroleum hydrocarbons [WA-VPH]) specified in an interim TPH policy (Ecology 1997), in addition to the analyses specified in the work plan. WA-EPH methods were used for analysis of polycyclic aromatic hydrocarbons (PAHs) in these four samples.

LABORATORY ANALYSES

Analyses for specific samples were selected based on historical operating information. The samples selected and the specified analytical suite for each sample are shown in Table 2.

To satisfy Model Toxics Control Act (MTCA) requirements regarding hydrocarbon quantification, NWTPH-D extended and NWTPH-G extended (which includes analysis for benzene, toluene, ethylbenzene, and xylenes [BTEX] constituents) analyses were performed on selected sediment, soil, and groundwater samples as specified in the work plan. In addition, the Ecology-proposed draft analytical methods (i.e., WA-EPH and WA-VPH) were performed to evaluate site conditions using the interim TPH policy (Ecology 1997). Selected PAHs are also reported under the WA-EPH method.

For non-petroleum hydrocarbon analysis, a subset of soil and groundwater samples was submitted for chlorinated phenols analysis by EPA Method 8151M or for VOC analysis by EPA Method 8260. Two soil samples (collected from the former dip tank and the former burn area as specified in the work plan) were also submitted for polychlorinated dibenzo-*p*-dioxin and polychlorinated dibenzofuran (dioxon/furan) analysis using EPA Method 8290. All groundwater samples were also submitted for analysis of TDS to determine potential potability.

North Creek Analytical of Bothell, Washington analyzed the sediment samples collected May 18, 1998. Columbia Analytical Services in Kelso, Washington conducted all other laboratory analyses.

area due to the presence of impermeable silts/clays. Surface soil samples (0-2 ft) were found to contain concentrations of lube oil at 291 and 635 mg/kg. One sample (SO0009) analyzed for EPH/VPH had concentrations of 23 and 49 mg/kg for total aliphatic and aromatic compounds, respectively. These values are well below risk-based concentrations for direct contact with soil based on Ecology's Interim TPH Policy (Table 6). Using modeling procedures specified in Ecology's Interim TPH Policy, the EPH/VPH concentrations yielded predicted groundwater concentrations that are substantially less than Ecology's target groundwater concentration for drinking water supplies. These results indicate that the measured soil concentrations do not present the potential for adverse impacts on underlying groundwater.

Former Underground Storage Tank Area

Three soil samples collected from the area of the former underground storage tanks (USTs) were analyzed for petroleum hydrocarbons. No groundwater samples were collected in this area due to the presence of impermeable silts/clays. The only analyte detected above method reporting limits (MRLs) was 246 mg/kg "non petroleum hydrocarbon as diesel." This is likely biogenic material such as wood fibers found in the clay/silt layer. This sample was also analyzed using MTCA Interim TPH Policy methods; the aliphatic and aromatic compound concentrations were well below risk-based benchmark concentrations for direct contact with soil derived based on Ecology's Interim TPH Policy (Table 6). Groundwater modeling analyses based on this sample also indicate that the measured soil concentrations do not present the potential for adverse impacts on underlying groundwater.

Former Pentachlorophenol Dip Tank Area

Three subsurface soil samples (from boreholes FDT-1, FDT-2, and FDT-3) collected in this area were analyzed for chlorinated phenols, dioxins/furans and petroleum hydrocarbons. Boreholes placed farther south (FDT-4) and north (FDT-6) of the former dip tank were sampled for groundwater and analyzed for chlorinated phenols. Sediment samples collected from two storm drain sumps (Figure 3) near the former dip tank were also analyzed for chlorinated phenols.

Chlorinated Phenols

Pentachlorophenol was detected in one soil sample (from borehole FDT-2) at a concentration of 0.04 mg/kg. (This sample was subsequently analyzed for dioxins and furans.) This is below Washington State MTCA Method B risk-based formula values for residential soil of 8.33 mg/kg (based on direct contact with soil). It is slightly below the MTCA Method B formula value for protection of underlying groundwater used as a drinking water supply (0.073 mg/kg). Use of these benchmark values as comparison values for this site is highly conservative (i.e., health-protective) because the site is located within a largely industrial area and is currently used as an industrial facility. The intended future use of the site is expected to remain industrial. Neither of the two groundwater samples had detectable amounts of chlorinated phenols.

Dioxins and Furans

The soil sample (from borehole FDT-2) analyzed for dioxins and furans had 0.034 μg/kg (parts per billion) expressed as 2,3,7,8-tetrachlorodibenzo-*p*-dioxin toxic equivalent concentration (TEC). This is well below current recommended EPA soil cleanup level of 1 μg/kg TEC for residential sites and 5 to 20 μg/kg TEC for industrial sites (U.S. EPA 1998). The MTCA soil risk-based formula value for dioxins/furans for direct contact with soil at industrial sites (0.875 μg/kg) is similar to EPA's level for residential soils. The sample result of 0.034 μg/kg does exceed the MTCA risk-based formula value for direct contact with soil at residential sites of 0.0067 μg/kg. However, this exceedance is not significant because 1) the Buse site qualifies as an industrial site according to MTCA criteria (WAC 173-340-745) and 2) the residential formula value is near typical background concentrations (0.008 μg/kg, U.S. EPA 1996) and is rarely, if ever, enforced[1]. For similar reasons, exceedance of the MTCA formula value for soil based on groundwater protection (0.000058 μg/kg) is not relevant. Specifically, the value is less than typical background concentrations, less than analytical detection limits, and less than cleanup levels that are typically used at dioxin/furan sites). Moreover, no potentially affected groundwater supply for drinking water is present at the site.

Petroleum Hydrocarbons

One soil sample (SO0001 from borehole FDT-2) was submitted for petroleum hydrocarbon analysis under the MTCA Interim TPH Policy. Results from this sample and groundwater modeling estimates based on these results were well below criteria established based on Ecology's Interim TPH Policy (Table 6).

Fire Pond Area

Subsurface soil and groundwater samples collected from three borings near the fire pond (FPD-1, FPD-2 and FPD-3) were analyzed for petroleum hydrocarbons.

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[1] We have conducted extensive searches of dioxin/furan cleanup levels in the Northwest and around the country. We are not aware of any sites where remediation was required based on a dioxin/furan cleanup level less than the EPA default value of 1 μg/kg.

Subsurface Soil

One of the three subsurface soil samples had detectable petroleum hydrocarbons. A relatively low detection of lube oil (852 mg/kg) was reported for sample SO0011 from borehole FPD-1. This sample was also analyzed for EPH and VPH in order to determine whether the site concentrations exceeded criteria established under Ecology's Interim TPH Policy. As shown in Table 6, the concentrations were well below the risk-based formula values for residential land use. In addition, groundwater concentrations predicted based on these analytical results were substantially less than the MTCA target value for drinking water supplies. This sample was also analyzed for PAHs (no detections) and for benzene, ethylbenzene, toluene, and xylenes (BTEX) with only a very low detection of ortho-xylene (0.3 mg/kg).

Groundwater

Groundwater collected from one of the boreholes (FPD-1) had detectable petroleum hydrocarbon (diesel range petroleum hydrocarbons at a concentration of 1.1 mg/L). This sample is approximately equal to the MTCA target for drinking water of 1 mg/L. This borehole was located in the backfilled area of the filled-in portion of the fire pond. The diesel concentration is likely a result of the backfill material and not an indication of migration of diesel through the native silty clay soils. Two other groundwater samples were found to contain non-petroleum hydrocarbons at concentrations of 3.02 mg/L and 5.01 mg/L. These results are not subject to regulations and are likely due to biogenic (i.e., naturally occurring) substances, probably decomposed wood waste.

Stockpiled Soils

One composite soil sample (SO0014 from station FPS-1) was collected from the stockpiled soil previously removed from the fire pond. The sample was analyzed for petroleum hydrocarbons and found to contain 18,200 mg/kg lube oil. Although this sample was not analyzed using the EPH/VPH methods, a rough approximation of the likely results was estimated using results from a soil sample containing similar source materials. These estimates indicated a concentration of total aliphatic compounds in this sample of 5,700 mg/kg and a concentration of total aromatic compounds of 2,600 mg/kg[2]. These estimates are well below the Interim TPH Policy risk-based concentrations for direct contact with soil at industrial sites (Table 6). The estimate of total aromatic compound concentration is slightly greater than the Interim TPH Policy risk-based concentration for direct contact with soil at residential sites. As discussed above, applying standards based on residential land use is highly conservative for this site. Thus, this slight exceedance does not indicate a potential adverse health risk. Modeling predictions based on the Interim TPH Policy modeling approach and these estimated concentrations indicate that the TPH concentration present at this location does not present a threat to underlying groundwater.

Maintenance Shop

One storm drain sump sediment sample (SO0012 from station MSA-4) and two groundwater samples (from boreholes MSA-1 and MSA-2) were collected from the area near the storm drain located adjacent to the maintenance shop. A planned third groundwater sample (from borehole MSA-3) was not collected because of lack of water. The storm water entering this drain flows north in the buried cedar storm drain line to the North Ditch. A borehole was placed adjacent to that line in the field north of the facility.

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[2] The aliphatic and aromatic compound totals were roughly estimated from the lube oil concentration for sample FPS-1 because both types of petroleum analyses (TPH-Dx/TPH-Gx and EPH/VPH) were conducted on sample SO0011, which was collected from borehole FPD-1 at the fire pond and resulted from the same petroleum source material. For sample SO0011, the ratio of lube oil concentration (852 mg/kg) to total aliphatics (268 mg/kg) is 0.3145; the ratio to total aromatics (120 mg/kg) is 0.14. Applying these ratios to the 18,200 mg/kg lube oil result for sample SO0014 yields estimates of 5,725 mg/kg and 2,563 mg/kg total aliphatics and total aromatics, respectively.

A groundwater sample (GW0017) from that location was collected and analyzed for volatile organic compounds and petroleum hydrocarbons.

Sump Sediments

The sump sediments were very oily as indicated by the lube oil result (140,000 mg/kg). Results from this sample would likely exceed criteria based on the Interim TPH Policy if analyzed by the EPH/VPH method. Gasoline (76 mg/kg) and toluene (34 mg/kg) were detected but the concentrations were less than MTCA Method A levels. Other VOCs (1,1-dichloroethane, 1,1,1-trichloroethane, ethylbenzene, total xylenes, 1,2,4-trimethylbenzene, and naphthalene) were detected at concentrations (less than a maximum of 4 mg/kg) several orders of magnitude lower than the most conservative MTCA values.

Groundwater

The groundwater analyses indicated that very little migration has occurred from the storm drain to the adjacent groundwater (i.e., soil pore water). In the two MSA samples, low concentrations of volatile compounds were detected (40 μg/L acetone, 1.8 μg/L ethyl benzene, 11 μg/L total xylene, 0.6 μg/L carbon disulfide, 3 μg/L 1,3,5-trimethylbenzene, and 8 μg/L 1,2,4-trimethylbenzene). None of the results exceeded the most conservative MTCA risk-based formula values for groundwater consumption. The groundwater sample from the north field had only a very low concentration of carbon disulfide (1.5 μg/L) detected (MTCA cleanup level is 800 μg/L). No petroleum hydrocarbons compounds were detected for any of the three groundwater samples.

Former Burn Area

This area was identified by Buse personnel as the location of historic burning of wood debris. However, the three 4-ft boreholes did not show evidence of past burning (e.g., ash or cinders). The composite soil sample (SO0015) collected from this area was analyzed for dioxins/furans. The concentration of 0.3 pg/g, or 0.003 μg/kg TEC, is less than the typical background level of 0.008 μg/kg TEC (U.S. EPA 1994).

Ditch and Slough Sediments

Fifteen sediment samples collected from 14 stations in the drainage ditches surrounding the site (Figure 2) were analyzed for petroleum hydrocarbons. Ten samples were also analyzed for chlorinated phenols and nine for VOCs. Lube oil was the primary contaminant detected with gasoline and diesel range hydrocarbons detected in some of the North Ditch samples. No chlorinated phenols were detected. Four VOCs (acetone, 2-butanone (MEK), toluene, and 4-isopropyltoluene) were detected at relatively low concentrations in several samples. The concentrations were well below any MTCA levels for soils. MTCA has no cleanup criteria for petroleum hydrocarbons or VOCs in sediments (either marine or freshwater).

Lube oil concentrations are shown in Figure 5. Upgradient (background) concentration is 1,680 mg/kg as measured in sample WDM-1 in the West Ditch. The East Ditch samples (4,060 and 10,500 mg/kg) and the eastern South Ditch sample (SDM-2, 2,530 and 2,810 mg/kg) are influenced by runoff from the freeway and from the site. The highest concentrations (greater than 20,000 mg/kg) are found near the storm water outfall at the south end of the North Ditch. The lowest concentrations (220 and 245 mg/kg) were reported for the tide gate stations adjacent to Union Slough (samples USG-1 and USG-2) indicating that very little lube oil has migrated offsite.

The North Ditch sediment samples with the elevated lube oil also had elevated diesel range organics (3,340 to 7,740 mg/kg) and much lower concentrations of gasoline range organics (18.4 to 71.9 mg/kg).

The only potential exceedance of a MTCA level in the ditch sediments is the diesel range organics in the North Ditch that, if analyzed by the EPH/VPH method, might result in a predicted exceedance of the Interim TPH Policy soil criteria for the protection of groundwater. MTCA has no cleanup criteria for freshwater sediments and deals with each site on a case by case basis (WAC 173-204-340).

RECOMMENDATIONS

ABOVEGROUND STORAGE TANK AREA

Yes

These aboveground tanks are not in compliance with current codes for protection of surface waters. We recommend that these tanks be equipped with secondary containment. As indicated in the Phase II soil sampling, there does not appear to be a soil contamination problem. However, small areas of petroleum hydrocarbon contaminated soils may be encountered when constructing the containment. These areas should be excavated and disposed of as petroleum hydrocarbon contaminated soils (potentially at a municipal landfill). Also, a spill prevention control and counter measure plan will be required for these ASTs and other aboveground fuel storage facilities at the facility.

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FORMER UST AREA

No evidence of petroleum hydrocarbon soil contamination was found at the locations sampled. No further action is recommended for this area.

FORMER PENTACHLOROPHENOL DIP TANK AREA

No evidence of soil, groundwater, or stormdrain sump sediments was found at the locations sampled. No further action is recommended for this area.

FIRE POND AREA

Petroleum hydrocarbon soil concentrations did not exceed criteria based on Interim TPH Policy. Groundwater concentrations were equal to the MTCA target for drinking water, however the sample was collected in fill placed when the log pond was closed and does not indicate transport of petroleum hydrocarbon through the silty clay layer that is present as an aquitard throughout the site. Moreover, standards based on use of groundwater as a drinking water supply are highly conservative for use at this site because of the absence of usable groundwater. No further action is recommended for this area.

STOCKPILED SOILS

Because the only contaminant is petroleum hydrocarbon as lube oil, the material may pass criteria based on Ecology's Interim TPH Policy. However, we recommend that this relatively small volume (estimated 30 CY) of oily soil be disposed of offsite. Bioremediation is not effective for heavy oils and the soil may even be acceptable at a municipal solid waste landfill (it would need to be tested for dangerous waste characteristics to determine actual disposal options).

might [illegible] with the fuel & Burial

MAINTENANCE SHOP

Low concentrations of VOCs (below MTCA Method A cleanup levels) were detected in groundwater in this area. No petroleum hydrocarbon compounds were detected in groundwater in this area. No further action is recommended except for the storm drains (see below).

DITCH SEDIMENTS

We recommend that oily water discharges be discontinued (see below) and that petroleum hydrocarbon contaminated sediments in the southern portion of the ditch be excavated for off site treatment or disposal. Storm water controls will be sufficient to address petroleum hydrocarbons in the east, south and west ditches.

STORM DRAINS

The maintenance shop storm drain was found to contain elevated concentrations of lube oil. Low concentrations of chlorinated phenols were found in two other catch basins. Exponent recommends that sediments in the maintenance shop storm drain system (including the maintenance shop storm drain, down gradient catch basins, and sediment accumulated in the culvert) be removed for offsite treatment and disposal. No further action is required for the storm drains near the former penta dip tank. → Hog Fuel

STORM WATER

We recommend that storm water controls, Drain including oil-water separators be constructed to prevent oily water from entering adjacent surface waters. These methods could include installation of oil/water separators at storm drains, installation of curbing or other drainage control measures to channel runoff from high trafficked areas to oil/water separators, and regular maintenance of equipment used at the site. This should reduce the concentration of petroleum hydrocarbons in the ditches, but will not eliminate offsite sources.

LUBE OIL STORAGE

We recommend that secondary containment be provided for all lubricating or hydraulic oil storage facilities at the mill. → Doug

FORMER BURN AREA

We found no evidence of elevated concentrations of dioxins/furans in subsurface soils in this area. No further action is recommended.

ENGINEERING COST ESTIMATE

In a May 27, 1998 letter, Exponent provided KFP with a conceptual-level engineering cost estimate to address potential environmental problems at the site. With the conclusion of the Phase II ESA, we make the following comments regarding the validity of that estimate:

- Remedial investigation costs have been higher than estimated. This is due to the greater level of certainty requested by KFP.
- The cost for soil remediation should be less than estimated in the May 27, 1998 letter. The Phase II ESA has shown that soil remediation will not be required in several areas, including the former UST area, former dip tank, and fire pond. Remediation is still recommended for the stockpiled soils, sediments in the maintenance shop storm drain system, small quantities associated with the ASTs, and the southern portion of the North Ditch.
- The cost for oil water separation may be higher than estimated. The low gradients and distance from the site to surface waters may require more expensive oil water separator technology. Costs will vary based on the technologies chosen, location and number of treatment units, and the amount of culvert replaced.

The reduced costs for remediation may offset the increased costs for storm water control and management. Thus the engineering cost estimate is still a valid conceptual-level engineering estimate of expected costs to address environmental liabilities at the Buse Timber & Sales site.

REFERENCES

Ecology. 1997. Interim interpretive and policy statement: cleanup of total petroleum hydrocarbons. Ecology Publication No. ECY97-600. Washington State Department of Ecology, Olympia, WA.

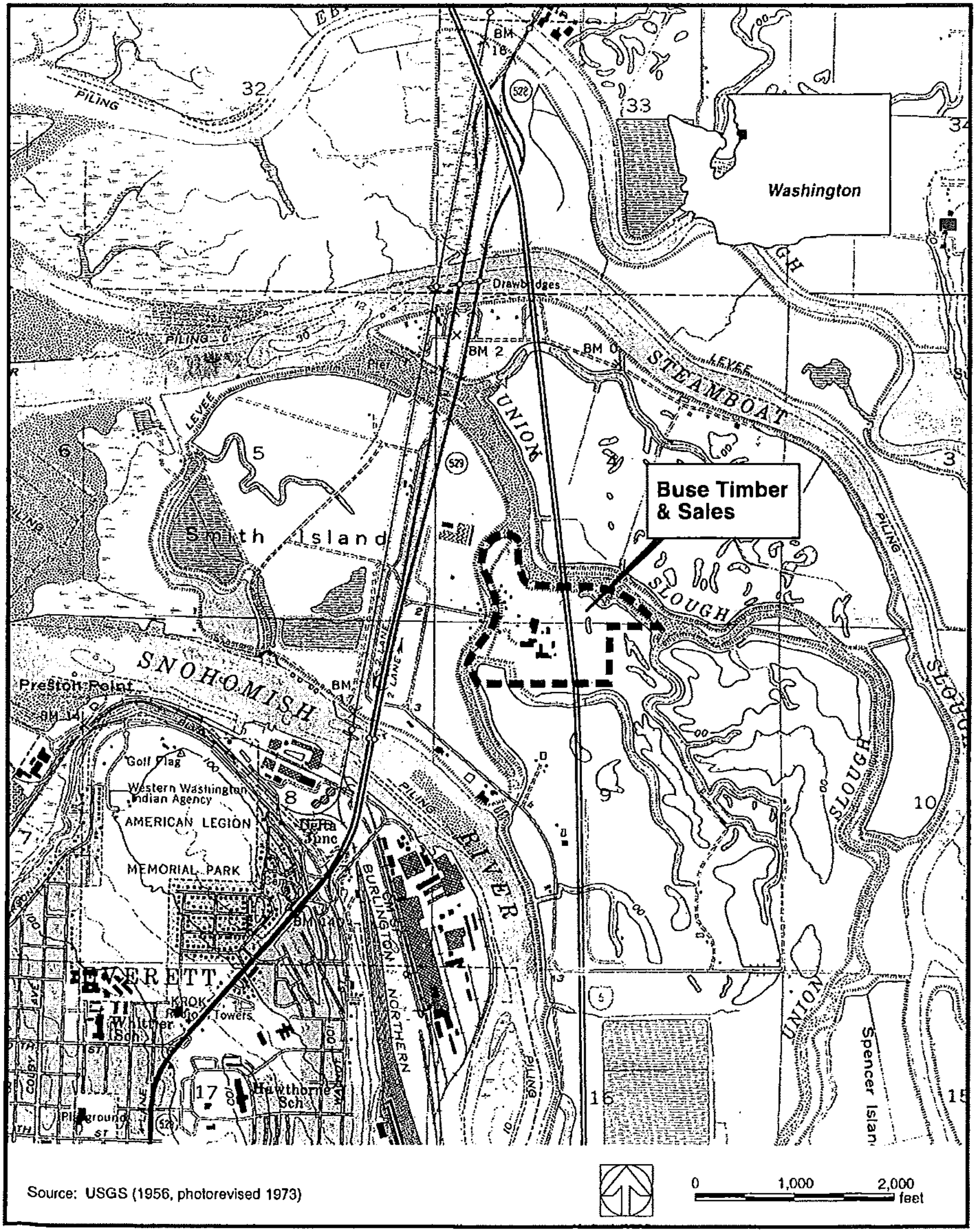
Exponent. 1998. Draft work plan, Phase II environmental site assessment, Buse Timber & Sales. Prepared by Exponent Environmental Group, Bellevue, WA.

USDA. 1983. Soil Survey of Snohomish County Area Washington. Soil Conservation Service, United States Department of Agriculture.

U.S. EPA. 1994. Estimating exposure to dioxin-like compounds. Volume II: properties, sources, occurrence and background exposures. EPA/600/6-88/005Cb. Exposure Assessment Group, Office of Health and Environmental Assessment, U.S. Environmental Protection Agency, Washington, DC.

U.S. EPA. 1998. Memorandum (Directive 9200.4-26 dated April 13, 1998 from Timothy Fields, Jr., Office of Solid Waste and Emergency Response, to EPA directors) re: approach for addressing dioxin in soil at CERCLA and RCRA sites. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Figures



Source: USGS (1956, photorevised 1973)

Figure 1. Buse Timber & Sales site, Everett, Washington.

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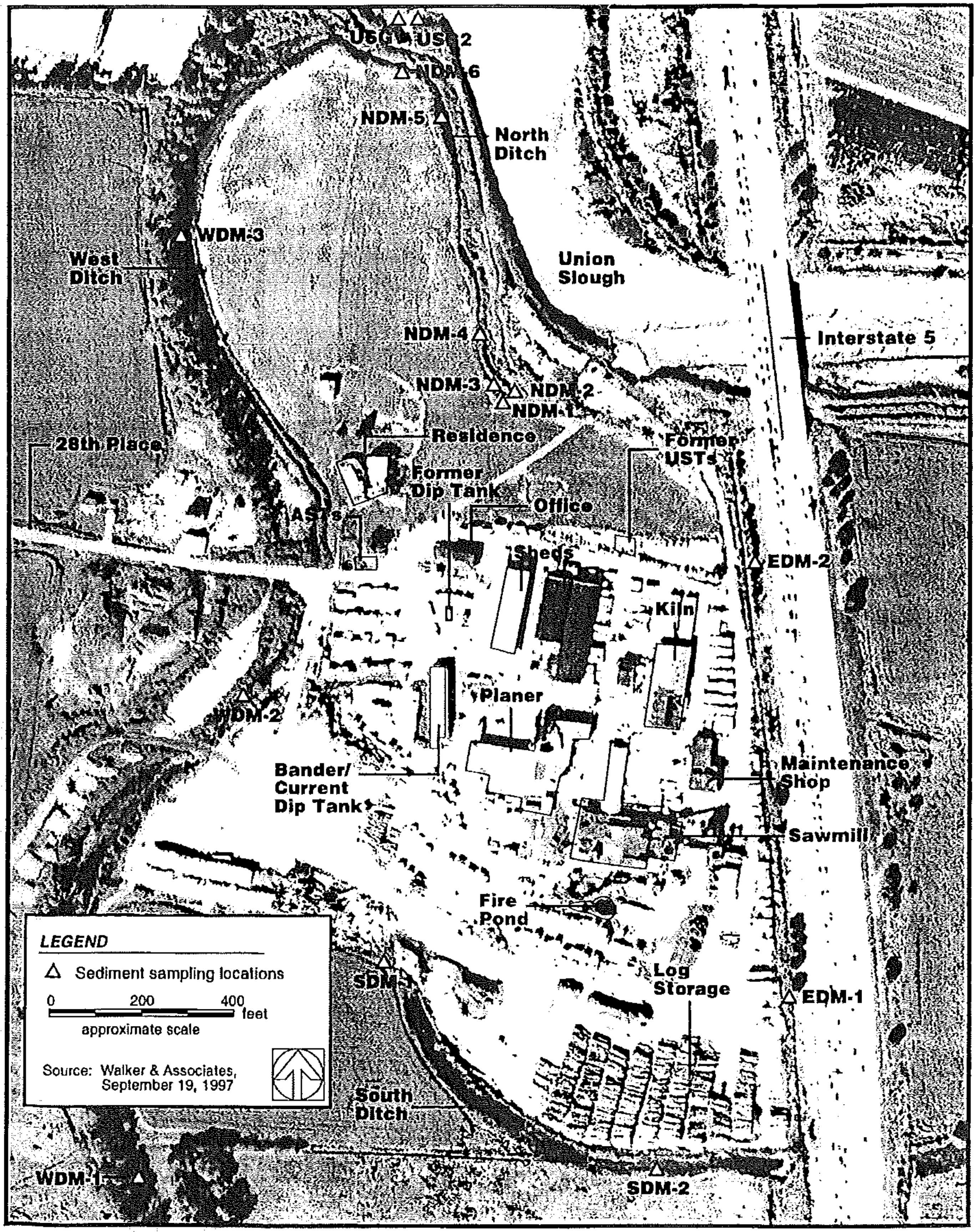

Figure 2. Surface sediment sampling locations.

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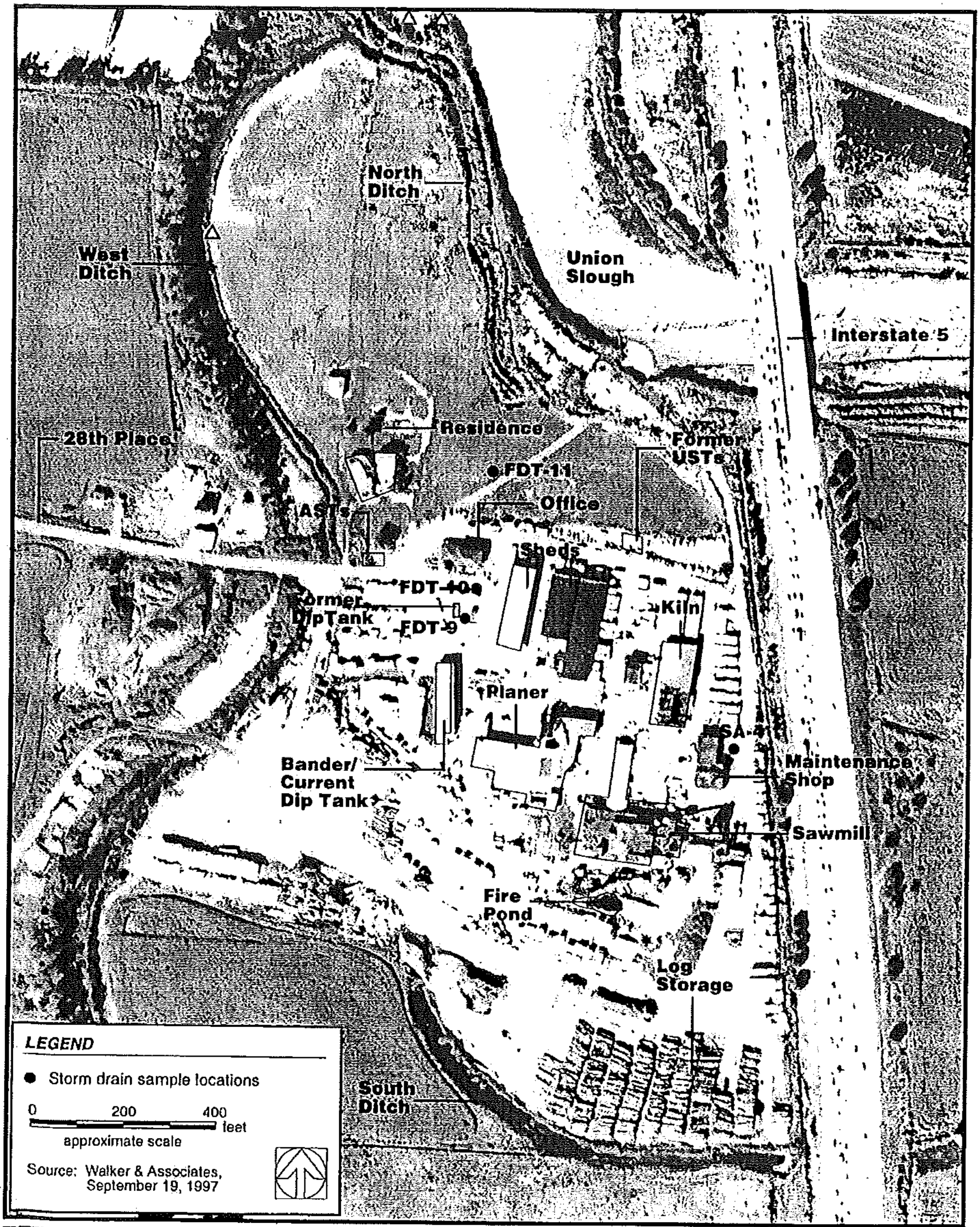

Figure 3. Storm drain sediment sample locations.

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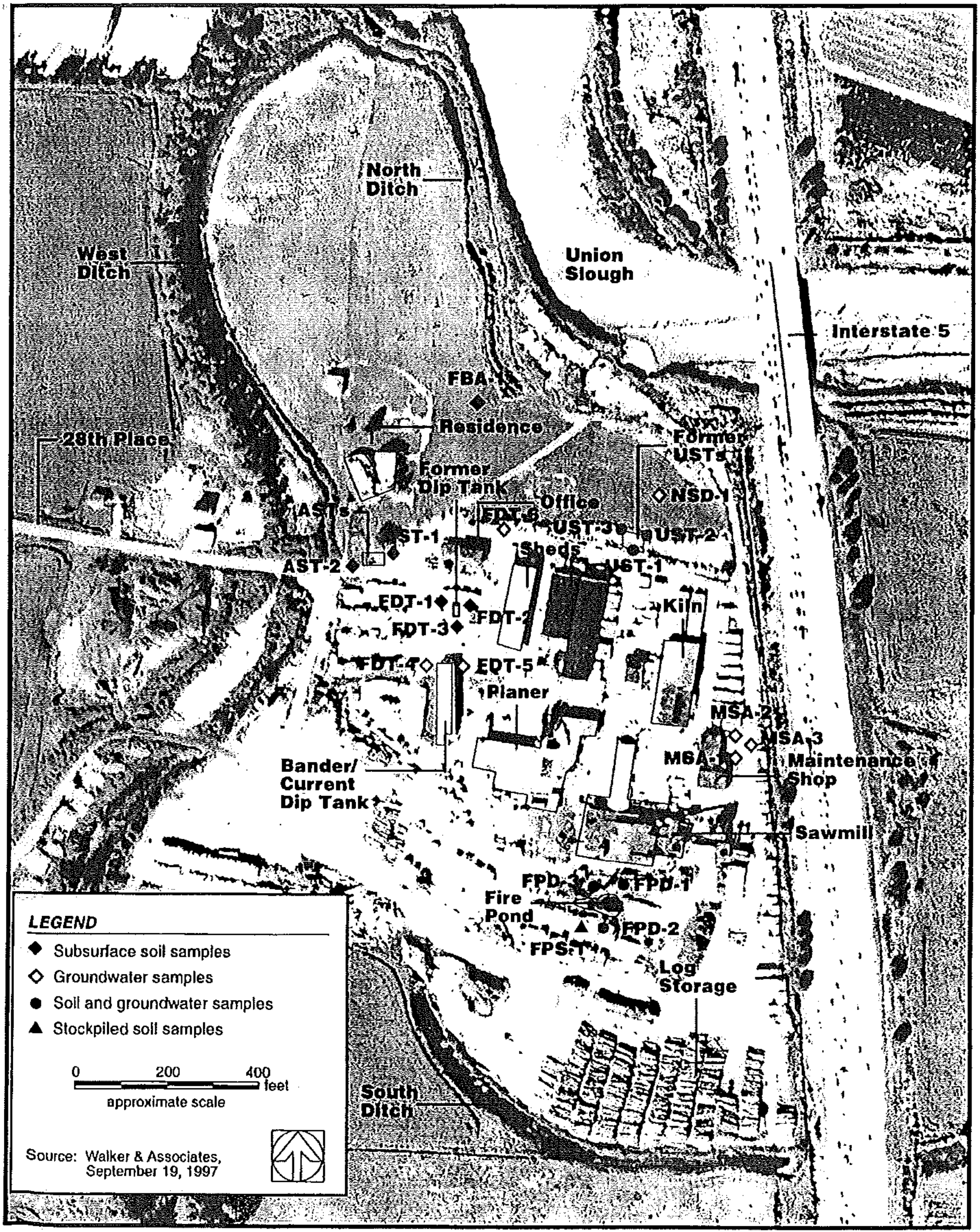

Figure 4. Geoprobe® sampling locations.

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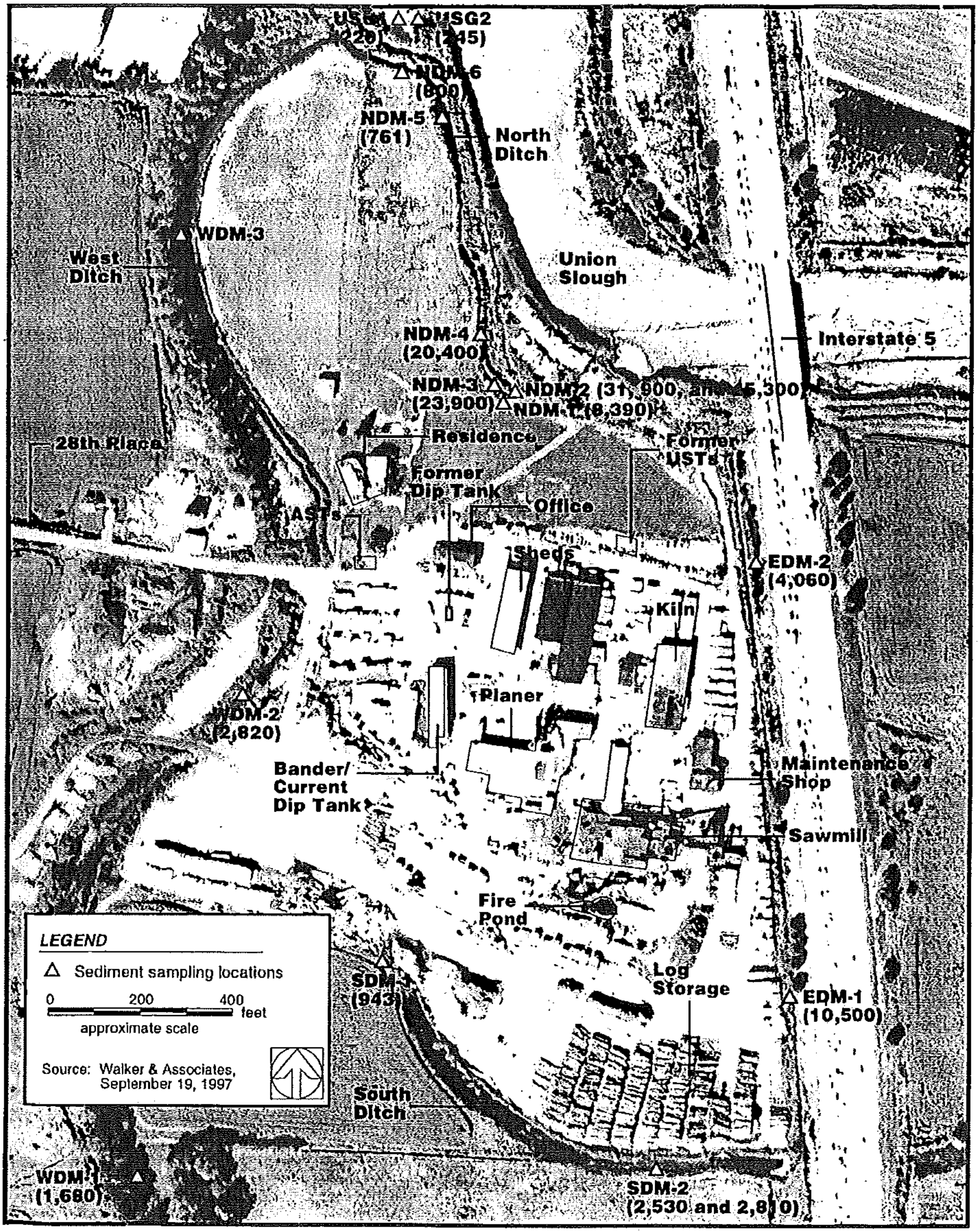

Figure 5. Lube oil concentration (mg/kg) in ditch sediments.

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Tables

TABLE 1. GENERAL SEDIMENT CHARACTERISTICS AND TYPE OF SAMPLING EQUIPMENT USED AT BUSE TIMBER SITE

Station	Sampling Equipment	Sediment Characteristics
North Ditch		
NDM-1	Polycarbonate core tube (3-in. diameter)	Brown-black color; thin layer of fine-grain sediment (>0.5 in. predominantly clay; sediment covered by thick blanket of vegetation (fresh and decomposing grass clippings); petroleum odor
NDM-2	Stainless-steel spoon	Black color; fine-grain sediment; lots of wood fragments; some worms; sheen on surface; very strong petroleum odor
NDM-3	Stainless-steel Ekman	Black color; fine-grain sediment; some wood debris and grass; two leaves removed from sample; sheen on surface; strong petroleum odor
NDM-4	Stainless-steel Ekman	Black color; fine-grain sediment with high water content; very little organic debris; some grass clippings; slight petroleum odor
NDM-5	Stainless-steel spoon	Brown color; clay; a few rocks removed from sample; organic debris on surface; no odor; sediment completely different from samples collected at Stations NDM1, NDM2, and NDM3
NDM-6	Stainless-steel spoon	Brown color; clay; decaying organic debris; no odor; sediment very similar to sample collected at Station NDM5
East Ditch		
EDM-1	Stainless-steel Ekman	Dark brown color; fine-grain sediment with high water content; organic debris; sheen on surface; slight petroleum odor
EDM-2	Stainless-steel Ekman	Dark brown color; fine-grain sediment with high water content; organic debris; slight petroleum odor
South Ditch		
SDM-1	Titanium core tube (3-in. diameter)	Thin red-brown flocculent layer on surface (0–0.75 in.); approximately 12 nymphs/larvae observed on sediment surface; 0.75–4 in. gray clay with gravel and sand and some organic debris; strong odor of decaying vegetation and possibly manure
SDM-2	Stainless-steel Ekman	Black color; fine-grain sediment with high water content; organic debris; no odor
West Ditch		
WDM-1	Titanium core tube (3-in. diameter)	Dark brown, fine-grain surface sediment with high water content (0–1.5 in.); large decaying leaf at 1.5 in.; 1.5–4 in. a lot of organic material (more organic material than sediment; sheen noted on surface of sample; no odor)
WDM-2	Stainless-steel Ekman	Red-brown, fine-grain surface sediment (0–0.75 in.); black color from 0.75 to 4 in.; fine-grain sediment with high water content; organic debris; normal odor

TABLE 1. (cont.)

Station	Sampling Equipment	Sediment Characteristics
WDM-3	Stainless-steel Ekman	Red-brown, fine-grain surface sediment (0–0.25 in.); black sediment from 0.25 to 2 in.; thin brown marbling in sediment at 2 in.; dark gray sediment from 2 to 4 in.; lots of organic debris; sheen on surface of water when sample was collected; normal odor
Union Slough		
USG-1	Stainless-steel spoon	Light brown, fine-grain sediment on surface (0–0.5 in.); 0.5–1.5 in. gray, fine-grain sediment; 1.5–4 in. dark gray compacted silt; normal odor
USG-2	Stainless-steel spoon	Light brown, fine-grain sediment on surface (0–0.5 in.); 0.5–1.5 in. gray, fine-grain sediment; 1.5–4 in. dark gray compacted silt; normal odor

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TABLE 2. SAMPLING AND ANALYSIS SUMMARY

Station ID	Depth	Sample No.	Archive Only	NWTPH-Gx	NWTPH-Dx	Chlorinated Phenols	Volatile Organic Compounds	Dioxins/ Furans	Total Dissolved Solids	WA-EPH & WA-VPH	Grain Size
Geoprobe Soil Samples											
Former Dip Tank											
FDT-1	2-4 ft	SO0002				X					X
FDT-2	4-6 ft	SO0001				X		X		X	
FDT-3	2-4 ft	SO0003				X					
FDT-3	4-6 ft	SO0016	X								
FDT-6	2-4 ft	SO0017	X								
Former Underground Storage Tanks											
UST-1	2-4 ft	SO0004		X	X						X
UST-2	2-4 ft	SO0005		X	X					X	
UST-3	2-4 ft	SO0006		X	X						
Current Aboveground Storage Tanks											
AST-1	0-2 ft	SO0007			X						
AST-1	2-4 ft	SO0008	X								
AST-2	0-2 ft	SO0009		X	X					X	
AST-2	2-4 ft	SO0010		X[a]							
Fire Pond											
FPD-1	2-4 ft	SO0011		X	X					X	
FPD-2	2-4 ft	SO0012		X	X						X
FPD-3	2-4 ft	SO0013		X	X						
Former Burn Area (3 boreholes composited into one sample)											
FBA-1	1-4 ft	SO0015						X			
Geoprobe Water Samples											
Former Dip Tank											
FDT-4	3-7 ft	GW0001				X			X		
FDT-5	NA	DELETED DUE TO POOR RECOVERY									
FDT-6	4-8 ft	GW0003				X			X		
FDT-7	NA	DELETED DUE TO POOR RECOVERY									
FDT-8	NA	DELETED DUE TO POOR RECOVERY									
Former Underground Storage Tanks											
UST-1	NA	DELETED DUE TO POOR RECOVERY									
UST-2	NA	DELETED DUE TO POOR RECOVERY									
UST-3	NA	DELETED DUE TO POOR RECOVERY									
Current Aboveground Storage Tanks											
AST-1	NA	DELETED DUE TO POOR RECOVERY									
AST-2	NA	DELETED DUE TO POOR RECOVERY									
Fire Pond											
FPD-1	2-6 ft	GW0011		X	X				X		
FPD-2	3-7 ft	GW0012		X	X				X		
FPD-3	4-8 ft	GW0013		X	X				X		
Maintenance Shop Area											
MSA-1	2-6 ft	GW0014		X	X		X		X		
MSA-2	2-6 ft	GW0015					X				
MSA-3	NA	DELETED DUE TO POOR RECOVERY									

TABLE 2. (cont.)

Station ID	Depth	Sample No.	Archive	NWTPH-Gx	NWTPH-Dx	Chlorinated Phenols	Volatile Organic Compounds	Dioxins	Total Dissolved Solids	WA-EPH & WA-VPH	Grain Size
Geoprobe Water Samples (cont.)											
North Storm Drain											
NSD-1	3-7 ft	GW0017		X	X		X		X		
Rinsate Blank											
RNS-1	NA	GW0018		X	X	X	X		X		
Storm Drain Sump Sediment Samples											
Former Dip Tank											
FDT-9	Surface	SD0010				X					
FDT-9	Sump	SD000B				X					
FDT-10	Surface	SD0011				X					
FDT-11	Sump	SD000A	X								
Maintenance Shop Area											
MSA-4	Surface	SD0012		X	X		X				
Ditch and Slough Sediment Samples											
Union Slough											
USG-1	0-4 in.	SD0013		X	X	X					
USG-2	0-4 in.	SD0014		X	X	X					
North Ditch											
NDM-1	0-4 in.	SD0003		X	X	X					
NDM-2	0-4 in.	SD0001		X	X						
NDM-2	0-4 in.	SD0002		X	X						
NDM-3	0-4 in.	SD0004		X	X						
NDM-4	0-4 in.	SD0005		X	X						
NDM-5	0-4 in.	SD0006		X	X						
NDM-6	0-4 in.	SD0007		X	X						
West Ditch											
WDM-1	0-4 in.	SD0015		X	X	X					
WDM-2	0-4 in.	SD0016		X	X	X					
WDM-3	0-4 in.	SD0017	X								
South Ditch											
SDM-1	0-4 in.	SD0018		X	X	X					
SDM-2	0-4 in.	SD0019		X	X	X					
East Ditch											
EDM-1	0-4 in.	SD0020		X	X	X					
EDM-2	0-4 in.	SD0021		X	X	X					
		SD0022	X	(Duplicate of USG2)							
		SD0023		X	X	X	(Duplicate of SDM2)				
Soil Grab Samples											
Fire Pond Soil Stockpile											
FPS-1		SO0014		X	X						X

[a] This sample was intended to be archived, but the laboratory inadvertently analyzed it for TPH-Gx.

TABLE 3. SOIL ANALYTICAL RESULTS

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				FDT-2	FDT-1	FDT-3	UST-1	UST-2	UST-3	AST-1	AST-2	AST-2	FPD-1
				SO0001	SO0002	SO0003	SO0004	SO0005	SO0006	SO0007	SO0009	SO0010	SO0011
				06/19/98	06/19/98	06/19/98	06/18/98	06/18/98	06/18/98	06/19/98	06/19/98	06/19/98	06/18/98
				14:15	14:00	14:40	10:45	11:00	11:30	16:30	17:10	17:25	17:24
Analyte	Units	Meas. Basis	Method	4-6 ft	2-4 ft	2-4 ft	2-4 ft	2-4 ft	2-4 ft	0-2 ft	0-2 ft	2-4 ft	2-4 ft
Diesel-Oil Range Petroleum Hydrocarbons													
Mineral spirits	mg/kg	dry	TPH-Dx				25 U	25 U	25 U	25 U	25 U		25 U
Jet fuel as Jet A	mg/kg	dry	TPH-Dx				25 U	25 U	25 U	25 U	25 U		25 U
Kerosene	mg/kg	dry	TPH-Dx				25 U	25 U	25 U	25 U	25 U		25 U
Diesel fuel	mg/kg	dry	TPH-Dx				25 U	25 U	25 U	25 U	25 U		25 U
Heavy fuel oil	mg/kg	dry	TPH-Dx				100 U	100 U	100 U	100 U	100 U		100 U
Lube oil	mg/kg	dry	TPH-Dx				100 U	100 U	100 U	635	291		852
PHC as diesel	mg/kg	dry	TPH-Dx				100 U	100 U	100 U	100 U	100 U		100 U
Non-PHC as diesel	mg/kg	dry	TPH-Dx				100 U	246	100 U	100 U	100 U		100 U
Gasoline Range Petroleum Hydrocarbons													
Gasoline	mg/kg	dry	TPH-Gx				20 U	20 U	20 U		20 U	20 U	20 U
Naphtha distillate	mg/kg	dry	TPH-Gx				20 U	20 U	20 U		20 U	20 U	20 U
Jet fuel as JP-4	mg/kg	dry	TPH-Gx				20 U	20 U	20 U		20 U	20 U	20 U
PHC as gasoline	mg/kg	dry	TPH-Gx				20 U	20 U	20 U		20 U	20 U	20 U
Non-PHC as gasoline	mg/kg	dry	TPH-Gx				20 U	20 U	20 U		20 U	20 U	20 U
Volatile Petroleum Hydrocarbon Fractions													
C8-C10 Aliphatics	mg/kg	dry	EPH	5 U				5 U			5 U		5 UJ
C10-C12 Aliphatics	mg/kg	dry	EPH	5 U				5 U			5 U		5 UJ
C10-C12 Aromatics	mg/kg	dry	EPH	5 U				5 U			5 U		5 UJ
C12-C16 Aliphatics	mg/kg	dry	EPH	5 U				5 U			5 U		5 UJ
C16-C21 Aliphatics	mg/kg	dry	EPH	32				19			5 U		41 J
C21-C34 Aliphatics	mg/kg	dry	EPH	186				13			23		227 J
C12-C16 Aromatics	mg/kg	dry	EPH	5 U				5 U			5 U		5 UJ
C16-C21 Aromatics	mg/kg	dry	EPH	5 U				34			25		37 J
C21-C34 Aromatics	mg/kg	dry	EPH	24				9			24		83 J
Extractable Petroleum Hydrocarbon Fractions													
C5-C6 Aliphatics	mg/kg	dry	VPH	5 U				5 U			5 U		5 U
C6-C8 Aliphatics	mg/kg	dry	VPH	5 U				5 U			5 U		5 U
C8-C10 Aromatics	mg/kg	dry	VPH	5 U				5 U			5 U		5 U
C8-C10 Aliphatics	mg/kg	dry	VPH	5 U				5 U			5 U		5 U
C10-C12 Aliphatics	mg/kg	dry	VPH	5 U				5 U			5 U		5 U
C10-C12 Aromatics	mg/kg	dry	VPH	5 U				5 U			5 U		5 U
C12-C13 Aromatics	mg/kg	dry	VPH	5 U							5 U		
Volatile Organic Compounds													
Methyl *tert* butylether	mg/kg	dry	8020A	0.5 U				0.5 U			0.5 U		0.5 UJ
Benzene	mg/kg	dry	8020A	0.05 U				0.05 U			0.05 U		0.05 UJ
Toluene	mg/kg	dry	8020A	0.1 U				0.1 U			0.1 U		0.1 UJ
Ethylbenzene	mg/kg	dry	8020A	0.1 U				0.1 U			0.1 U		0.1 UJ
meta and *para* Xylenes	mg/kg	dry	8020A	0.1 U				0.1 U			0.1 U		0.1 UJ
ortho-Xylene	mg/kg	dry	8020A	0.1 U				0.1 U			0.1 U		0.3 J
Phenols													
2,4,6-Trichlorophenol	ug/kg	dry	3540B/8151	5 U	20 U	15 U							
Tetrachlorophenols (2,3,4,5- and 2,3,4,6)	ug/kg	dry	3540B/8151	15 U	15 U	10 U							
Pentachlorophenol	ug/kg	dry	3540B/8151	40	5 U	15 U							

TABLE 3. (cont.)

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Analyte	Units	Meas. Basis	Method	FDT-2 SO0001 06/19/98 14:15 4-6 ft	FDT-1 SO0002 06/19/98 14:00 2-4 ft	FDT-3 SO0003 06/19/98 14:40 2-4 ft	UST-1 SO0004 06/18/98 10:45 2-4 ft	UST-2 SO0005 06/18/98 11:00 2-4 ft	UST-3 SO0006 06/18/98 11:30 2-4 ft	AST-1 SO0007 06/19/98 16:30 0-2 ft	AST-2 SO0009 06/19/98 17:10 0-2 ft	AST-2 SO0010 06/19/98 17:25 2-4 ft	FPD-1 SO0011 06/18/98 17:24 2-4 ft
Conventional Parameters													
Total solids (dry wt. as % of wet wt.)	%	wet	160.3M	50.4	65.2	56.8	63.4	76	53.3	80.2	74.2		87.4
Particles > 0.074 mm (sieve #200)	%	dry	D422		1.1		1.75						
Particles > 0.105 mm (sieve #140)	%	dry	D422		4.6		3.17						
Particles > 0.250 mm (sieve #60)	%	dry	D422		7.28		2.84						
Particles > 0.42 mm (sieve #40)	%	dry	D422		8.07		3.63						
Particles > 0.84 mm (sieve #20)	%	dry	D422		5.18		2.76						
Particles > 2.00 mm (sieve #10)	%	dry	D422		3.27		0.52						
Particles > 4.75 mm (sieve #4)	%	dry	D422		3.78		0.06						
Percent clay	%	dry	D422		22.9		32.4						
Percent silt	%	dry	D422		44.9		54.7						

TABLE 3. (cont.)

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Analyte	Units	Meas. Basis	Method	FPD-2 SO0012 06/19/98 07:40 2-4 ft	FPD-3 SO0013 06/19/98 09:10 2-4 ft	FPS-1 SO0014 06/19/98 16:50 2-4 ft	FBA-1 SO0015 6/18/98 9:30 1-4 ft	FDT-6 SO0017 06/19/98 15:45 2-4 ft
Diesel-Oil Range Petroleum Hydrocarbons								
Mineral spirits	mg/kg	dry	TPH-Dx	25 *U*	25 *U*	25 *U*		
Jet fuel as Jet A	mg/kg	dry	TPH-Dx	25 *U*	25 *U*	25 *U*		
Kerosene	mg/kg	dry	TPH-Dx	25 *U*	25 *U*	25 *U*		
Diesel fuel	mg/kg	dry	TPH-Dx	25 *U*	25 *U*	25 *U*		
Heavy fuel oil	mg/kg	dry	TPH-Dx	100 *U*	100 *U*	100 *U*		
Lube oil	mg/kg	dry	TPH-Dx	100 *U*	100 *U*	18200		
PHC as diesel	mg/kg	dry	TPH-Dx	100 *U*	100 *U*	100 *U*		
Non-PHC as diesel	mg/kg	dry	TPH-Dx	100 *U*	100 *U*	100 *U*		
Gasoline Range Petroleum Hydrocarbons								
Gasoline	mg/kg	dry	TPH-Gx	20 *U*	20 *U*	20 *U*		
Naphtha distillate	mg/kg	dry	TPH-Gx	20 *U*	20 *U*	20 *U*		
Jet fuel as JP-4	mg/kg	dry	TPH-Gx	20 *U*	20 *U*	20 *U*		
PHC as gasoline	mg/kg	dry	TPH-Gx	20 *U*	20 *U*	20 *U*		
Non-PHC as gasoline	mg/kg	dry	TPH-Gx	20 *U*	20 *U*	20 *U*		
Volatile Petroleum Hydrocarbon Fractions								
C8-C10 Aliphatics	mg/kg	dry	EPH					
C10-C12 Aliphatics	mg/kg	dry	EPH					
C10-C12 Aromatics	mg/kg	dry	EPH					
C12-C16 Aliphatics	mg/kg	dry	EPH					
C16-C21 Aliphatics	mg/kg	dry	EPH					
C21-C34 Aliphatics	mg/kg	dry	EPH					
C12-C16 Aromatics	mg/kg	dry	EPH					
C16-C21 Aromatics	mg/kg	dry	EPH					
C21-C34 Aromatics	mg/kg	dry	EPH					
Extractable Petroleum Hydrocarbon Fractions								
C5-C6 Aliphatics	mg/kg	dry	VPH					
C6-C8 Aliphatics	mg/kg	dry	VPH					
C8-C10 Aromatics	mg/kg	dry	VPH					
C8-C10 Aliphatics	mg/kg	dry	VPH					
C10-C12 Aliphatics	mg/kg	dry	VPH					
C10-C12 Aromatics	mg/kg	dry	VPH					
C12-C13 Aromatics	mg/kg	dry	VPH					
Volatile Organic Compounds								
Methyl *tert* butylether	mg/kg	dry	8020A					
Benzene	mg/kg	dry	8020A					
Toluene	mg/kg	dry	8020A					
Ethylbenzene	mg/kg	dry	8020A					
meta and *para* Xylenes	mg/kg	dry	8020A					
ortho-Xylene	mg/kg	dry	8020A					
Phenols								
2,4,6-Trichlorophenol	ug/kg	dry	3540B/8151					
Tetrachlorophenols (2,3,4,5- and 2,3,4,6)	ug/kg	dry	3540B/8151					
Pentachlorophenol	ug/kg	dry	3540B/8151					

TABLE 3. (cont.)

DRAFT

Analyto	Units	Meas. Basis	Method	FPD-2 SO0012 06/19/98 07:40 2-4 ft	FPD-3 SO0013 06/19/98 09:10 2-4 ft	FPS-1 SO0014 06/19/98 16:50 2-4 ft	FBA-1 SO0015 6/18/98 9:30 1-4 ft	FDT-6 SO0017 06/19/98 15:45 2-4 ft
PAHs								
Naphthalene	ug/kg	dry	SIM					
2-Methylnaphthalene	ug/kg	dry	SIM					
Acenaphthene	ug/kg	dry	SIM					
Acenaphthylene	ug/kg	dry	SIM					
Dibenzofuran	ug/kg	dry	SIM					
Fluorene	ug/kg	dry	SIM					
Phenanthrene	ug/kg	dry	SIM					
Anthracene	ug/kg	dry	SIM					
Fluoranthene	ug/kg	dry	SIM					
Pyrene	ug/kg	dry	SIM					
Benz[a]anthracene	ug/kg	dry	SIM					
Benzo[a]pyrene	ug/kg	dry	SIM					
Benzo[b]fluoranthene	ug/kg	dry	SIM					
Benzo[ghi]perylene	ug/kg	dry	SIM					
Benzo[k]fluoranthene	ug/kg	dry	SIM					
Chrysene	ug/kg	dry	SIM					
Dibenz[a,h]anthracene	ug/kg	dry	SIM					
Indeno[1,2,3-cd]pyrene	ug/kg	dry	SIM					
Polychlorinated Dibenzo-p-dioxins and Dibenzofurans								
2,3,7,8-TCDD	pg/g	dry	8290				0.059 *U*	
Total TCDD	pg/g	dry	8290				4.1	
1,2,3,7,8-PeCDD	pg/g	dry	8290				0.1	
Total PeCDD	pg/g	dry	8290				1.4	
1,2,3,4,7,8-HxCDD	pg/g	dry	8290				0.14	
1,2,3,6,7,8-HxCDD	pg/g	dry	8290				0.33	
1,2,3,7,8,9-HxCDD	pg/g	dry	8290				0.37	
Total HxCDD	pg/g	dry	8290				5.4	
1,2,3,4,6,7,8-HpCDD	pg/g	dry	8290				3.5	
Total HpCDD	pg/g	dry	8290				9	
OCDD	pg/g	dry	8290				62	
2,3,7,8-TCDF	pg/g	dry	8290				0.053 *U*	
Total TCDF	pg/g	dry	8290				1.2	
1,2,3,7,8-PeCDF	pg/g	dry	8290				0.048 *U*	
2,3,4,7,8-PeCDF	pg/g	dry	8290				0.081 *U*	
Total PeCDF	pg/g	dry	8290				0.48	
1,2,3,4,7,8-HxCDF	pg/g	dry	8290				0.076 *U*	
1,2,3,6,7,8-HxCDF	pg/g	dry	8290				0.041 *U*	
2,3,4,6,7,8-HxCDF	pg/g	dry	8290				0.044 *U*	
1,2,3,7,8,9-HxCDF	pg/g	dry	8290				0.083 *U*	
Total HxCDF	pg/g	dry	8290				0.62	
1,2,3,4,6,7,8-HpCDF	pg/g	dry	8290				0.6	
1,2,3,4,7,8,9-HpCDF	pg/g	dry	8290				0.036 *U*	
Total HpCDF	pg/g	dry	8290				1.2	
OCDF	pg/g	dry	8290				1.7	

TABLE 3. (cont.)

Analyte	Units	Meas. Basis	Method	FPD-2 SO0012 06/19/98 07:40 2-4 ft	FPD-3 SO0013 06/19/98 09:10 2-4 ft	FPS-1 SO0014 06/19/98 16:50 2-4 ft	FBA-1 SO0015 6/18/98 9:30 1-4 ft	FDT-6 SO0017 06/19/98 15:45 2-4 ft
Conventional Parameters								
Total solids (dry wt. as % of wet wt.)	%	wet	160.3M	90.7	94.1	41.4		
Particles > 0.074 mm (sieve #200)	%	dry	D422	0.82				1.31
Particles > 0.105 mm (sieve #140)	%	dry	D422	11.3				5.63
Particles > 0.250 mm (sieve #60)	%	dry	D422	34.9				3.93
Particles > 0.42 mm (sieve #40)	%	dry	D422	33.2				2.55
Particles > 0.84 mm (sieve #20)	%	dry	D422	8.31				2.01
Particles > 2.00 mm (sieve #10)	%	dry	D422	2.88				0.77
Particles > 4.75 mm (sieve #4)	%	dry	D422	4.6				0
Percent clay	%	dry	D422	0.78				28.6
Percent silt	%	dry	D422	2.83				54.4

TABLE 4. SEDIMENT ANALYTICAL RESULTS

Analyte	Units	Meas. Basis	Method	NDM-2 SD0001 05/08/98 13:08 0-4 in.	NDM-2 SD0002 05/08/98 13:23 0-4 in.	NDM-1 SD0003 05/08/98 13:55 0-4 in.	NDM-3 SD0004 05/08/98 15:10 0-4 in.	NDM-4 SD0005 05/08/98 15:55 0-4 in.	NDM-5 SD0006 05/08/98 16:40 0-4 in.	NDM-6 SD0007 05/08/98 17:28 0-4 in.	FDT-9 SD0008 06/29/98 14:10 Sump	FDT-9 SD0010 06/29/98 12:20 Sump	FDT-10 SD0011 06/29/98 13:10 Sump	MSA-4 SD0012 06/29/98 11:30 Sump	USG-1 SD0013 06/29/98 14:50 0-4 in.
Diesel-Oil Range Hydrocarbons															
Mineral spirits	mg/kg	dry	TPH-Dx											25 *U*	25
Jet fuel as Jet A	mg/kg	dry	TPH-Dx											25 *U*	25
Kerosene	mg/kg	dry	TPH-Dx	50 *UJ*	50 *UJ*	50 *UJ*	50 *UJ*	50 *UJ*	50 *UJ*	10 *UJ*				25 *U*	25
Diesel fuel	mg/kg	dry	TPH-Dx											25 *U*	25
Heavy fuel oil	mg/kg	dry	TPH-Dx	125 *UJ*	125 *UJ*	125 *UJ*	125 *UJ*	125 *UJ*	125 *UJ*	25 *UJ*				100 *U*	100
Lube oil	mg/kg	dry	TPH-Dx	45300 *J*	31900 *J*	8390 *J*	23900 *J*	20400 *J*	761 *J*	800 *J*				140000	220
PHC as diesel	mg/kg	dry	TPH-Dx											100 *U*	100
Non-PHC as diesel	mg/kg	dry	TPH-Dx											100 *U*	100
Gx range hydrocarbons [<C10]	mg/kg	dry	TPH-Dx	50 *UJ*	50 *UJ*	50 *UJ*	50 *UJ*	50 *UJ*	50 *UJ*	10 *UJ*					
Diesel range organics	mg/kg	dry	TPH-Dx	7740 *J*	7120 *J*	50 *UJ*	5240 *J*	3440 *J*	50 *UJ*	10 *UJ*					
Insulating oil range hydrocarbons	mg/kg	dry	TPH-Dx	125 *UJ*	125 *UJ*	125 *UJ*	125 *UJ*	125 *UJ*	125 *UJ*	25 *UJ*					
Gasoline Range Hydrocarbons															
Gasoline	mg/kg	dry	TPH-Gx											20 *UJ*	20
Naphtha distillate	mg/kg	dry	TPH-Gx											20 *UJ*	20
Jet fuel as JP-4	mg/kg	dry	TPH-Gx											20 *UJ*	20
PHC as gasoline	mg/kg	dry	TPH-Gx											76 *J*	20
Non-PHC as gasoline	mg/kg	dry	TPH-Gx											20 *UJ*	20
Aviation gasoline range hydrocarbons	mg/kg	dry	TPH-Gx	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *U*	5 *U*					
Gasoline range organics	mg/kg	dry	TPH-Gx	46.2 *J*	71.9 *J*	5	53.8 *J*	18.4 *J*	5 *U*	5 *U*					
VM&P naphtha range hydrocarbons	mg/kg	dry	TPH-Gx	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *U*	5 *U*					
Mineral spirits	mg/kg	dry	TPH-Gx	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *U*	5 *U*					
Dx range hydrocarbons [>C12]	mg/kg	dry	TPH-Gx	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *UJ*	5 *U*	5 *U*					
Phenols															
2,4,6-Trichlorophenol	mg/kg	dry	3540B/8151								0.005 *U*	0.005 *U*	0.005 *U*		0.005
Tetrachlorophenols (2,3,4,5- and 2,3,4,6)	mg/kg	dry	3540B/8151								0.005 *U*	0.105	0.081		0.005
Pentachlorophenol	mg/kg	dry	3540B/8151			0.01 *U*					0.016	0.5	0.22		0.005
Volatile Organic Compounds															
Dichlorodifluoromethane	ug/kg	dry	8260B											200 *U*	10
Chloromethane	ug/kg	dry	8260B											200 *U*	10
Vinyl chloride	ug/kg	dry	8260B											200 *U*	10
Bromomethane	ug/kg	dry	8260B											200 *U*	10
Chloroethane	ug/kg	dry	8260B											200 *U*	10
Trichlorofluoromethane	ug/kg	dry	8260B											200 *U*	10
Acetone	ug/kg	dry	8260B											10000 *U*	100
1,1-Dichloroethene	ug/kg	dry	8260B											200 *U*	10
Carbon disulfide	ug/kg	dry	8260B											200 *U*	10
Methylene chloride	ug/kg	dry	8260B											200 *U*	20
trans-1,2-Dichloroethene	ug/kg	dry	8260B											200 *U*	10
1,1-Dichloroethane	ug/kg	dry	8260B											2500	10
2-Butanone	ug/kg	dry	8260B											10000 *U*	40
2,2-Dichloropropane	ug/kg	dry	8260B											200 *U*	10
cis-1,2-Dichloroethene	ug/kg	dry	8260B											730	10
Chloroform	ug/kg	dry	8260B											200 *U*	10
Bromochloromethane	ug/kg	dry	8260B											200 *U*	10
1,1,1-Trichloroethane	ug/kg	dry	8260B											560	10
1,1-Dichloropropene	ug/kg	dry	8260B											200 *U*	10
Carbon tetrachloride	ug/kg	dry	8260B											200 *U*	10

TABLE 5. GROUNDWATER ANALYTICAL RESULTS

Analyte	Units	Meas. Basis	Method	FDT-4 GW0001 06/19/98 12:45 3-7 ft	FDT-6 GW0003 06/19/98 17:40 4-8 ft	FPD-1 GW0011 06/18/98 17:15 2-6 ft	FPD-2 GW0012 06/19/98 07:50 3-7 ft	FPD-3 GW0013 06/19/98 09:25 4-8 ft	MSA-1 GW0014 06/18/98 14:45 2-6 ft	MSA-2 GW0015 06/19/98 10:15 2-6 ft	NSD-1 GW0017 06/18/98 13:35 3-7 ft
Diesel-Oil Range Hydrocarbons											
Diesel fuel	ug/L	whl	TPX-Dx			250 *U*	250 *U*	250 *U*	250 *UJ*		250 *U*
Heavy fuel oil	ug/L	whl	TPX-Dx			500 *U*	500 *U*	500 *U*	500 *UJ*		500 *U*
Jet fuel as Jet A	ug/L	whl	TPX-Dx			250 *U*	250 *U*	250 *U*	250 *UJ*		250 *U*
Kerosene	ug/L	whl	TPX-Dx			250 *U*	250 *U*	250 *U*	250 *UJ*		250 *U*
Lube oil	ug/L	whl	TPX-Dx			500 *U*	500 *U*	500 *U*	500 *UJ*		500 *U*
Mineral spirits	ug/L	whl	TPX-Dx			250 *U*	250 *U*	250 *U*	250 *UJ*		250 *U*
Non-PHC as diesel	ug/L	whl	TPX-Dx			500 *U*	5010	3020	792 *J*		1900
PHC as diesel	ug/L	whl	TPX-Dx			1110	500 *U*	500 *U*	500 *UJ*		500 *U*
Gasoline Range Hydrocarbons											
Gasoline	ug/L	whl	TPH-Gx			250 *U*	250 *U*	250 *U*	250 *U*		250 *U*
Naphtha distillate	ug/L	whl	TPH-Gx			250 *U*	250 *U*	250 *U*	250 *U*		250 *U*
Jet fuel as JP-4	ug/L	whl	TPH-Gx			250 *U*	250 *U*	250 *U*	250 *U*		250 *U*
PHC as gasoline	ug/L	whl	TPH-Gx			250 *U*	250 *U*	250 *U*	250 *U*		250 *U*
Non-PHC as gasoline	ug/L	whl	TPH-Gx			250 *U*	260	250 *U*	250 *U*		250 *U*
Phenols											
2,4,6-Trichlorophenol	ug/L	whl	8151	0.5 *U*	0.5 *U*						
Pentachlorophenol	ug/L	whl	8151	0.5 *U*	0.5 *U*						
Tetrachlorophenols (2,3,4,5- and 2,3,4,6)	ug/L	whl	8151	0.5 *U*	0.5 *U*						
Volatile Organic Compounds											
Dichlorodifluoromethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Chloromethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Vinyl chloride (CH2--CHCl)	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Bromomethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Chloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Trichlorofluoromethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Acetone	ug/L	whl	8260A						20 *U*	40	20 *U*
1,1-Dichloroethene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Carbon disulfide	ug/L	whl	8260A						0.5 *U*	0.6	1.5
Methylene chloride (dichloromethane)	ug/L	whl	8260A						1 *U*	1 *U*	1 *U*
trans-1,2-Dichloroethene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,1-Dichloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
2-Butanone (methyl ethyl ketone, MEK)	ug/L	whl	8260A						20 *U*	20 *U*	20 *U*
2,2-Dichloropropane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
cis-1,2-Dichloroethene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Chloroform	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Bromochloromethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,1,1-Trichloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,1-Dichloropropene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Carbon tetrachloride	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,2-Dichloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Benzene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Trichloroethene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,2-Dichloropropane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*

TABLE 5. (cont.)

DRAFT

Analyte	Units	Meas. Basis	Method	FDT-4 GW0001 06/19/98 12:45 3-7 ft	FDT-6 GW0003 06/19/98 17:40 4-8 ft	FPD-1 GW0011 06/18/98 17:15 2-6 ft	FPD-2 GW0012 06/19/98 07:50 3-7 ft	FPD-3 GW0013 06/19/98 09:25 4-8 ft	MSA-1 GW0014 06/18/98 14:45 2-6 ft	MSA-2 GW0015 06/19/98 10:15 2-6 ft	NSD-1 GW0017 06/18/98 13:35 3-7 ft
Bromodichloromethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Dibromomethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
2-Hexanone	ug/L	whl	8260A						20 *U*	20 *U*	20 *U*
cis-1,3-Dichloropropene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Toluene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
trans-1,3-Dichloropropene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,1,2-Trichloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
4-Methyl-2-pentanone (MIBK)	ug/L	whl	8260A						20 *U*	20 *U*	20 *U*
1,3-Dichloropropane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,1,1,2-Tetrachloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,1,2,2-Tetrachloroethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,2,3-Trichlorobenzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
1,2,3-Trichloropropane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,2,4-Trichlorobenzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
1,2,4-Trimethylbenzene	ug/L	whl	8260A						8	2 *U*	2 *U*
1,2-Dibromo-3-chloropropane	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
1,2-Dibromoethane (EDB)	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
1,2-Dichlorobenzene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,3,5-Trimethylbenzene	ug/L	whl	8260A						3	2 *U*	2 *U*
1,3-Dichlorobenzene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
1,4-Dichlorobenzene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
2-Chlorotoluene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
4-Chlorotoluene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
4-Isopropyltoluene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
Bromobenzene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Bromoform	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Chlorobenzene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Dibromochloromethane	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Ethylbenzene	ug/L	whl	8260A						1.8	0.5 *U*	0.5 *U*
Hexachlorobutadiene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
Isopropylbenzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
Naphthalene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
n-Butyl benzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
n-Propylbenzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
sec Butylbenzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
Styrene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
tert Butylbenzene	ug/L	whl	8260A						2 *U*	2 *U*	2 *U*
Tetrachloroethene	ug/L	whl	8260A						0.5 *U*	0.5 *U*	0.5 *U*
Xylene isomers (total)	ug/L	whl	8260A						11	0.5 *U*	0.5 *U*
Conventional Parameters											
Total dissolved solids	mg/L	dis	160.1	364	2080	2160	852	535	612		5230

TABLE 6. COMPARISON OF SITE TPH DATA WITH BENCHMARKS FROM FROM MTCA INTERIM TPH POLICY (Ecology 1997)

	Site Values				Comparison Values		
Basis for Comparison	SO0001	SO0005	SO0009	SO0011			
	Station Location						
	FDT-2	UST-2	AST-2	FDD-1			
Direct Contact with Soil					Risk-Based Soil Concentration (mg/kg)		
Description of Value	Site Soil Concentration (mg/kg)				Residential	Commercial	Industrial
Total aliphatic compounds	218	32	23	268	4,800	19,200	210,000
Total aromatic compounds	24	43	49	120	2,400	9,600	105,000
Groundwater Protection							
Description of Value	Predicted Groundwater Concentration (mg/L)				MTCA Target for Drinking Water (mg/L)		
TPH	0.0002	0.016	0.015	0.007	1		

Note: With one exception, no individual toxic constituents of TPH (i.e., benzene, toluene, ethylbenzene, xylenes) or polycyclic aromatic hydrocarbon (PAH) compounds were detected in these samples. Ortho-xylene was detected at a concentration of 0.3 mg/kg in SO0011. The risk-based soil concentrations for ortho-xylene are 160,000 mg/kg (residential), 640,000 mg/kg (commercial), and >1,000,000 mg/kg (industrial).

MTCA - Model Toxics Control Act
TPH - total petroleum hydrocarbon

Attachment A

Summary of Historical Photos

BUSE SITE AERIAL PHOTOS

1947 (B&W)

This photo shows most of the site to be cultivated farm fields. The sawmill occupies a small area near the entrance to the current mill (west edge of operating mill, adjacent to the west ditch). The West Ditch is much larger in this photo than at present, and is a tributary of Union Slough. The South Ditch connects to the West Ditch. There is some evidence of fill to the south of the mill and along the north side of the South Ditch.

1955 (B&W)

This photo shows an expanded mill with several new buildings. The mill operation has been expanded to the east. Two log ponds have been created between the mill and the South Ditch. The west end of the South Ditch has been filled, apparently related to the construction of the log pond. The West Ditch is mostly dry, having been blocked off at Union Slough (and presumably at the Snohomish River, but that is not visible in the picture).

1967 (B&W)

This photo shows a greatly expanded mill occupying the present mill location. The original mill shown in the 1947 and 1955 photos has been demolished. The log pond has been increased in size and now occupies the entire area south of the mill and north of the South Ditch. A large log storage area is also visible southeast of the mill. Logs are shown rafted in Union Slough and a ramp is visible where logs are hauled out.

Vegetation is visible in the West Ditch, especially in the lower (northern) channel near the former confluence with Union Slough.

Log storage and other trafficked areas extend eastward under the current location of Interstate 5 and into the western edge of the current farm field (this includes the area along I-5 that is not currently cultivated). The remaining lands to the east of the mill appear to be cultivated.

1976 (B&W)

This photo shows Interstate 5 crossing through the site. The log ponds have been almost entirely filled — only a small pond remains immediately south of the mill building. A dark rectangle is located south of the mill office. This may be the former penta dip tank. This feature was not visible in the 1967 photograph, but may have been obscured by stacks of lumber. Logs are still rafted along Union Slough; the land to the east of the freeway appears to be cultivated.

FEBRUARY 1981 (B&W)

This photo shows the mill to be very similar to the present configuration. The mill office has been expanded and there is a soil "mound" in the field north of the dry lumber storage sheds. (According to Buse personnel, this is a septic system built when the office was expanded.) The log pond is much smaller than in the 1976 photo. A dark rectangle corresponding with the location of the former penta dip tank is visible in the photo.

MARCH 1985 (B&W)

This photo also shows the mill to be very similar to the present configuration. A light-colored rectangle that appears to be the former penta dip tank is present.

The field north of the office (near the confluence of the west and north ditches) has been expanded by reclaiming/grading the vegetated portions of the former west slough (i.e., the area of the West Ditch that was formerly a river channel). The field south of the log storage area has been similarly expanded westward into the former river channel/West Ditch.

A new drainage ditch is now visible extending westward from the southern portion of the South Ditch. This new ditch cuts straight across the cornfield, whereas the original South Ditch curved northward along the edge of the log yard.

SEPT 1989 (COLOR)

This photo is very similar to the present site conditions. The southwest corner of the log storage area has been expanded over the western end of the South Ditch. Although it is not clearly visible, the former penta dip tank appears to still be present.

SEPTEMBER 1993 (COLOR)

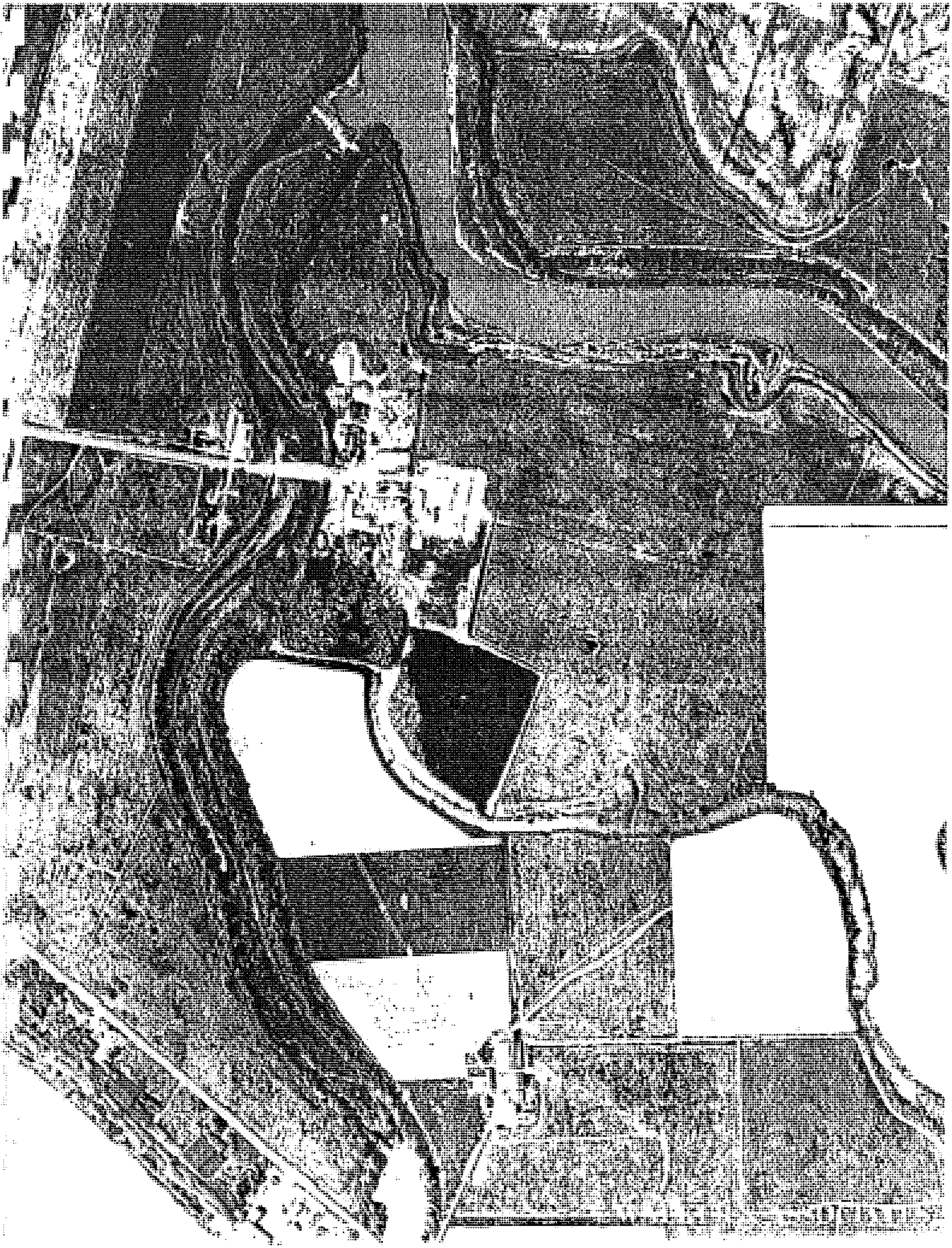
This photo is also very similar to the present mill site conditions. The photo shows the active filling or expansion of the southwest corner of the log storage area into the adjacent farm field.

What appears to be a pile of lumber is located at the former location of the penta dip tank. The southern end of the farmland (east of I-5) is not currently cultivated.

SEPTEMBER 1997 (COLOR)

This photo closely matches current site conditions. The former penta dip tank is not visible. The expansion of the southwest corner of the log yard appears to be complete. The land east of the freeway is cultivated.


SNYDER & ASSOCIATES

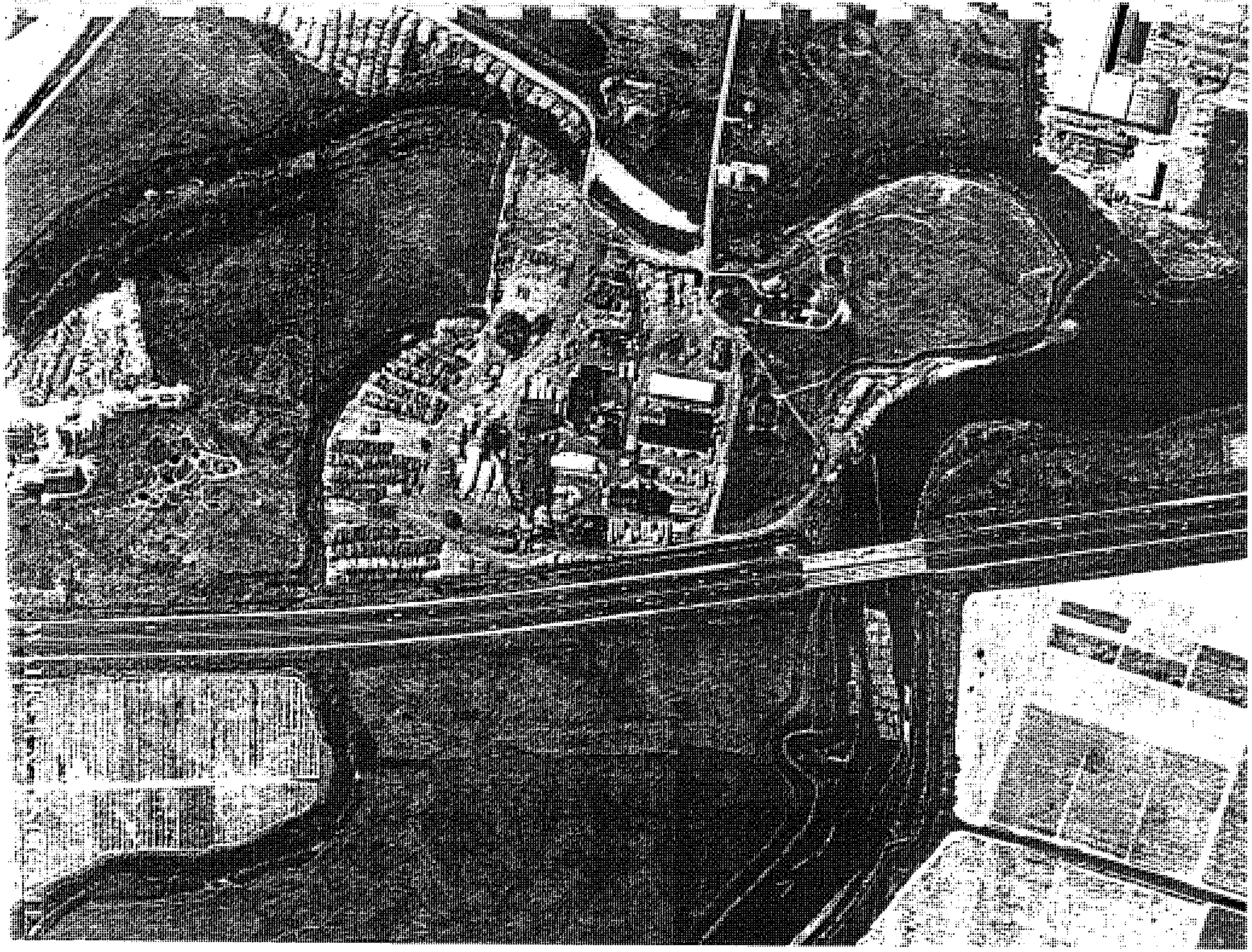


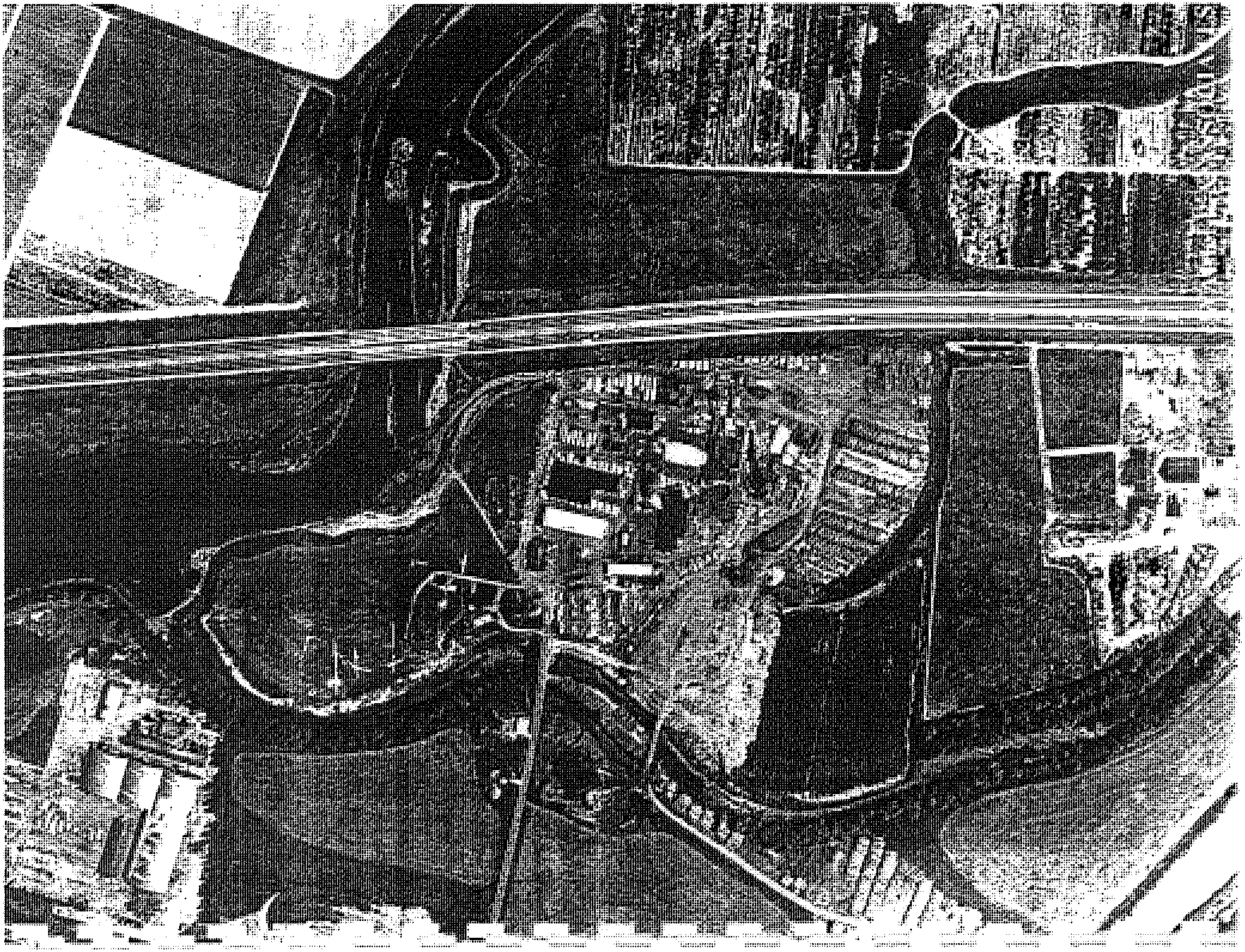

WALKER ASSOCIATES


ALKER & ASSOCIATES


R&AS


R&ASSOCIATES





Attachment B

Borehole Logs

Exponent

Page 1 of 1

FIELD BOREHOLE LOG

Client/Owner Buse Timber

Well Number FPD-1

Project No. 8601061.001

Start Date 6.18.98

Finish Date 6.18.98

Ground Surface Conditions Asphalt (12 in.)

Weather Conditions Rainy, 50°F

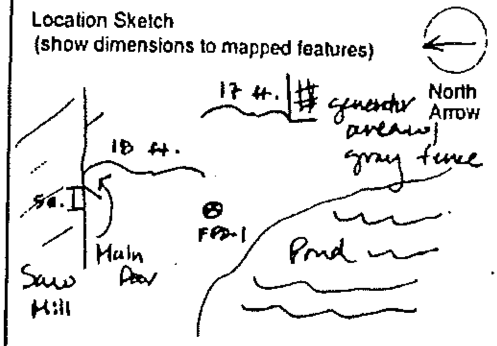
Field Geologist S. Duran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation n/a at Date

Well Casing Elevation n/a

Ground Surface Elevation n/a Datum

Water Level Information			
Date	6.18.98		
Time	1724		
Depth to Water	3.0 ~~ft~~ bgs		
Hole to Depth	6 ft		
Casing Depth	—		

Sample No. - GW	~~Sampler Type~~ [illegible]	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0	Asp.		
		1	Not Log.		GWØ011 collected
↑ GWØ011 ↓	↑ [illegible] ↓	2			from 2-6 ft.
		3	SM	2-4 ft: Brown and gray sandy	interval.
		4		silts and silty sands with	
		5	Not Logged	some cobbles. Faint hydro-	
		6		carbon-like odor.	

Sampler: D/M. SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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Page ___ of ___

FIELD BOREHOLE LOG

Client/Owner Buse Timber

Well Number FPD-2

Project No. 8601061.001

Start Date 6.19.98

Finish Date 6.19.98

Ground Surface Conditions Asphalt / concrete (2 ft.)

Weather Conditions Overcast, 50°F

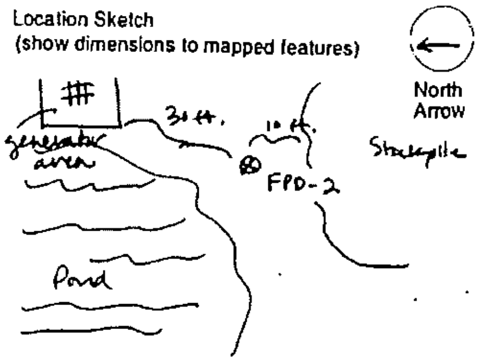
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation n/a

Ground Surface Elevation n/a Datum

Water Level Information	
Date	6.19.98
Time	0740
Depth to Water	4.0 ft
Hole to Depth	7.0 ft
Casing Depth	—

Sample No. - GW	~~Sample Type~~ Soil	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
		0	Asphalt/ concrete		
		1			GW0012 collected
		2			from 3-7 ft.
GW0012	SO012	3	SM	2-4 ft: Brown sand w/ rust-colored	interval.
		4	∇	streaks; grayish sand near	
		5	NOT LOGGED	bottom. Medium to fine sand	
		6		w/ silt. No odor.	
		7			
				Total depth: 7 ft.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent

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FIELD BOREHOLE LOG

Client/Owner Buse Timber

Well Number FPD-3

Project No. 8601061.001

Start Date 6.19.98

Finish Date 6.19.98

Ground Surface Conditions Grass/weeds

Weather Conditions Cloudy, 50°F

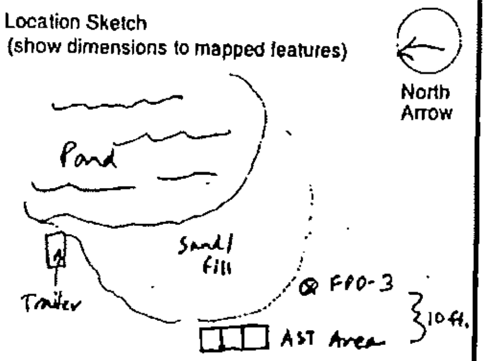
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation —

Ground Surface Elevation — Datum

Water Level Information			
Date	6.19.98		
Time	0846		
Depth to Water	5.0 ft		
Hole to Depth	10.0 ft.		
Casing Depth	—		

Sample No. – GW	~~Sampler Type~~ Soil	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0	Not Logged		
		1			GW0013 collected
	↑ SO0013 ↓	2			from 4-8 ft.
		3	SM	2-4 ft: Brown to gray silty sand w/	interval.
↑ GW0013 ↓		4		some cobbles, fine to medium	
		5	▽ Not Logged	grained; one 2 in. lense of	
		6		green-gray sand at 2.5 ft	
		7		bgs with hydrocarbon-like	
		8	SM	odor.	
		9	CL		
		10		8-9.2 ft: Gray sand as above but	
				with no odor or staining.	
				9.2-10 ft: Brown clay (stiff),	
				mottled with woody, bark-like	
				plant materials at 10 ft bgs.	
				Total depth= 10 ft.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Buse Timber Well Number HSA-1

Project No. 8601061.001

Start Date 6.18.98 Finish Date 6.18.98

Ground Surface Conditions Asphalt (3ft. thick)

Weather Conditions Rainy, 50°F

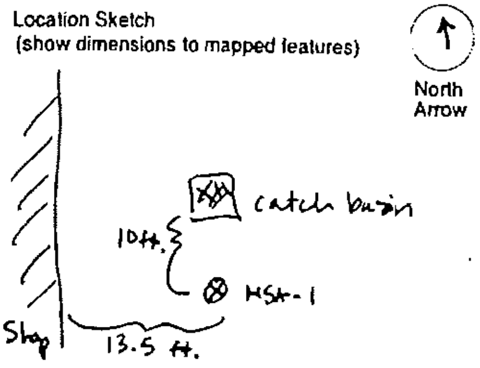
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date _____

Well Casing Elevation n/a

Ground Surface Elevation n/a Datum _____

Water Level Information			
Date	6.18.98		
Time	1355		
Depth to Water	3 ft. bgs		
Hole to Depth	6 ft.		
Casing Depth	—		

Sample No.	Sampler Type	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
		0			
		1	Asphalt		GW0014 collected
GW0014		2			from 2-6 ft.
		3 ▽			interval.
		4	SM	3-6 ft: Silty sands; brown (may be subbase materials)	
		5			
		6		Total depth: 6 ft.	
				GW0014 collected over 2-6 ft bgs. interval.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent

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FIELD BOREHOLE LOG

Client/Owner Buse Timber Well Number MSA - 2

Project No. 8601061. 001

Start Date 6.18.98 Finish Date 6.19.98

Ground Surface Conditions Asphalt (14 in. thick)

Weather Conditions Rainy, 50° F

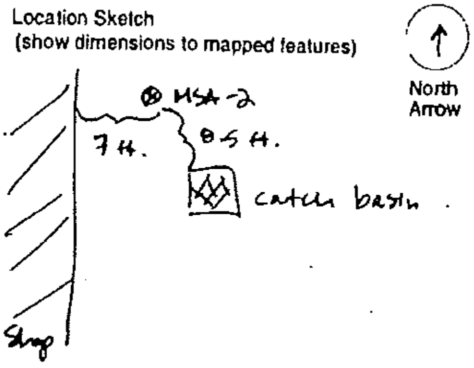
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation n/a

Ground Surface Elevation n/a Datum

Water Level Information		
Date	6.19.98	
Time	0947	
Depth to Water	4.9 ft bgs	
Hole to Depth	6 ft	
Casing Depth	—	

Sample No.	Sampler Type	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0	Asph.		
		1			GW0015 collected
GW0015		2	SM	1.2 - 2.0 ft: Gray sand / silts	from 2-6 ft.
		3	CL	2.0 - 5.0 ft: Brown, mottled clays	interval. Recovery
		4		(stiff) with silt	was allowed
		5	▽		overnight, with
		6	PT	5.0 - 6.0 ft: Wood fragments	sufficient recharge
					volume for only
				Total depth: 6 ft.	1 VOA vial.

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent

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FIELD BOREHOLE LOG

Client/Owner Buse Timber Well Number MSA · 3

Project No. 8601061.001

Start Date 6·18·98 Finish Date 6·19·98

Ground Surface Conditions Asphalt (1.8 ft.)

Weather Conditions Rainy, 50°F

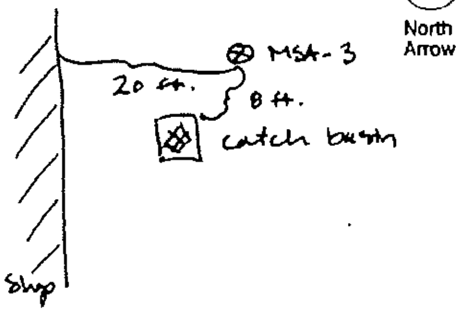
Field Geologist S. Duan

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date –

Well Casing Elevation n/a

Ground Surface Elevation n/a Datum

Water Level Information		
Date	6·19·98	
Time	0947	
Depth to Water	5.1 ft.	
Hole to Depth	17 ft.	
Casing Depth	—	

Sample No.	Sampler Type	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
*NONE		0			*GW0916 could not be collected due to insufficient recharge. Recovery allowed overnight.
		1	Asphalt		
		2	SM	1.8-2.5 ft: Gray sands	
		3	CL		
		4		2.5-5.0 ft: Brown mottled clay (stiff) with some silt. No odor, no staining.	
		5	▽ NOT LOGGED		
		6			
		7			
		8			
		9			
		10	CL/ML	9.0-11.0 ft: Brown to light gray silty clay and clayey silts (less stiff) with root masses and decomposing plant (reducing) odor present.	
		11	NOT LOGGED		
		12			
		13			
		14			
		15			
		16	ML/SM	15.0-17.0 ft: Light gray silts that coarsen downward into fine sands with some silt; no odor, some small woody debris lenses.	
		17			
				Total depth: 17.0 ft.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent

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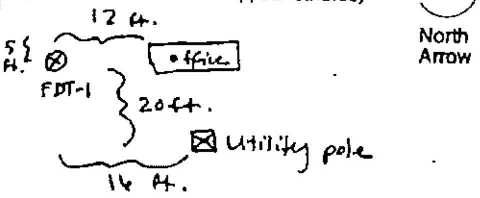
FIELD BOREHOLE LOG

Client/Owner: Buse Timber
Well Number: FDT-1
Project No.: 8601061.001
Start Date: 6.19.98
Finish Date: 6.19.98
Ground Surface Conditions: Asphalt (8 in.)
Weather Conditions: Sunny, 60°F
Field Geologist: S. Doran
Contractor/Operator: Cascade
Drill Type/Method: Geoprobe
Boring Diameter: 1.5 in.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation: —
at Date:
Well Casing Elevation: —
Ground Surface Elevation: —
Datum:

Water Level Information		
Date	6.19.98	
Time	1400	
Depth to Water	3.5 ft	
Hole to Depth	4.0 ft	
Casing Depth	—	

Sample No. – Soil	Sampler Type	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0		Asphalt	
		1	NOT LOGGED		
←SOB02→		2	SM	2-4 ft. Gray to brown silty SAND, medium to fine grained from 2.0-2.5 ft.; from 2.5 ft - 4 ft. gray clay (stiff) with some root fragments. No odor or staining.	
		3	CL ▽		
		4			
				Total depth = 4.0 ft bgs	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent™

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FIELD BOREHOLE LOG

Client/Owner Buse Timber

Well Number FDT-2

Project No. 8601061.001

Start Date 6.19.98

Finish Date 6.19.98

Ground Surface Conditions Asphalt

Weather Conditions Sunny, 60°F

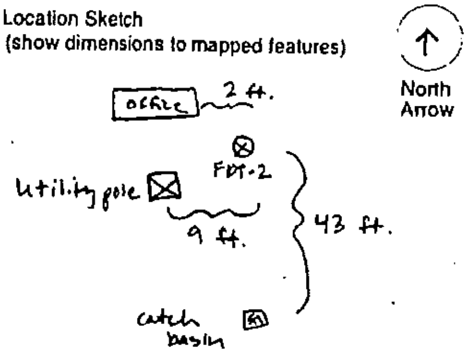
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation —

Ground Surface Elevation — Datum

Water Level Information	
Date	6.19.98
Time	1405
Depth to Water	3 ft.
Hole to Depth	6 ft.
Casing Depth	—

Sample No.	Sampler Type	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
		0–2	NOT LOGGED		S00001 collected from 4-6 ft interval b/c <10% recovery at 2-4 ft. interval.
		2–4	∇ SM	2-4: Gray silty sand w/ some cobbles, wood chips in nose of sampler. No odor.	
S00001		4–6	CL	4-6 ft: Dark gray to black silty sand to 4.5 ft; transitions into clay that is brown to gray (stiff) that contains decomposing woody debris; reducing odor. Staining appears to cease at clay transition. Slight organic? odor at sand layer.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent™

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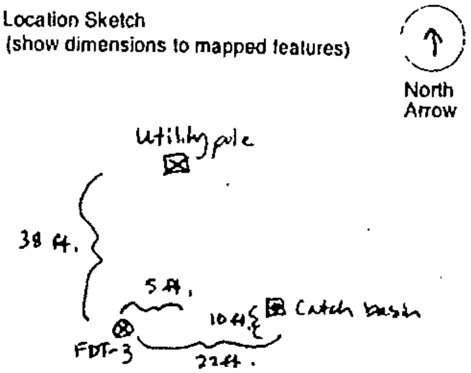
FIELD BOREHOLE LOG

Client/Owner Bure Timber
Well Number FDT-3
Project No. 8601061.001
Start Date 6.19.98
Finish Date 6.19.98
Ground Surface Conditions Asphalt (8 in.)
Weather Conditions Sunny, 60°F
Field Geologist S. Duran
Contractor/Operator Cascade
Drill Type/Method Geoprobe
Boring Diameter 1.5 in.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date
Well Casing Elevation —
Ground Surface Elevation — Datum

Water Level Information		
Date	6.19.98	
Time	1420	
Depth to Water	6 ft.	
Hole to Depth	10 ft.	
Casing Depth	—	

Sample No.	Sampler Type	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0	[illegible]	Asphalt	
		1			
Samp #3		2	SM	2-4 ft: Gray to brown sand, medium to fine grained; underlying gray clay @ 3.0 ft. No odor.	
		3			
		4			
		5	CL		
		6	▽		
		7		4-6 ft: Gray clay with root mass and decaying woody material.	
		8			
		9			
		10		6-8 ft: Same clay.	
				8-10 ft: " "	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Buse Timber

Well Number FDT-4

Project No. 8601061.001

Start Date 6.19.98

Finish Date 6.19.98

Ground Surface Conditions Asphalt (6 in. thick)

Weather Conditions Cloudy, 50° F

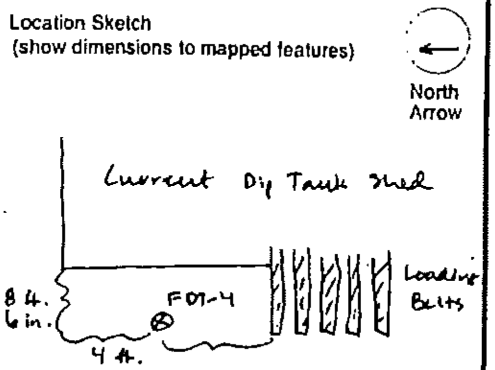
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation —

Ground Surface Elevation — Datum

Water Level Information			
Date	6.19.98		
Time	1245		
Depth to Water	4.0 ft.		
Hole to Depth	16.0 ft.		
Casing Depth			

Sample No.	Sampler Type	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0		← Asphalt	
		1	SM		GW0001 collected
		2		1-4 ft: Gray to brown sand w/	from 3-7 ft.
↑		3	CL	cobbles (may be subbase for	interval.
GW0001		4	∇ NOT LOGGED	asphalt). Underlying brown	Slightly turbid
		5		to gray clay, with no	w/ faint
		6		odor. One dark brown lense	hydrocarbon-
↓		7		of sand has faint organic?	like odor.
		9		odor.	
		9	CL		
		10	NOT LOGGED	8-10 ft: Gray to brown clay (stiff)	
		11		with some wood debris; burn	
		12		layer present 9.5 ft bgs.	
		13			
		14		14-16 ft: Same gray clay as above.	
		15	CL		
		16			
				Total depth: 16 ft.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent

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FIELD BOREHOLE LOG

Client/Owner Bose Timber Well Number FDT-5

Project No. 8601061.001

Start Date 6.19.98 Finish Date 6.19.98

Ground Surface Conditions Asphalt (1 ft. thick)

Weather Conditions Cloudy, 55°F

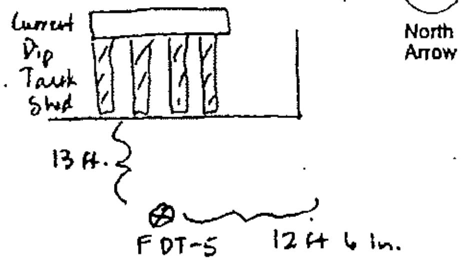
Field Geologist S Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation —

Ground Surface Elevation — Datum

Water Level Information			
Date	6.19.98		
Time	1147		
Depth to Water	3 ft.		
Hole to Depth	6 ft.		
Casing Depth	—		

Sample No.	Sampler Type	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
NONE		0	Asph.		
		1	SM		GW0002 screened
		2		1-4 ft: Some sand on surface (may	from 2-6 ft.
		3	CL	be subbase to support asphalt,	interval, but
		4		with gray clay below. No	no recovery.
			NOT LOGGED	odors or staining.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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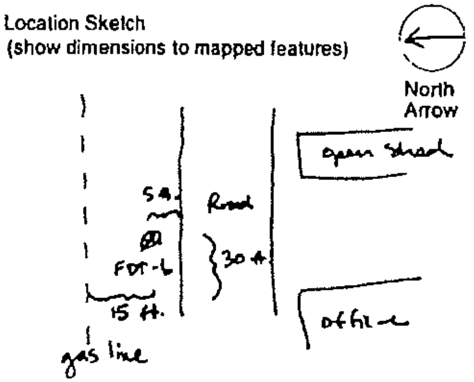
FIELD BOREHOLE LOG

Client/Owner Buse Timber
Well Number FDT-6
Project No. 8601061.001
Start Date 6.19.98
Finish Date 6.21.98
Ground Surface Conditions Grass
Weather Conditions Sunny, 55°F
Field Geologist S. Duran
Contractor/Operator Cascade
Drill Type/Method Geoprobe
Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation – at Date
Well Casing Elevation –
Ground Surface Elevation – Datum

Water Level Information		
Date	6.19.98	
Time	1601	
Depth to Water	5.0 ft	
Hole to Depth	22.0 ft	
Casing Depth	—	

Sample No. Gw	~~Sampler Type~~ Soil	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
		0–2	NOT LOGGED		
	SO0012	2–4	CL	2-4 ft: Gray stiff clay w/ root fragments and decomposing wood materials. Reducing odor.	
GW0003		4–8	NOT LOGGED		
		8–10	CL	8-10 ft: Gray clay from 8 - 8.6 ft, then brown clay with woody debris and decomposing organic matter.	
		10–14	NOT LOGGED		
		14–16	CL/ML	14-16 ft: Gray clay with increasing silt content.	Response in drilling resistance suggested sand layer began @ 19 ft. bgs per the driller.
		16–20	NOT LOGGED		
		20–21	SM	20-22 ft: Silty sand with silt lenses, coarsens downward to gray sand.	

Sampler: D/M, SPT, Thinwall (TW), She be (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Buse Timber

Well Number FBA-1

Project No. 8601061.001

Start Date 6.18.98

Finish Date 6.18.98

Ground Surface Conditions Grass / sod

Weather Conditions Cloudy, 50°F

Field Geologist G. Bowden

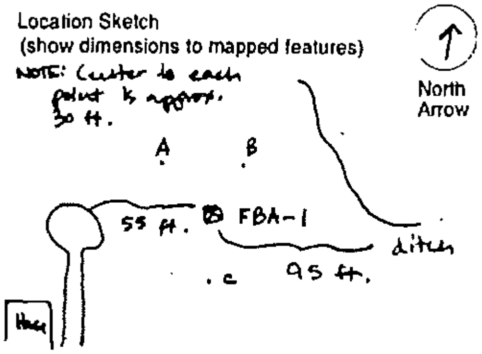
Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in.

Location Sketch
(show dimensions to mapped features)

NOTE: Center to each point is approx. 30 ft.



Groundwater Elevation — at Date

Well Casing Elevation n/a

Ground Surface Elevation n/a Datum

Water Level Information			
Date	6.18.98		
Time	0900		
Depth to Water	4 ft bgs.		
Hole to Depth	4 ft.		
Casing Depth	—		

Sample No.	Sampler Type	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
		0			
		1		0-2 ft: Brown silt, mottled.	Three boreholes
		2	ML		(points A, B, C in
SO0015		3		2-4 ft: Brown to grey silt, contains	above figure)
		4	∇	wood fibers.	were composited
					for one sample.
				Total depth = 4 ft.	This borelog
					is recorded from
					point B.

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Buse Timber Well Number NSP-1

Project No. 8601061.001

Start Date 6.18.98 Finish Date 6.19.98

Ground Surface Conditions Grass / sod

Weather Conditions Rainy, 50°F

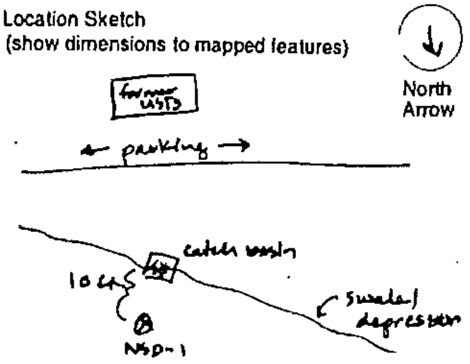
Field Geologist G. Bawden

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 inch.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date

Well Casing Elevation —

Ground Surface Elevation — Datum

Water Level Information			
Date	6.18.98		
Time	1015		
Depth to Water	6.9 ft.		
Hole to Depth	7.0 ft		
Casing Depth	—		

Sample No.	Sampler Type					Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
						0			
						1		– Soil not logged.	Soil not logged
						2			because no soil
← GW98017 →						3			Samples were to
						4			be collected.
						5			
						6			
						7	▽		
								Total depth = 7.0 ft	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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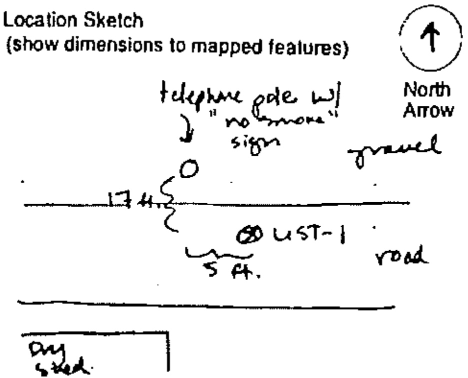
FIELD BOREHOLE LOG

Client/Owner Buse Timber
Well Number UST-1
Project No. 86061.001
Start Date 6.18.98
Finish Date 6.18.98
Ground Surface Conditions Asphalt (9 in. thick)
Weather Conditions Overcast 50° F
Field Geologist G. Bawden
Contractor/Operator Cascade
Drill Type/Method Geoprobe
Boring Diameter 1.5 inch

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation — at Date
Well Casing Elevation —
Ground Surface Elevation — Datum

Water Level Information			
Date	—		
Time	—		
Depth to Water	n/a		
Hole to Depth	4.0 ft		
Casing Depth	—		

Sample No.	Sampler Type	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
		0		Asphalt	
		1		- Soil not logged.	
← Sampled →		2			
		3			
		4			
				Total depth = 4.0 ft.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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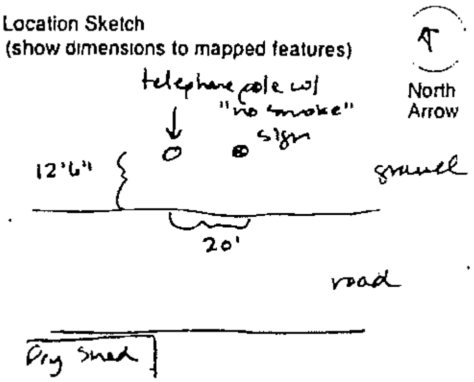
FIELD BOREHOLE LOG

Client/Owner Buse Timber
Well Number UST-2
Project No. 8601061.001
Start Date 6.18.98
Finish Date 6.18.98
Ground Surface Conditions gravel
Weather Conditions Overcast, 50°F
Field Geologist S. Bawden
Contractor/Operator Cascade
Drill Type/Method Geoprobe
Boring Diameter 1.5 in

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation – at Date
Well Casing Elevation –
Ground Surface Elevation – Datum

Water Level Information	
Date	–
Time	–
Depth to Water	n/a
Hole to Depth	4.0
Casing Depth	–

Sample No.	Sampler Type				Depth Scale (ft)	Unified Symbol	Soil Description	Comments
					0			
					1		- Soil not logged	
←samples→					2			
					3			
					4			
							Total depth = 4 ft. bgs.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Buse Timber Well Number UST-3

Project No. 8601061.001

Start Date 6.18.98 Finish Date 6.18.98

Ground Surface Conditions Gravel

Weather Conditions Overcast, 50° F

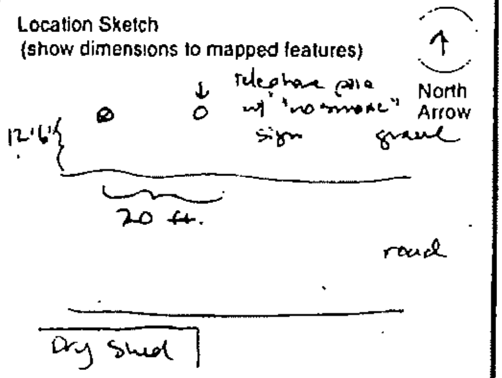
Field Geologist G. Bawden

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation – at Date

Well Casing Elevation –

Ground Surface Elevation – Datum

Water Level Information	
Date	–
Time	–
Depth to Water	n/a
Hole to Depth	4.0 ft
Casing Depth	–

Sample No.	Sampler Type					Depth Scale (ft)	Unified Symbol	Soil Description	Comments
						0			
						1		- Soil not logged.	
						2			
←Sample→						3			
						4			
								Total depth = 4 ft bgs.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Buse Timber Well Number AST-1

Project No. B601061.001

Start Date 6.19.98 Finish Date 6.19.98

Ground Surface Conditions Asphalt (1 ft. thick)

Weather Conditions Sunny, 55°F

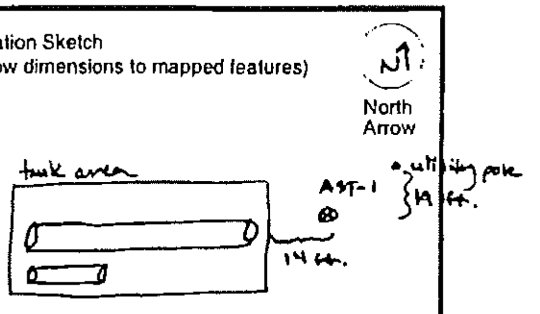
Field Geologist S. Daran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in.

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation – at Date

Well Casing Elevation –

Ground Surface Elevation – Datum

Water Level Information			
Date	6.19.98		
Time	1640		
Depth to Water	~3.9 ft bgs		
Hole to Depth	4.0 ft		
Casing Depth	–		

Sample No.	Sampler Type	Depth Scale (ft.)	Unified Symbol	Soil Description	Comments
		0			
←S0007→		1		0-2 ft. Gray sand/gravel (may be subbase); <50% recovery; no odor.	Due to poor recovery @ 0-2 ft. interval, only 4 oz. jar filled for analysis.
←S0008→		2 3 4	SM ▽	2-4 ft. Brown to gray sandy silt and sand; no odor.	
				Total depth: 4.0 ft bgs.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

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FIELD BOREHOLE LOG

Client/Owner Bue Timber

Well Number AST - 2

Project No. 86 01061. 001

Start Date 6.19.98

Finish Date 6.19.98

Ground Surface Conditions Asphalt (3" thick

Weather Conditions Sunny, 55°F

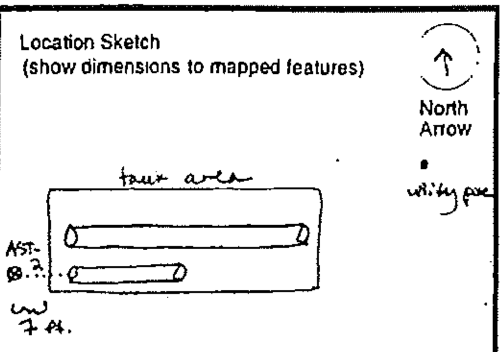
Field Geologist S. Doran

Contractor/Operator Cascade

Drill Type/Method Geoprobe

Boring Diameter 1.5 in

Location Sketch
(show dimensions to mapped features)



Groundwater Elevation – at Date

Well Casing Elevation –

Ground Surface Elevation – Datum

Water Level Information		
Date	6.19.98	
Time	1725	
Depth to Water	3.8 ft.	
Hole to Depth	4.0 ft	
Casing Depth	–	

Sample No.	Sampler Type	Depth Scale (ft)	Unified Symbol	Soil Description	Comments
←S0609→		0	SM	Asphalt	
		1			
←S0610→		2	CL	0-2: Sand (subbase material?) overlying gray, mottled clay w/ root fragments; no odor.	
		3			
		4	▽		
				2-4 ft: Gray, stiff clay w/ decomposing organic matter (reducing odor). Also noted moderate hydrocarbon-like odor during sample compositing	
				Total depth = 4.0 ft bgs.	

Sampler: D/M, SPT, Thinwall (TW), Shelby Tube (S), Bulk (B), etc. (Add 'C' to sampler type if a catcher is used)

Exponent®
15375 SE 30th Place, Suite 250
Bellevue, WA 98007

December 6, 2010

BUSE Timber and Sales Phase II Update

Introduction

BUSE Timber and Sales Inc. (BUSE) retained Exponent in November 2010 to prepare an update to the 1998 environmental site assessment report (Exponent 1998) and the 2004 Update. This letter report summarizes Exponent's work and findings, including limitations.

Scope

The scope of Exponent's activities was limited to review and assessment of those items listed in the recommendations section of the subject report (Exponent 1998) and the 2004 Update (Exponent 2004) as requiring further action. Additionally, Exponent was asked to view and assess environmentally-related site improvements and changes made since the 2004 Update to the 1998 report. In 2004, the site improvements identified by BUSE and viewed and assessed by Exponent were limited to the new lubricants storage facility, new oil/water separators, and the new fueling facility that was nearly complete at the time of the 2003 site visit presented in the 2004 report. In 2010, Exponent observed the operation of these facilities and focused on current conditions and operation. Although there were no significant environmental upgrades made to the Site since the last inspection in 2004, housekeeping was even better and filter fabrics have been added to the storm water catch basins. Exponent also noted that the kiln has been shut down and computer upgrades have been completed in the saw mill.

Limitations

This report and the activities conducted by Exponent were limited to only those activities necessary to assess the status of recommendations contained in the Exponent (1998) report and the 2004 Update. These activities did not include assessment or evaluation of wood waste, lead-based paint, asbestos, polychlorinated biphenyls (PCBs), or any other element not included in the *Recommendations* section of the original Exponent report (Exponent 1998). Also, Exponent did not review the storm water pollution prevention plan (Landau Associates 2003b), or the spill prevention, contingency, and countermeasure plan (SPCC) (Landau Associates 2003a), because Exponent was not retained to review or assess these documents.

Activities

Gary Brugger, a senior managing engineer at Exponent, conducted the site visit and met with Mr. Steve Fogg, a representative of BUSE, on November 12, 2010. Mr. Brugger's observations and Exponent's assessment of BUSE's progress regarding implementation of recommendations from past Exponent reports (1998, 2004), and recommendations for further action, are presented in the following sections.

BUSE Timber Site Visit and Observations

Gary Brugger met with Mr. Steve Fogg, C.P.M. of BUSE Timber and Sales, on November 12, 2010. Mr. Fogg and Mr. Brugger reviewed the recommendations from past Exponent reports (1998, 2004) and toured the BUSE Timber facility located at 3812 28th Place Northeast, Everett, Washington. The bulk of the time was spent observing the storm water collection and mill operation with regard to the handling of fuels and lubricants.

At the time of the visit, the site was still wet from recent rains. Mr. Brugger observed two of the oil/water separators and surface runoff from the operation areas. Small puddles containing from several liters to as much as 100 liters of rainwater were observed in low areas around the site. None of these puddles contained any sign of oil (e.g., petroleum sheens). The pavement was sufficiently wet that a single drop of oil would produce a visible sheen about 6-in. in diameter on the wet pavement. Sheens were observed almost entirely in the portion of the site where outside trucks (non-BUSE) enter and leave the site. These minor sheens observed primarily at the site entrance/exit are generally considered insignificant, and when considered with the absence of any sheen on the puddles, indicates good housekeeping and management of equipment, fuels, and lubricants. Few changes have occurred since the 2004 Update. The biggest operational change is the shutdown of the kiln. Other than terminating the gas line to the boiler, the kiln remains intact and can be returned to operation. The Fueling Pad with connection to an oil/water separator was completed shortly after the 2004 Update was completed. The pad and connection were observed and appear to be functioning as intended to control both small and large spills. The heavy parts warehouse/large equipment storage building was inspected. There was a minor amount of oil on the floor under a recently placed piece of equipment. The mill uses sawdust to absorb such spills and recycles the material as hog fuel. Mr. Fogg said that he would have someone get some additional sawdust on the oil ASAP.

Other changes since the 2004 Update included filter/absorbent fabric in the catch basins to adsorb small fuel spills and facilitate cleanup. Drip pans have been placed under lubricant dispensing drums, and drums outside the storage building were on pallets with spill containment compartments.

The mill uses a portable diesel tank to fuel the diesel heaters below the saw mill. This tank was observed on the pavement on the south side of the building at the time of the site visit. No containment or spill protection was observed.

According to Steve Fogg, minimal waste is generated at the site as the total volume of hazardous waste generation continues to be less than the current threshold requiring a generator permit. The mill has shifted to zinc-free lubricants to facilitate recycling and all paint and wood preservatives used at the mill are now water-based/oil-free products. Other waste streams, including hydraulic oils and cutting fluids, are also recycled.

Most of the issues from the 1998 Exponent report and the 2004 Update have been or are being addressed.

It has been noted that Exponent’s current report will not address wood wastes, PCBs, asbestos, or lead-based paints. Also, Exponent did not address any sediment or water quality issue that was not addressed in the 1998 report. Additionally, the sediment and water quality issues in the 1998 report were addressed by 2004 and were included in the 2004 Update. During this assessment we reviewed only the latest test information from the last four quarters.

Implementation of Recommendations

The Exponent (1998) report included a number of findings and recommendations. These original recommendations are listed in order below. Each recommendation is followed by Exponent's 2004 Update (in italics) and the current 2010 assessment (in bold) of the status of implementation of the recommendation. New recommendations are presented at the end of this section.

Aboveground Storage Tank Area

Exponent's findings and recommendation from the Exponent (1998) report:

> These aboveground tanks are not in compliance with current codes for protection of surface waters. We recommend that these tanks be equipped with secondary containment. As indicated in the Phase II soil sampling, there does not appear to be a soil contamination problem. However, small areas of petroleum hydrocarbon contaminated soils may be encountered when constructing the containment. These areas should be excavated and disposed of as petroleum hydrocarbon contaminated soils (potentially at a municipal landfill). Also, a spill prevention control and counter measure plan will be required for these ASTs and other aboveground fuel storage facilities at the facility.

Status—2003. *The single-walled ASTs have been replaced with new double-walled ASTs placed on a new concrete pad. The fueling area sub-grade has been prepared for the placement of a fueling pad with containment. According to Mr. Fogg, the fueling pad will be installed in early 2004 and the fueling pad drain will be connected to an oil-water separator that has already been installed. The ASTs existing at the time of the 1998 Exponent investigation were removed. One tank was removed and disposed of by Emerald Petroleum and the other tank was moved to the boiler room to be used as a backup. The backup tank was not observed during the site visit. According to Mr. Fogg, there was no physical evidence of spills at the ASTs when they were removed. However, the area will be excavated and further assessed after the new AST fueling facility is operational (Fogg 2003a, pers. comm.). Additionally, BUSE has contracted Landau Associates to prepare an SPCC plan to cover these tanks. A draft copy of the SPCC plan (Landau Associates 2003a) was provided to Exponent for verification. Exponent* *did not review and/or assess the draft SPCC plan because such review was not included in the scope of work requested by BUSE.*

Status—2010. The fueling facility has been completed as planned. The fueling pads were clean and free of stains during the November 12, 2010, site visit. Containment controls appeared to be maintained and ready for use and set to contain mode should spill containment be needed.

Former UST Area

Exponent's findings and recommendation from the Exponent (1998) report:

> No evidence of petroleum hydrocarbon soil contamination was found at the locations sampled. No further action is recommended for this area.

Status—2003, 2010. *Because no further action was recommended, this item was not re-assessed during the December 2003 or the* **November 2010** *review.*

Former Pentachlorophenol Dip Tank Area

Exponent's findings and recommendation from the Exponent (1998) report:

> No evidence of soil, groundwater, or storm drain sump sediments was found at the locations sampled. No further action is recommended for this area.

Status—2003, 2010. *Because no further action was recommended, this item was not re-assessed during the December 2003 or the* **November 2010** *review*

Fire Pond Area

Exponent's findings and recommendation from the Exponent (1998) report:

> Petroleum hydrocarbon soil concentrations did not exceed criteria based on Interim TPH Policy. Groundwater concentrations were equal to the MTCA target for drinking water; however, the sample was collected in fill placed when the log pond was closed and does not indicate transport of petroleum hydrocarbon through the silty clay layer that is present as an aquitard throughout the site.

> Moreover, standards based on use of groundwater as a drinking water supply are highly conservative for use at this site because of the absence of usable groundwater. No further action was recommended for this area.

Status—2003, 2010. *Because no further action was recommended in 1998, this item was not re-assessed during the December 2003 or the* **November 2010** *review*

Stockpiled Soils

Exponent's findings and recommendation from the Exponent (1998) report:

> Because the only contaminant is petroleum hydrocarbon as lube oil, the material may pass criteria based on Ecology's Interim TPH Policy. However, we recommend that this relatively small volume (estimated 30 CY) of oily soil be disposed of offsite. Bioremediation is not effective for heavy oils and the soil may even be acceptable at a municipal solid waste landfill (it would need to be tested for dangerous waste characteristics to determine actual disposal options).

Status—2003. *The soil was reportedly disposed at an offsite disposal facility. Mr. Fogg provided a copy of the invoice for soil disposal (Fogg 2003b, pers. comm.; see attached copy included with the 2004 letter report).*

Status—2010. The soils were removed and disposal complete by 2003. Because work was completed by December 2003, this item was not re-assessed during the November 2010 review.

Maintenance Shop

Exponent's findings and recommendation from the Exponent (1998) report:

> Low concentrations of VOCs (below MTCA Method A cleanup levels) were detected in groundwater in this area. No petroleum hydrocarbon compounds were detected in groundwater in this area. No further action is recommended except for the storm drains (see below).

Status—2003, 2010. *Because no further action was recommended, this item was not re-assessed during the December 2003 or the* **November 2010** *review*

Ditch Sediments

Exponent's findings and recommendation from the Exponent (1998) report:

> We recommend that oily water discharges be discontinued (see below) and that petroleum hydrocarbon contaminated sediments in the southern portion of the ditch be excavated for off site treatment or disposal. Storm water controls will be sufficient to address petroleum hydrocarbons in the east, south and west ditches.

Status—2003. *Oil-water separators have been placed on the discharges from the BUSE site to the north ditch that was the subject of the comments in the Exponent (1998) report. According to Mr. Fogg, sediments were removed from the southern portion of this ditch. At the time of the site visit, the oil-water separators showed no evidence of oil and the discharge to the ditch did not have a sheen, odor, or other physical evidence of oil contamination. The west ditch was observed. The west ditch had been recently dredged. The dredge material from the west ditch appeared to be primarily a medium to coarse sand with no physical evidence of oil contamination.*

Status—2010. The areas that drain to the oil/water separators that discharge to the north ditch had no evidence of any oil or sheen and the discharges were not inspected further. The oil/water separators are inspected regularly and cleaned every 3 months unless earlier cleaning is needed. The effluent sample test results for the second calendar quarter of 2010 are within the benchmarks for the statewide facility permit (permit number WAR000097). However, the chemical oxygen demand (COD) concentration detected during the October sampling event was above the permit benchmark of 120 mg/L. The storm water management system relies on keeping wastes with high COD values out of the discharge as the oil/water separators are not designed to remove substantial quantities of material with high COD. The ditch was cleaned between the second quarter sampling and the third quarter sampling. Because the cleaning leaves some soils exposed to erosion during the initial run-off period, it can cause short-term increases in turbidity and COD; thus this cleaning may have been the primary cause of the increased COD. If the October 2010 COD result is not an anomaly caused by the earlier cleaning, additional storm water treatment may be required. See the New Items section below.

Storm Drains

Exponent's findings and recommendation from the Exponent (1998) report:

> The maintenance shop storm drain was found to contain elevated concentrations of lube oil. Low concentrations of chlorinated phenols were found in two other catch basins. Exponent recommends that sediments in the maintenance shop storm drain system (including the maintenance shop storm drain, down gradient catch basins, and sediment accumulated in the culvert) be removed for offsite treatment and disposal. No further action is required for the storm drains near the former penta dip tank.

Status—2003, 2010. Because no further action was recommended for these storm drains, this item was not re-assessed during the December 2003 or 2010 reviews. However, the recommended soil disposal was completed (Fogg 2003b, pers. comm.; **see Exponent 2004 Letter Report for a copy of the disposal invoice).**

Storm Water

Exponent's findings and recommendation from the Exponent (1998) report:

> We recommend that storm water controls, including oil-water separators be constructed to prevent oily water from entering adjacent surface waters. These methods could include installation of oil/water separators at storm drains, installation of curbing or other drainage control measures to channel runoff from high trafficked areas to oil/water separators, and regular maintenance of equipment used at the site. This should reduce the concentration of petroleum hydrocarbons in the ditches, but will not eliminate offsite sources.

Status—2003. *Four oil-water separators have been installed on the storm drain system that discharges to the north ditch. This discharge is permitted under a statewide, storm water NPDES permit (number WAR000097) issued by the Washington State Department of Ecology (Ecology). According to Mr. Fogg, all the oil-water separators are inspected regularly and pumped yearly except for the separators located downgradient from the maintenance building that are pumped quarterly. There was no physical evidence of oil in any of these separators at the time of Mr. Brugger's visit. Although Exponent obtained copies of the NPDES permit and some monitoring data, Exponent did not assess any compliance issues that may be associated with this permit. Such assessment was not included in the scope of work requested by BUSE. Because* *there was no physical evidence of petroleum products in the oil-water separators or at the point of discharge, it is probable that BUSE is in compliance with the NPDES permit condition that limits the discharge of petroleum. BUSE has contracted Landau Associates to prepare a storm water management plan. A copy of the draft storm water management plan was provided to Exponent for verification. Exponent did not review or assess the storm water management plan because such review and assessment were not included in Exponent's scope of services.*

Status—2010. As noted above, the COD concentration in the sample collected in October exceeded the permit benchmark of 120 mg/L. The 2010 inspection was limited to catch basins and two oil/water separators and the last two sample results. None of these showed any evidence of any measurable or detectable release of petroleum. Consequently, the COD exceedance may be related the ditch cleaning rather than fuels and lubricating oils or other onsite sources.

Lube Oil Storage

Exponent's findings and recommendation from the Exponent (1998) report:

> We recommend that secondary containment be provided for all lubricating or hydraulic oil storage facilities at the mill.

Status—2003. *BUSE has constructed a new building to house and dispense lubrication and hydraulic oils. This building has a concrete floor with a sump.*

Status—2010. This storage building was free of drips and there was no evidence of spills. Small drip pans have been placed under each dispenser. The oil-based paints previously stored in the building have been replaced by water-based paint. The sump has not been lined as Exponent recommended in the 2004 report. Exponent still recommends lining the sump to facilitate cleanup of any spills that overwhelm the drip pans.

Former Burn Area

Exponent's findings and recommendation from the Exponent (1998) report:

> We found no evidence of elevated concentrations of dioxins/furans in subsurface soils in this area. No further action is recommended.

Status—2003, 2010. *Because no further action was recommended, this item was not re-assessed during the December 2003 or the* **November 2010** *review*. However, it would be prudent to reevaluate this area prior to any new development, as the regulations have changed since 1998.

2004 Letter Report Recommendations

Aboveground Storage Tank Area

The recommendations from the Exponent (1998) report regarding the ASTs and dispensing of fuels have not been completely implemented. Installing the fueling pad, connecting the fueling pad drain to the new oil-water separator, and excavation of the former AST site remain to be completed. According to Mr. Fogg, these improvements are planned for early 2004. Once these improvements are complete, BUSE will have implemented the recommendations regarding the ASTs contained in the Exponent (1998) report.

Status—2010. The fuel pad and environmental controls were installed in 2004. The area was clean and well maintained at the time of the Exponent site visit on November 12. Control valves were not tested but were observed to be well lubricated and relatively free of rust. No sign of spills were observed around the dispensers or the tank.

Lube Oil Storage

Although most of the lubrication and hydraulic oils are now stored and dispensed in a building with a concrete floor, the sump of the building is not lined and there are no drip pans under the dispensers. While the current facility is generally protective, it is possible that the concrete sump will develop cracks with time. Additionally, the lining of the sump and the use of drip pans will facilitate the cleanup of any small spills. Accordingly, Exponent recommends that the sump be lined and drip pans used at all dispensing locations.

Status—2010. Drip pans are in use but the sump remained unlined at the time of the Exponent site visit on November 12.

Site Housekeeping

The general housekeeping of the site was very good during Exponent's site visit (the exception being several pieces of equipment being randomly stored at the site). Because the oil-water separators installed by BUSE are not very efficient, BUSE must rely on good housekeeping, particularly of petroleum products, and frequent inspection and periodic maintenance (pumping) of the separators to meet the conditions of the NPDES permit Exponent recommends that BUSE develop a regular inspection program to address site housekeeping and separator operation, including documentation that includes dates of inspection and service of the separators.

Status—2010. Site housekeeping was generally excellent during the November 2010 site visit. The equipment storage building located at the northern portion of the property sees intermittent use and was generally organized and free of spills. However, one piece of equipment recently placed in the building had a minor oil leak that was contained by sawdust but not cleaned up.

Finalize Draft SPCC and Storm Water Management Plans

BUSE has contracted Landau Associates to prepare both an SPCC plan and a storm water management plan. Exponent recommends that BUSE carefully review these plans, verify that they meet EPA and Ecology requirements, and then finalize these plans. Both plans should be reviewed at least yearly to verify that the plans are consistent with site operations and still meet agency (EPA and Ecology) requirements.

Status—2010. Exponent did not review these plans or look for updates and approvals because it was not in the scope of the 2003 work covered in the 2004 Update. Exponent did review the results of the last four storm water sampling events. Exponent recommends that BUSE review these plans and update them if the plans have not been updated in the last year. This is particularly true for the storm water management plan, as the WDOE rules have been revised during the last 2 years. WDOE will likely complete rule revisions

in early 2011. Consequently, updating the Storm Water Management Plan in 2011 is recommended.

New Items 2010

At the time of Exponent's Site Visit on November 12, a portable diesel fuel tank was present on the south side of the sawmill building. This tank is used to fuel the heaters in the basement of the building. Exponent recommends that BUSE provide secondary containment when the tank is temporarily placed outside the sawmill building. Because of the temporary nature of the tank placement, a simple containment system was discussed with Mr. Fogg and Allen McKay, Maintenance Supervisor, which included the use of a small piece of 40-mil or heavier HDPE liner to place under this tank when placed at this location. Timbers or other materials could be used to construct a temporary containment dike that would contain the contents of the tank in case of a major rupture.

Housekeeping was excellent in the yard, building, and work areas. The equipment maintenance is good, as illustrated by the absence of oil leaks from the heavy equipment used in the yard. The shops have been in use for many years and the floors show the expected wear and staining. However, the staining is old and relatively small, and consistent with prompt cleanup of spills and drips. The two hydraulic reservoirs that supply the large log and small log band saws are fitted with spill containment trays placed to collect any spills or pump leaks. However, accumulated liquid was observed in both trays. Subsequently, Mr. Fogg directed the maintenance manager to have the accumulated liquids recovered ASAP. Finally, there were some empty drums found outside the Lube Oil Storage Building and several more at other locations in the mill that were being stored for future use. Exponent recommends that "Empty" and "Clean" labels, stencils, or other markers be placed on drums to clearly indicate the current status, as soon as the drums are emptied and again if they have been cleaned so that these drums will not be mistaken for their original contents..

References

Exponent. 1998. Draft Phase II environmental site assessment, BUSE Timber & Sales, Inc., Everett, Washington. Prepared for Koncor Forest Products Company, Tacoma, WA. Exponent, Lake Oswego, OR.

Exponent. 2004. BUSE Timber and Sales Phase II Update (Update). Prepared for BUSE Timber Company. Exponent, Bellevue, WA.

Fogg, S. 2003a. Personal communication (e-mail to G. Brugger, Exponent, Bellevue, WA, dated December 26, 2003, regarding AST removal). BUSE Timber and Sales Inc., Everett, WA.

Fogg, S. 2003b. Personal communication (letter to G. Brugger, Exponent, Bellevue, WA, dated December 17, 2003, regarding soil pile disposal). BUSE Timber and Sales Inc., Everett, WA.

Landau Associates. 2003a. Client review draft—Spill prevention, control, and countermeasures plan (SPCC), BUSE Timber Sales, Inc., Everett, Washington. Prepared for BUSE Timber Sales, Inc., Everett, WA. Landau Associates, Edmonds, WA.

Landau Associates. 2003b. Stormwater pollution prevention plan, BUSE Timber Sales, Inc., 3812 28th Place NE, Everett, Washington. Prepared for BUSE Timber Sales, Inc., Everett, WA. Landau Associates, Edmonds, WA.

Exponent®
15375 SE 30th Place, Suite 250
Bellevue, WA 98007

January 5, 2004

Buse Timber and Sales Phase II Update

Introduction

Buse Timber and Sales Inc. (Buse) retained Exponent to prepare an update to the 1998 environmental site assessment report (Exponent 1998). This letter report summarizes Exponent's work and findings, including limitations.

Scope

The scope of Exponent's activities was limited to review and assessment of those items listed in the recommendations section of the subject report (Exponent 1998) as requiring further action. Additionally, Exponent would view and assess environmentally related site improvements made since the 1998 report. The new site improvements identified by Buse and viewed and assessed by Exponent were limited to the new lubricants storage facility, new oil/water separators, and the new fueling facility.

Limitations

This report and the activities conducted by Exponent were limited to only those activities necessary to assess the status of recommendations contained in the Exponent (1998) report. This assessment and report did not assess or evaluate lead-based paint, asbestos, polychlorinated biphenyls (PCBs), or any other item not included in the *Recommendations* section of the original Exponent report (Exponent 1998). Although Buse provided copies of its draft storm water management plan (Landau Associates 2003a), and its draft spill prevention, contingency, and countermeasure plan (SPCC) (Landau Associates 2003b), Exponent did not review or assess these documents, but simply verified that Buse was in the process of preparing such documents. Exponent was not retained to review or assess these documents.

Activities

Gary Brugger, a managing engineer at Exponent, conducted the site visit and met with Mr. Steve Fogg, a representative of Buse, on December 15, 2003. Mr. Brugger's observations and Exponent's assessment of Buse's progress regarding implementation of recommendations from the Exponent (1998) report, and recommendations for further action, are presented in the following sections.

Buse Timber Site Visit and Observations

Gary Brugger met with Mr. Steve Fogg, C.P.M. of Buse Timber and Sales, on December 15, 2003. Mr. Fogg and Mr. Brugger reviewed the recommendations from the Exponent (1998) report and toured the Buse Timber facility. The bulk of the time was spent observing the storm water collection and oil/water separators that were installed as the result of recommendations included in the 1998 report and the handling and storage areas for the lubricants also addressed in the 1998 report.

At the time of the visit, the site was still wet from the weekend rains. Mr. Brugger observed all the oil water separators and surface runoff from the operation areas. Small puddles containing several liters of water were observed around the site. Two of these puddles (one in the employee parking area) had oil sheens that Mr. Brugger estimated in the 5–10 mg/L range based on his prior experience assessing fuel spills. This minor sheening is generally considered insignificant, and provides an indication that good housekeeping and management of equipment, fuels, and lubricants, including storage and handling, are being practiced at the facility.

There are a number of changes that have occurred since the 1998 audit. Mr. Brugger was able to observe and note some of the changes during the morning visit; other changes and issues arising since the time of the 1998 report required a review of additional documents from Buse. The biggest changes from the time of the Exponent (1998) report included the construction of a lubricants storage building and a new aboveground storage tank (AST) fueling area. Fuels handling improvements included new double-wall ASTs sitting on a concrete slab. The fueling pad has been laid out and the oil-water separator has been put in place but not installed. Once the fueling pad has been installed, walls placed around the AST pad, and piping completed, all fueling handling will occur on contained surfaces connect to an oil-water separator.

According to Steve Fogg, the site is no longer on the hazardous waste generators list, as the annual disposal is reportedly less than the current threshold. The storm water discharges from the site are covered under the general storm water permit issued by the State of Washington. Current sampling results were discussed and copies will be obtained.

Most of the issues from the 1998 Exponent report have been or are being addressed.

New recommendations include improved containment for dispensing lubricants and other liquids from barrels and lining the concrete sump in the new lubricants building.

It has been noted that Exponent's current report will not address wood wastes, PCBs, asbestos, or lead-based paints. Also, Exponent will not address any sediment or water quality issue that was not addressed in the 1998 report. Additionally, the sediment and water quality issues in the 1998 report will only be addressed to document the actions taken in response to those issues raised in the 1998 report.

Implementation of Recommendations

The Exponent (1998) report contained a number of findings and recommendations. These original recommendations are listed in order below. Each recommendation is followed by Exponent's current assessment of the status of implementation of the recommendation.

Aboveground Storage Tank Area

Exponent's findings and recommendation from the Exponent (1998) report:

> These aboveground tanks are not in compliance with current codes for protection of surface waters. We recommend that these tanks be equipped with secondary containment. As indicated in the Phase II soil sampling, there does not appear to be a soil contamination problem. However, small areas of petroleum hydrocarbon contaminated soils may be encountered when constructing the containment. These areas should be excavated and disposed of as petroleum hydrocarbon contaminated soils (potentially at a municipal landfill). Also, a spill prevention control and counter measure plan will be required for these ASTs and other aboveground fuel storage facilities at the facility.

Status—The single-walled ASTs have been replaced with new double-walled ASTs placed on a new concrete pad. The fueling area sub-grade has been prepared for the placement of a fueling pad with containment. According to Mr. Fogg, the fueling pad will be installed in early 2004 and the fueling pad drain will be connected to an oil-water separator that has already been installed. The ASTs existing at the time of the 1998 Exponent investigation were removed. One tank was removed and disposed of by Emerald Petroleum and the other tank was moved to the boiler room to be used as a backup. The backup tank was not observed during the site visit. According to Mr. Fogg, there was no physical evidence of spills at the ASTs when they were removed. However, the area will be excavated and further assessed after the new AST fueling facility is operational (Fogg 2003a, pers. comm.). Additionally, Buse has contracted Landau Associates to prepare an SPCC plan to cover these tanks. A draft copy of the SPCC plan (Landau Associates 2003a) was provided to Exponent for verification. Exponent did not review and/or assess the draft SPCC plan because such review was not included in the scope of work requested by Buse.

Former UST Area

Exponent’s findings and recommendation from the Exponent (1998) report:

> No evidence of petroleum hydrocarbon soil contamination was found at the locations sampled. No further action is recommended for this area.

Status—Because no further action was required, this item was not re-assessed during the December 2003 review.

Former Pentachlorophenol Dip Tank Area

Exponent's findings and recommendation from the Exponent (1998) report:

> No evidence of soil, groundwater, or storm drain sump sediments was found at the locations sampled. No further action is recommended for this area.

Status—Because no further action was required, this item was not re-assessed during the December 2003 review.

Fire Pond Area

Exponent's findings and recommendation from the Exponent (1998) report:

> Petroleum hydrocarbon soil concentrations did not exceed criteria based on Interim TPH Policy. Groundwater concentrations were equal to the MTCA target for drinking water, however the sample was collected in fill placed when the log pond was closed and does not indicate transport of petroleum hydrocarbon through the silty clay layer that is present as an aquitard throughout the site. Moreover, standards based on use of groundwater as a drinking water supply are highly conservative for use at this site because of the absence of usable groundwater. No further action is recommended for this area.

Status—Because no further action was required, this item was not re-assessed during the December 2003 review.

Stockpiled Soils

Exponent's findings and recommendation from the Exponent (1998) report:

> Because the only contaminant is petroleum hydrocarbon as lube oil, the material may pass criteria based on Ecology's Interim TPH Policy. However, we recommend that this relatively small volume (estimated 30 CY) of oily soil be disposed of offsite. Bioremediation is not effective for heavy oils and the soil may even be acceptable at a municipal solid waste landfill (it would need to be tested for dangerous waste characteristics to determine actual disposal options).

Status—The soil was reportedly disposed at an offsite disposal facility. Mr. Fogg provided a copy of the invoice for soil disposal (Fogg 2003b, pers. comm.; see attached copy).

Maintenance Shop

Exponent's findings and recommendation from the Exponent (1998) report:

> Low concentrations of VOCs (below MTCA Method A cleanup levels) were detected in groundwater in this area. No petroleum hydrocarbon compounds were detected in groundwater in this area. No further action is recommended except for the storm drains (see below).

Status—Because no further action was required, this item was not re-assessed during the December 2003 review.

Ditch Sediments

Exponent's findings and recommendation from the Exponent (1998) report:

> We recommend that oily water discharges be discontinued (see below) and that petroleum hydrocarbon contaminated sediments in the southern portion of the ditch be excavated for off site treatment or disposal. Storm water controls will be sufficient to address petroleum hydrocarbons in the east, south and west ditches.

Status—Oil-water separators have been placed on the discharges from the Buse site to the north ditch that was the subject of the comments in the Exponent (1998) report. According to Mr. Fogg, sediments were removed from the southern portion of this ditch. At the time of the site visit, the oil-water separators showed no evidence of oil and the discharge to the ditch did not have a sheen, odor, or other physical evidence of oil contamination. The west ditch was observed. The west ditch had been recently dredged. The dredge material from the west ditch appeared to be primarily a medium to course sand with no physical evidence of oil contamination.

Storm Drains

Exponent's findings and recommendation from the Exponent (1998) report:

> The maintenance shop storm drain was found to contain elevated concentrations of lube oil. Low concentrations of chlorinated phenols were found in two other catch basins. Exponent recommends that sediments in the maintenance shop storm drain system (including the maintenance shop storm drain, down gradient catch basins, and sediment accumulated in the culvert) be removed for offsite treatment and disposal. No further action is required for the storm drains near the former penta dip tank.

Status—Because no further action was required for these storm drains, this item was not re-assessed during the December 2003 review. However, the recommended soil disposal was completed (Fogg 2003b, pers. comm.; see attached copy of invoice).

Storm Water

Exponent's findings and recommendation from the Exponent (1998) report:

> We recommend that storm water controls, including oil-water separators be constructed to prevent oily water from entering adjacent surface waters. These methods could include installation of oil/water separators at storm drains, installation of curbing or other drainage control measures to channel runoff from high trafficked areas to oil/water separators, and regular maintenance of equipment used at the site. This should reduce the concentration of petroleum hydrocarbons in the ditches, but will not eliminate offsite sources.

Status—Four oil-water separators have been installed on the storm drain system that discharges to the north ditch. This discharge is permitted under a statewide, storm water NPDES permit issued by the Washington State Department of Ecology (Ecology). According to Mr. Fogg, all the oil-water separators are inspected regularly and pumped yearly except for the separators located downgradient from the maintenance building that are pumped quarterly. There was no physical evidence of oil in any of these separators at the time of Mr. Brugger's visit. Although Exponent obtained copies of the NPDRS permit and some monitoring data, Exponent did not assess any compliance issues that may be associated with this permit. Such assessment was not included in the scope of work requested by Buse. Because there was no physical evidence of petroleum products in the oil-water separators or at the point of discharge, it is probable that Buse is in compliance with the NPDES permit condition that limits the discharge of petroleum. Buse has contracted Landau Associates to prepare a storm water management plan. A copy of the draft storm water management plan was provided to Exponent for verification. Exponent did not review or assess the storm water management plan because such review and assessment were not included in Exponent's scope of services.

Lube Oil Storage

Exponent's findings and recommendation from the Exponent (1998) report:

> We recommend that secondary containment be provided for all lubricating or hydraulic oil storage facilities at the mill.

Status—Buse has constructed a new building to house and dispense lubrication and hydraulic oils. This building has a concrete floor with a sump.

Former Burn Area

Exponent's findings and recommendation from the Exponent (1998) report:

> We found no evidence of elevated concentrations of dioxins/furans in subsurface soils in this area. No further action is recommended.

Status—Because no further action was required, this item was not re-assessed during the December 2003 review.

Recommendations

Aboveground Storage Tank Area

The recommendations from the Exponent (1998) report regarding the ASTs and dispensing of fuels have not been completely implemented. Installing the fueling pad, connecting the fueling pad drain to the new oil-water separator, and excavation of the former AST site remain to be completed. According to Mr. Fogg, these improvements are planned for early 2004. Once these improvements are complete, Buse will have implemented the recommendations regarding the ASTs contained in the Exponent (1998) report.

Lube Oil Storage

Although most of the lubrication and hydraulic oils are now stored and dispensed in a building with a concrete floor, the sump of the building is not lined and there are no drip pans under the dispensers. While the current facility is generally protective, it is possible that the concrete sump will develop cracks with time. Additionally, the lining of the sump and the use of drip pans will facilitate the cleanup of any small spills. Accordingly, Exponent recommends that the sump be lined and drip pans used at all dispensing locations.

Site Housekeeping

The general housekeeping of the site was very good during Exponent's site visit (the exception being several pieces of equipment being randomly stored at the site). Because the oil-water separators installed by Buse are not very efficient, Buse must rely on good housekeeping, particularly of petroleum products, and frequent inspection and periodic maintenance (pumping) of the separators to meet the conditions of the NPDES permit. Exponent recommends that Buse develop a regular inspection program to address site housekeeping and separator operation, including documentation that includes dates of inspection and service of the separators.

Finalize Draft SPCC and Storm Water Management Plans

Buse has contracted Landau Associates to prepare both an SPCC plan and a storm water management plan. Exponent recommends that Buse carefully review these plans, verify that they meet EPA and Ecology requirements, and then finalize these plans. Both plans should be reviewed at least yearly to verify that the plans are consistent with site operations and still meet agency (EPA and Ecology) requirements.

Bibliography

Exponent. 1998. Draft Phase II environmental site assessment, Buse Timber & Sales, Inc., Everett, Washington. Prepared for Koncor Forest Products Company, Tacoma, WA. Exponent, Lake Oswego, OR.

Fogg, S. 2003a. Personal communication (e-mail to G. Brugger, Exponent, Bellevue, WA, dated December 26, 2003, regarding AST removal). Buse Timber and Sales Inc., Everett, WA.

Fogg, S. 2003b. Personal communication (letter to G. Brugger, Exponent, Bellevue, WA, dated December 17, 2003, regarding soil pile disposal). Buse Timber and Sales Inc., Everett, WA.

Landau Associates. 2003a. Client review draft—Spill prevention, control, and countermeasures plan (SPCC), Buse Timber Sales, Inc., Everett, Washington. Prepared for Buse Timber Sales, Inc., Everett, WA. Landau Associates, Edmonds, WA.

Landau Associates. 2003b. Stormwater pollution prevention plan, Buse Timber Sales, Inc., 3812 28th Place NE, Everett, Washington. Prepared for Buse Timber Sales, Inc., Everett, WA. Landau Associates, Edmonds, WA.

DOUGLAS FIR HEMLOCK SPRUCE

BUSE
TIMBER & SALES, INC.

EVERETT: (425) 258-2577
FAX: (425) 259-6956

3812 - 28TH PLACE N.E.
EVERETT, WASHINGTON 98205-3209

December 17, 2003

Gary Brugger, PE
Exponent
15375 SE 30th PL
Suite 250
Bellevue, WA 98007

Gary,

Regarding the disposal of the "soil pile" referred to in your 1998 Report, the verbal information that I gave you on the 15th of December was in error. The material was disposed of offsite as indicated by the attached copies of invoices and a copy of the file folder front with notes.

This should clear up the concern
Thank you,

Steve Fogg C.P.M.
Buse Timber

North Ditch Clean up 9/98

Ditch was excavated by Buse
Material Hauled to Waste Management Inc.
by Clark Service

Area was reseeded
Work completed 10/1/98

CLEAN SERVICE COMPANY, INC.
P.O. BOX 49
MAPLE VALLEY, WA 98038-0049
PHONE 425-432-8005
FAX 425-432-2405

File

INVOICE NO.
103384

INVOICE

SOLD TO:
BUSE TIMBER
3812 28TH PL. NE

EVERETT, WA 98205-3209
(206) 252-5119

SHIP TO:
BUSE TIMBER
DISPOSAL & TRANSPORTATION OF
SLEW SLUDGE
EVERETT, WA 98205-3209
(206) 252-5119

Page 1

ACCOUNT NO.	SALES REP. NO.	PURCHASE ORDER NO.	SHIP VIA	COL	PPD	DATE SHIPPED	TERMS	INVOICE DATE	PA
BUSE		S FOGG				09/15/98	NET 30	09/17/98	

QTY. ORDERED	QTY. SHIPPED	QTY. BACK ORDERED	ITEM NO.	DESCRIPTION	UNIT PRICE	DISC %	EXTENDED PRICE
				DISPOSAL AND TRANSPORTATION OF SLEW SLUDGE TRUCK AND TRAILER SERVICES 9-15-98 11.5 HRS @ $78 PER HR = $897.00	897.00		897.00
				9-16-98 11.25 HRS @ $78 PER HR = $877.50	877.50		877.50
				DISPOSAL OF WASTE 114.75 TONS @ $44 PER TON = $ 5,049.00	5049.00		5049.00

SALE AMOUNT	6823.50
MISC. CHARGES 8.300% SALES TAX FREIGHT	566.35
TOTAL	7389.85

Thank You

CLEAN SERVICE COMPANY, INC.
P.O. BOX 49
MAPLE VALLEY, WA 98038-0049
PHONE 425-432-8005
FAX 425-432-2405

File

INVOICE NO. 1
103441

INVOICE

SOLD TO: BUSE TIMBER
3812 28TH PL. NE

EVERETT, WA 98205-3209
(206) 252-5119

SHIP TO: BUSE TIMBER
3812 28TH PL. NE

EVERETT, WA 98205-3209
(206) 252-5119

Page 1

ACCOUNT NO.	SALES REP NO.	PURCHASE ORDER NO.	SHIP VIA	COL	PPD	DATE SHIPPED	TERMS	INVOICE DATE	PA
BUSE		S FOGG				09/28/98	NET 30	09/29/98	

QTY ORDERED	QTY SHIPPED	QTY BACK ORDERED	ITEM NO.	DESCRIPTION	UNIT PRICE	DISC %	EXTENDED PRICE
				TRUCKING AND DISPOSAL OF SLEW SLUDGE ON 9-28-98 TRUCK & TRAILER 7 HRS @ $78 PER HR = $ 546.00	546.00		546.00
				DISPOSAL 32.81 TONS @ $44 PER TON = $ 1443.64	1443.64		1443.64

	SALE AMOUNT	1989.64
8.300%	MISC. CHARGES SALES TAX FREIGHT	165.14
Thank You	TOTAL	2154.78

INVOICE NO.
103461

CLEAN SERVICE COMPANY, INC.
P.O. BOX 49
MAPLE VALLEY, WA 98038-0049
PHONE 425-432-8005
FAX 425-432-2405

INVOICE

SOLD TO: BUSE TIMBER
3812 28TH PL. NE

EVERETT, WA 98205-3209
(206) 252-5119

SHIP TO: BUSE TIMBER
3812 28TH PL. NE

EVERETT, WA 98205-3209
(206) 252-5119

Page 1

ACCOUNT NO.	SALESPER. NO.	PURCHASE ORDER NO.	SHIP VIA	COL	PPD	DATE SHIPPED	TERMS	INVOICE DATE	PA
BUSE	PK	S FOGG				09/30/98	NET 30	09/30/98	

QTY. ORDERED	QTY. SHIPPED	QTY. BACK ORDERED	ITEM NO.	DESCRIPTION	UNIT PRICE	DISC	EXTENDED PRIC
				DUMP TRUCK SERVICES ON 9-30-98 12 HRS @ $78 PER HR = $936.00	936.00		936.00
				DISPOSAL 48.2 TONS @ $44 PER TON = $2120.80	2120.80		2120.80

	SALE AMOUNT	3056.80
8.300%	MISC. CHARGES SALES TAX FREIGHT	253.71
Thank You	TOTAL	3310.51

Subject: FW: Site visit
Attachments: Storm water 2.jpg; Storm water 1.jpg

From: SteveFogg [mailto:SteveFogg@BuseTimber.com]
Sent: Tuesday, November 16, 2010 1:27 PM
To: Gary Brugger
Subject: RE: Site visit

Gary
Here are the last two tests. Let me know if you need anything else.
Steve

From: Gary Brugger [mailto:bruggerg@exponent.com]
Sent: Tuesday, November 16, 2010 12:29 PM
To: SteveFogg
Subject: Site visit

Forgot to check your stormwater permit and annual report. Do you still have a permit that requires reporting? If yes could you forward a copy of the latest report?

Thanks

Gary

ALS Environmental

CERTIFICATE OF ANALYSIS

CLIENT: Buse Timber
3812 28th Pl. NE
Everett, WA 98205
CLIENT CONTACT: Steve Fogg
CLIENT PROJECT: DP1-102510
CLIENT SAMPLE ID DP1-102510

DATE: 11/8/2010
ALS JOB#: 1010162
ALS SAMPLE#: -01
DATE RECEIVED: 10/25/2010
COLLECTION DATE: 10/25/2010 08:17
WDOE ACCREDITATION: C601

DATA RESULTS

ANALYTE	METHOD	RESULTS	REPORTING LIMITS	DILUTION FACTOR	UNITS	ANALYSIS DATE	ANALYSIS BY
Total Suspended Solids	SM2540D	**11** 100	5.0	1	MG/L	10/25/2010	DLC
Turbidity	EPA-180.1	**10** 25	0	1	NTU	10/25/2010	RAL
Copper	EPA-6020	U 14	2.6	1	UG/L	10/26/2010	RAL
Iron	EPA-6020	[redacted]	220	1	UG/L	10/26/2010	RAL
Zinc	EPA-6020	**17** 117	14	1	UG/L	10/26/2010	RAL
Chemical Oxygen Demand (COD)	SM5220	**200** 120	10	1	MG/L	11/08/2010	ARI

U - Analyte analyzed for but not detected at level above reporting limit.

Benchmark

GARY

This test is in house info
not part of the Stormwater permit

Steve

APPROVED BY:

Laboratory Director

Site Name: BUSE TIMBER AND SALES INC	WAR000097	DP-1
Site Address: 3812 28th Pl Ne	Permit Number	Sampling Point
City: Everett / **County:** Snohomish		

Submit **one** DMR per sampling point.

Reporting Period			
Quarter (circle one) ~~Year~~:			
1st	2nd	[✓ 3rd]	4th
Jan/Feb/Mar	Apr/May/Jun	Jul/Aug/Sept	Oct/Nov/Dec

Parameter	**Units**	**Benchmark Value**	**Analytical Method**	**Laboratory Quantitation Level**	**Sample Results**			
					SINGLE SAMPLE RESULT	SINGLE SAMPLE DATE (MM/DD)	AVERAGE (If more than one sample collected, complete additional sampling log on next page.)	CONSISTENT ATTAINMENT? (Condition S4.B.6) (✓ for yes)
Turbidity	NTU	25	EPA 180.1, Meter	0.5	23	9/1/10		☐
pH	s.u.	5 - 9	Meter	±0.5	6.5		N/A	☐
Zinc, Total	µg/L	117	EPA 200.8	2.5	65			☐
Oil Sheen	Yes/No	No visible oil sheen	N/A	N/A	Sheen Present? Yes / [✓ No] (circle)		N/A	N/A
Copper, Total	µg/L	Western WA: 14 Eastern WA: 32	EPA 200.8	2.0	ND			☐
COD	mg/L	120	SM5220-D	10	100			☐
TSS	mg/L	100	SM2540-D	5	45			☐

☐ No sample collected – No stormwater was discharged during normal working hours.

☐ No sample collected – Stormwater was discharged during normal working hours, but a sample wasn't collected (explain in comments section).

ADDITIONAL COMMENTS:

Attachment F

Preliminary Sediment Characterization Memorandum

Prepared by:
The Dredged Material Management Office
Seattle District, U.S. Army Corps of Engineers

MEMORANDUM FOR RECORD January 4, 2019

SUBJECT: PRELIMINARY SEDIMENT CHARACTERIZATION ASSOCIATED WITH POTENTIAL DREDGING OF UNION SLOUGH (EVERETT, WASHINGTON) BY SNOHOMISH COUNTY

1. Introduction. This memorandum reflects the consensus opinion of the Dredged Material Management Program (DMMP) agencies (U.S. Army Corps of Engineers, Washington Departments of Ecology and Natural Resources, and the Environmental Protection Agency) regarding preliminary sediment characterization results associated with potential future dredging of Union Slough and additional actions required of Snohomish County prior to dredging.

2. Background. The Snohomish River estuary includes the mainstem river and three primary interconnected distributary tidal channels: Union Slough, Steamboat Slough and Ebey Slough (Figure 1). Flows within Steamboat and Union sloughs are connected through the short navigational channel known informally as the Buse Cut, created between 1955 and 1965. Buse Timber transports logs from Puget Sound upstream in Steamboat Slough, through the Buse Cut, and downstream in Union Slough to the Buse Log Ramp, which is 300 feet west of I-5 (Figure 2). The proposed dredging would occur in the channel of Union Slough, between the Buse Cut and the Buse Log Ramp (Anchor, 2017).

   Prior to the arrival of Euro-Americans around the mid-19th century, the estuary downstream of the head of Ebey Slough contained approximately 10,000 acres of tidal marsh where freshwater from the Snohomish River mixed with saltwater from Puget Sound. After Euro-American settlement, the estuary area was progressively logged and cleared. A system of dikes, tide gates, and linear ditches were constructed to drain the marshlands and prevent tidal inundation and flooding. A diking district, which later became Diking Improvement District 5, was formed in 1931 to construct a diking system on Smith Island. A dike was constructed adjacent to Union Slough, likely in the early 1930s (Anchor, 2017).

   In 2018 Snohomish County breached the Smith Island dike in several places to restore the island to tidal marshland. The dike breaches allowed water from Union Slough to flow over Smith Island. With this flow came the potential for erosion of material from the marsh plain and newly excavated dike material into Union Slough. Breaches were also made in a dike on the west side of Mid-Spencer Island, increasing the tidal influence there and subjecting the newly excavated dike material to erosion.

   Prior to construction of the Smith Island restoration project, Buse Timber expressed concern that erosion from the island could result in accumulation of sediment in Union Slough to such an extent as to make the slough practicably impassable by raft tugs. Snohomish County agreed to dredge the slough should that happen. The county worked proactively with the DMMP agencies prior to construction to characterize upland material that could erode and necessitate dredging of the slough.

   Conservative estimates of potential post-construction erosion were made prior to breaching the dikes through the use of bed shear-stress modeling, (Anchor, 2017). Three areas with the highest erosion potential were identified. These included the East Tidal Channel, Mid-Spencer Island and East Smith Island. The South Tidal Channel had a lower shear-stress value, but was identified conservatively as a fourth area with erosion potential due to plans to construct a new channel in that area. Construction plans called for breached dike material to be graded behind the breaches in the East Tidal Channel, Mid-Spencer Island and East Smith Island. This newly placed material had the highest likelihood of being mobilized by tidal floodwaters. The erosion potential of the marsh plain in the area of the East Tidal Channel was also high. A maximum total of 100,000 cy of sediment was projected to potentially wash downstream after the dikes were breached.

3. Project Summary. Table 1 includes project summary and tracking information.

Table 1. Project Summary

Project ranking	Moderate (homogeneous)
Characterized volume	100,000 cy
Characterized depth (feet)	Erosional areas: 2.5 ft Slough: 10 cm
Draft SAP received	September 7, 2017
Draft SAP returned for revisions	September 19, 2017
Revised SAP received	October 6, 2017
Revised SAP returned for revisions	October 19, 2017
Final SAP received	October 19, 2017
Final SAP approved	October 19, 2017
Sampling dates	January 2-4, 2018
Data report received	December 10, 2018
DMMO Tracking number	UNION-1-A-F-394
EIM Study ID	UNION18
USACE Permit Application Number	TBD
Recency Determination	January 2023 (moderate rank = 5 yrs)

4. Project Ranking and Sampling Requirements. The DMMP agencies ranked the potential erosional areas as ‘moderate’ for sediment characterization due to the project’s location within the plume of the former ASARCO smelter in Everett. Previous soil sampling in the vicinity of the East Tidal Channel, Mid-Spencer Island and South Tidal Channel demonstrated that concentrations of COCs did not vary significantly with depth (Anchor, 2017). Therefore, the potential erosional areas were considered to have soil that was relatively homogeneous. The minimum numbers of field samples and dredged material management units (DMMUs) in the erosional areas were calculated using the following Puget Sound guidelines for homogeneous material in a moderate-ranked area (DMMP, 2016):

- Maximum volume of sediment represented by each field sample = 4,000 cubic yards
- Maximum volume of sediment represented by each DMMU = 20,000 cubic yards.

Based on these guidelines, five DMMUs with five field samples in each DMMU were nominally required. However, in a conference call with Anchor QEA on September 27, 2017, during which a preliminary sampling diagram was reviewed, the DMMP agencies agreed that four field samples per DMMU were sufficient to represent the four most compact DMMUs (DMMUs 1, 2, 3 and 5). For DMMU 4, which was elongated, the agencies required five field samples to adequately represent the area (Figure 2).

For the purpose of conducting an antidegradation evaluation for the project, existing conditions within Union Slough needed to be assessed (DMMP, 2008; Ecology, 2013). The rationale for doing so was that dredging would presumably return the slough to conditions similar to those existing prior to construction. The DMMP agencies required collection of three individual surface grab samples from the slough for this assessment (sampling stations SG-01, SG-02 and SG-03 in Figure 2).

5. Sampling. Sampling took place January 2-4, 2018 using a hand auger for soil samples in the erosional areas and a power Van Veen grab sampler for the surface samples from Union Slough. Soil borings to a depth of 2.5 feet were deemed representative of the erodible material in the marsh plain and dikes. Grab samples from Union Slough were taken from the top 10 cm to assess existing conditions. Figure 2 shows the target and actual sampling locations. Tables 2 and 3 provide the sampling data for the soil borings and sediment grab samples respectively.

   In the East Tidal Channel area, both the marsh plain behind the dike, and dike material that was to be excavated and placed behind the breaches, were predicted to be subject to potential erosion. Two samples within each of the three DMMUs in this area were collected from the dike and the other two samples from each DMMU were collected from the marsh plain.

   In the East Smith Island and Mid-Spencer Island areas, the material subject to the greatest erosion potential was predicted to be the dike material that was to be excavated and placed behind the breaches. Therefore, all five samples in DMMU 4 were collected along the dikes to be breached.

   In the South Tidal Channel area, excavated dike material was to be stockpiled upland in an area not subject to erosion. Therefore, the core samples in DMMU 5 were collected along the sides of the newly created channel, which was constructed behind the dike prior to breaching.

   Two grab samples were taken from each station in Union Slough to collect enough sediment for chemical and potential biological analysis. Sampling difficulties were encountered at stations SG-1 and SG-3, necessitating multiple attempts in order to collect two intact grab samples at these stations. Difficulties included winnowing of sediment within the grab sampler and objects such as sticks and cobbles keeping the jaws of the sampler from closing.

6. Grain Size, Sediment Conventional and Chemical Analysis. The grain-size, sediment conventional and chemical results are presented in Table 4. The grain-size data show that the physical characteristics of the erosional material varied considerably from one DMMU to another. For example, DMMU 1 contained 40% gravel and only 39% fines, while DMMUs 3 and 5 had very little gravel and a fines content of over 80%. DMMUs 2 and 4 had a more even distribution of grain sizes, with each containing 14% gravel, 25-30% sand and 56-61% fines. The grab samples taken from three stations in Union Slough were predominantly sand, with only one of them (SG-3) having a significant fines fraction.

   The total organic carbon content (TOC) also varied widely in the erosional material, ranging from 0.9% in DMMU 2 to 4.4% in DMMU 5. TOC in the grab samples was uniformly low, ranging from 0.1 to 0.4%. Total solids ranged from 55 to 75% in the erosional areas and 68 to 77% in the grab samples. Total volatile solids ranged from 4.5 to 11.2% in the erosional material and only 0.9 to 2.1% in the grab samples. Ammonia concentrations were low (or undetected) in all samples and sulfides were undetected throughout.

The DMMP marine guidelines were used to assess COC concentrations in the erosional material, because this material has the potential to be dredged and placed at the Port Gardner open-water disposal site. The three DMMUs in the East Tidal Channel erosional area (DMMUs 1, 2 and 3) all had one or more exceedances of SL for pesticides (Table 5). All three DMMUs exceeded the SL for dieldrin, with concentrations ranging from 8.4 to 23.3 ug/kg (SL = 1.9 ug/kg). DMMUs 2 and 3 also had SL exceedances for 4,4'-DDE and 4,4'-DDT. Concentrations of 4,4'-DDE for DMMUs 2 and 3 were 11.5 and 28.8 ug/kg respectively (SL = 9 ug/kg) and concentrations of 4,4'-DDT were18.6 and 49.9 ug/kg respectively (SL = 12 ug/kg). DMMU 3 also exceeded the BT (50 ug/kg) and maximum level (ML) (69 ug/kg) for Total DDT, with a concentration of 88.1 ug/kg. None of the other marine SLs were exceeded in the East Tidal Channel area. DMMUs 4 and 5 had no DMMP guideline exceedances.

There was no reason to believe that tributyltin or dioxins/furans would be present at elevated concentrations. Therefore, the DMMP agencies did not require these chemicals to be analyzed.

The State of Washington marine sediment quality standards (SQS) were used to assess COC concentrations in surface grab samples collected from Union Slough. The data provided in Table 4 show that there were no SQS exceedances for any of the three surface samples from the slough.

7. <u>Biological Testing</u>. The SL and BT exceedances would normally result in a requirement to run bioassays and bioaccumulation testing were the chemical results for actual dredged material. In this case, however, the tested material only has the potential to erode. Depending on the rate of erosion and the resulting mixing ratio with cleaner bed-load material, the concentration of pesticides in the material requiring dredging may or may not exceed DMMP guidelines (Anchor, 2018).

8. <u>Antidegradation Evaluation</u>. As discussed earlier, should dredging be required in the future, the post-dredge surface will likely be similar to the condition existing in Union Slough prior to breaching the dikes. This condition was represented by the three surface grab sample composites taken from the slough prior to construction. Concentrations of COCs in these samples were all below SQS. Therefore, assuming that dredging returns Union Slough to its pre-construction condition, the State of Washington antidegradation standard will be met.

9. <u>Additional Actions Required Before Dredging</u>. This memorandum documents the evaluation of data collected by Snohomish County from erosional areas in preparation for potential dredging of Union Slough. Should dredging be required, Snohomish County will collect surface grab samples of shoaled material in the slough in accordance with Anchor (2017) and at a level of intensity consistent with the DMMP guidelines. A SAP addendum consisting of the proposed dredge footprint, sampling locations, and compositing scheme will be provided to the DMMP agencies for approval prior to sampling.

   The preliminary data clearly showed that other than dieldrin and DDT, there is no reason to believe that concentrations of other COCs will exceed DMMP SLs or BTs. Therefore, only dieldrin and DDT constituents will need to be analyzed (along with TOC and grain size). Should concentrations exceed one or more SL or BT, the appropriate biological testing will need to be performed. A brief technical memorandum including the sampling data, sample location figure, and testing results will be provided to the DMMP agencies by Snohomish County. The data will also be provided in EIM format.

Once testing of the dredged material has been completed, the DMMP agencies will document the results in a suitability determination. This memorandum will be referenced and included as an attachment to the suitability determination.

10. References.

Anchor, 2017. *Final Sampling and Analysis Plan for Union Slough Sediment Characterization.* Prepared by Anchor QEA for Snohomish County Public Works, October 2017.

Anchor, 2018. *Sediment Characterization Report for Union Slough Sediment Characterization.* Prepared by Anchor QEA for Snohomish County Public Works, December 2018.

DMMP, 2008. *Quality of Post-Dredge Sediment Surfaces (Updated)*. A Clarification Paper Prepared by David Fox (USACE), Erika Hoffman (EPA) and Tom Gries (Ecology) for the Dredged Material Management Program, June 2008.

DMMP, 2016. *Dredged Material Evaluation and Disposal Procedures (User Manual)*. Dredged Material Management Program, August 2016.

Ecology, 2013. *Sediment Management Standards – Chapter 173-204 WAC*. Washington State Department of Ecology, Revised February 2013.

11. DMMO Signature. This memorandum was coordinated by the undersigned with Laura Inouye (Ecology), Justine Barton (EPA) and Celia Barton (DNR).

The signed copy is on file in the Dredged Material Managment Office.

Date

David Fox, P.E. - Seattle District Corps of Engineers

Copies furnished:

DMMP agencies
Jacalen Printz, Corps Regulatory
Aaron Kopp, Snohomish County
Joy Dunay, Anchor QEA

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Figure 1
Vicinity Map
Sediment Characterization Report
Union Slough Sediment Characterization

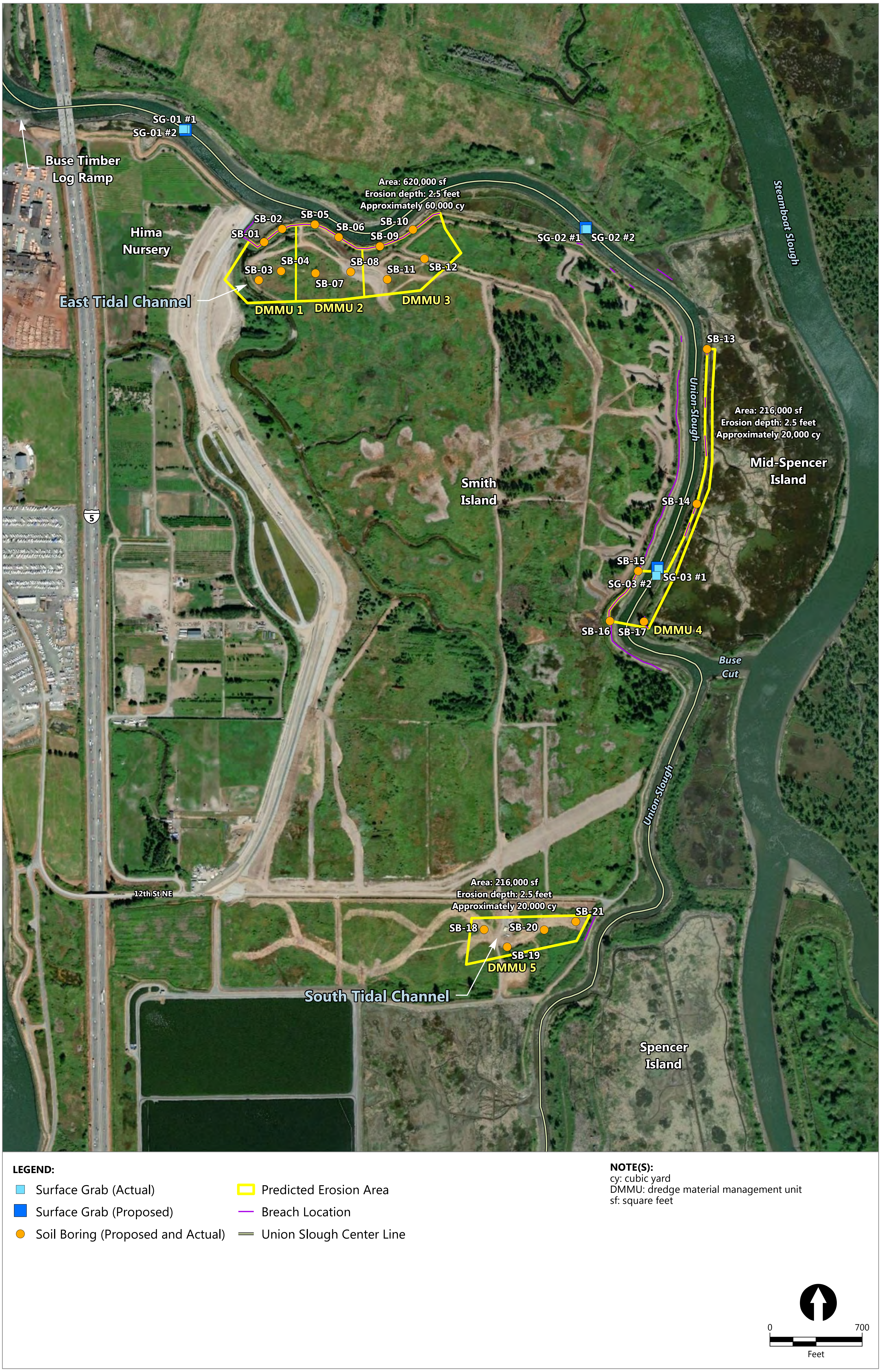

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Figure 2
Proposed and Actual Sampling Locations
Sediment Characterization Report
Union Slough Sediment Characterization

Table 2
Soil Collection Data

DMMU	Station ID	Date	X Coordinate[1]	Y Coordinate[1]	Archive Sample ID[2]	Composite Sample ID	Sampling Interval	Surface Interval Composite Testing Parameters
DMMU1	SB-1	1/2/2018	1313428.92	375335.59	SB-1-180102	DU-1-180102	0 to 2.5 feet below ground surface (0 to 76 centimeters)	DMMP Testing Parameters,[3] Bioassay Archive
	SB-2		1313565.45	375434.89	SB-2-180102			
	SB-3		1313388.18	375046.30	SB-3-180102			
	SB-4		1313556.86	375115.74	SB-4-180102			
DMMU2	SB-5	1/2/2018	1313813.76	375469.14	SB-5-180102	DU-2-180102		
	SB-6		1313993.98	375373.27	SB-6-180102			
	SB-7		1313818.12	375098.88	SB-7-180102			
	SB-8		1314085.70	375109.52	SB-8-180102			
DMMU3	SB-9	1/4/2018	1314307.53	375303.60	SB-9-180104	DU-3-180104		
	SB-10		1314558.40	375430.41	SB-10-180104			
	SB-11		1314363.26	375052.01	SB-11-180104			
	SB-12		1314645.13	375209.17	SB-12-180104			
DMMU4	SB-13	1/4/2018	1316789.82	374524.17	SB-13-180104	DU-4-180104		
	SB-14		1316711.19	373348.48	SB-14-180104			
	SB-15		1316267.21	372839.02	SB-15-180104			
	SB-16		1316053.03	372459.79	SB-16-180104			
	SB-17		1316310.98	372454.75	SB-17-180104			
DMMU5	SB-18	1/4/2018	1315098.34	370118.52	SB-18-180104	DU-5-180104		
	SB-19		1315273.10	369986.11	SB-19-180104			
	SB-20		1315554.18	370116.60	SB-20-180104			
	SB-21		1315793.49	370179.11	SB-21-180104			

Notes:
1. Coordinates are in North American Datum of 1983 Washington State Plane, North Zone, U.S. feet.
2. Archives of individual intervals kept.
3. DMMP testing parameters include semivolatile organic compounds, polycyclic aromatic hydrocarbons, pesticides, polychlorinated biphenyls, metals, sulfide, ammonia, total organic carbon, grain size, total volatile solids, and total solids.

DMMP: Dredged Material Management Program
DMMU: Dredged Material Management Unit

Table 3
Sediment Collection Data – Z-Samples

Station ID	Date	Accepted Attempt	X Coordinate[1]	Y Coordinate[1]	Water Depth (feet)	Water Level (feet NAVD88)[2,3]	Mudline Depth (feet NAVD88)[3]	Sample ID	Sampling Interval Below Mudline	Z-Sample Testing Parameters
SG-1	1/3/2018	5	1312833.00	376191.08	10.8	4.04	-6.8	SG-1-180103	0 to 10 centimeters (0 to 4 inches)	DMMP Testing Parameters,[4] Bioassay Archive
		8	1312814.20	376192.59	11.0	4.04	-7.0			
SG-2	1/3/2018	1	1315867.41	375431.71	12.6	4.36	-8.2	SG-2-180103		
		2	1315876.56	375434.26	12.4	4.36	-8.0			
SG-3	1/3/2018	4	1316421.33	372855.82	13.4	6.59	-6.8	SG-3-180103		
		8	1316404.31	372803.77	11.6	5.10	-6.5			

Notes:

1. Coordinates are in North American Datum of 1983 Washington State Plane, North Zone, U.S. feet.
2. Water levels at time of sampling were surveyed using a real time kinematic global positioning system connected to the Washington State Reference Network.
3. Add 2 feet to NAVD88 to obtain mean lower low water elevation.
4. DMMP testing parameters include semivolatile organic compounds, polycyclic aromatic hydrocarbons, pesticides, polychlorinated biphenyls, metals, sulfide, ammonia, total organic carbon, grain size, total volatile solids, and total solids.

DMMP: Dredged Material Management Program

NAVD88: North American Vertical Datum of 1988

Table 4

Location ID							DU-1-180102	DU-2-180102	DU-3-180104	DU-4-180104	DU-5-180104	SG-1-180103	SG-2-180103	SG-3-180103
Sample ID							DU-1-180102	DU-2-180102	DU-3-180104	DU-4-180104	DU-5-180104	SG-1-180103	SG-2-180103	SG-3-180103
DMMU							DMMU1	DMMU2	DMMU3	DMMU4	DMMU5	--	--	--
Sample Date							1/2/2018	1/2/2018	1/4/2018	1/4/2018	1/4/2018	1/3/2018	1/3/2018	1/3/2018
Depth							0 - 2.5 feet	0 - 2.5 feet	0 - 2.5 feet	0 - 2.5 feet	0 - 2.5 feet	0 - 10 cm	0 - 10 cm	0 - 10 cm
Matrix							SO	SO	SO	SO	SO	SE	SE	SE
	Method	DMMP SL	DMMP BT	DMMP ML	SMS Marine SCO SCUM II	SMS Marine CSL SCUM II								
Conventional Parameters (mg/kg)														
Ammonia as nitrogen	SM4500NH3H						**1.62 J**	**1.03 J**	**2.41**	**2.2**	**6.59**	0.51 U	0.55 U	**1.12**
Sulfide	SM4500S2D						1.22 U	1.29 U	1.41 U	1.42 U	1.69 U	1.33 U	1.36 U	1.47 U
Conventional Parameters (pct)														
Total organic carbon	SW9060AM						**1.29 J**	**0.93 J**	**1.62**	**3.4**	**4.35**	**0.11 J**	**0.13 J**	**0.41 J**
Total solids	SM2540G						**74.61**	**73.57**	**71.29**	**70.89**	**55.22**	**76.74**	**70.71**	**68.48**
Total volatile solids	PSEP						**5.13**	**4.53**	**6.37**	**8.21**	**11.2**	**0.887**	**0.98**	**2.13**
Grain Size (pct)														
Gravel	PSEP						**40.2**	**13.6**	**0.2**	**13.7**	**1.1**	**0.1**	**0.3**	**0**
Sand, very coarse	PSEP						**3.3**	**5.1**	**0.9**	**1.9**	**2**	**0.9**	**0.5**	**0.3**
Sand, coarse	PSEP						**2.9**	**6.6**	**1.2**	**5**	**2.9**	**18.6**	**2.9**	**2.8**
Sand, medium	PSEP						**3.2**	**9.1**	**1.2**	**6.6**	**3.2**	**71.4**	**53.9**	**27**
Sand, fine	PSEP						**4.2**	**6.5**	**3.6**	**5.1**	**3.2**	**7.6**	**40.1**	**32.3**
Sand, very fine	PSEP						**6.9**	**3.1**	**12.3**	**6.9**	**2.3**	**0.3**	**1.5**	**14.2**
Total Sand	PSEP						**20.5**	**30.4**	**19.2**	**25.5**	**13.6**	**98.8**	**98.9**	**76.6**
Silt, coarse	PSEP						**5.8**	**6.8**	**14.5**	**12.6**	**5.5**	1 U	0.8 U	**8.9**
Silt, medium	PSEP						**8.3**	**10.2**	**17.6**	**13.1**	**14.3**	1 U	0.8 U	**4.7**
Silt, fine	PSEP						**7.6**	**11.2**	**15**	**11.2**	**19.3**	1 U	0.8 U	**3.4**
Silt, very fine	PSEP						**5.6**	**9.4**	**12.1**	**8.8**	**16.2**	1 U	0.8 U	**2.2**
Clay, coarse	PSEP						**4.3**	**6.8**	**8.2**	**5.4**	**10.7**	1 U	0.8 U	**1.7**
Clay, medium	PSEP						**2.7**	**4.1**	**5.1**	**3.6**	**6.5**	1 U	0.8 U	**1**
Clay, fine	PSEP						**5**	**7.6**	**8.3**	**6**	**12.7**	1 U	0.8 U	**1.3**
Total Fines (Silt + Clay)							**39.3**	**56.1**	**80.8**	**60.7**	**85.2**	1 U	0.8 U	**23.2**
Metals (mg/kg)														
Antimony	SW6020A	150		200			**-- R**	**-- R**	**-- R**	**-- R**	**0.04 J**	**-- R**	**-- R**	**-- R**
Arsenic	SW6020A	57	507.1	700	57	93	**14.3**	**13.8**	**18.4**	**13.8**	**27.2**	**5.83**	**5.58**	**7.82**
Cadmium	SW6020A	5.1	11.3	14	5.1	6.7	**0.13 J**	**0.1 J**	**0.16**	**0.11 J**	**0.27**	**0.04 J**	**0.04 J**	**0.07 J**
Chromium	SW6020A	260	260		260	270	**59.9 J**	**65.6 J**	**57.3 J**	**51.2 J**	**65.4**	**21.5 J**	**27.4 J**	**38.1 J**
Copper	SW6020A	390	1027	1300	390	390	**40**	**34.5**	**45.3**	**39.8**	**52.6**	**13.6**	**16.1**	**26**
Lead	SW6020A	450	975	1200	450	530	**13**	**11.4**	**14.2**	**14.6**	**30.5**	**4.09**	**4.07**	**5.62**
Mercury	SW7471B	0.41	1.5	2.3	0.41	0.59	**0.0831**	**0.0686**	**0.0796**	**0.0889**	**0.0966**	0.0296 U	0.0316 U	**0.0321**
Selenium	SW6020A		3				**1.13**	**1.17**	**1.39**	**0.97**	**1.62**	**0.49 J**	0.7 U	**0.77**
Silver	SW6020A	6.1	6.1	8.4	6.1	6.1	**0.11 J**	**0.08 J**	**0.13 J**	**0.12 J**	**1.2**	**0.02 J**	**0.03 J**	**0.07 J**
Zinc	SW6020A	410	2783	3800	410	960	**63**	**67.4**	**71.1**	**58.5**	**77**	**39.4**	**43.4**	**55.2**
Semivolatile Organics (mg/kg-OC)														
1,2,4-Trichlorobenzene	SW8270DSIM				0.81	1.8	0.3721 U	0.5054 U	0.3086 U	0.1441 U	0.1103 U	*4.4545 U*	*3.8462 U*	*1.1707 U*
1,2-Dichlorobenzene	SW8270DSIM				2.3	2.3	0.3721 U	0.5054 U	0.3086 U	0.1441 U	0.1103 U	*4.4545 U*	*3.8462 U*	1.1707 U
1,4-Dichlorobenzene	SW8270DSIM				3.1	9	0.3721 U	0.5054 U	0.3086 U	0.1441 U	0.1103 U	*4.4545 U*	*3.8462 U*	1.1707 U
2,4-Dimethylphenol	SW8270DSIM						1.876 UJ	2.5269 UJ	1.5309 UJ	0.7265 UJ	0.554 UJ	22.4545 UJ	19.2308 UJ	5.8293 UJ
2-Methylphenol (o-Cresol)	SW8270DSIM						**0.2326 J**	0.5054 U	0.3086 U	**0.1382 J**	**0.0828 J**	4.4545 U	3.8462 U	1.1707 U
4-Methylphenol (p-Cresol)	SW8270DSIM						0.3721 U	0.5054 U	0.3086 U	**0.0882 J**	**0.3655**	4.4545 U	3.8462 U	**1.0488 J**
Benzoic acid	SW8270DSIM						**8.837**	**7.5484**	**6.667**	**4.912**	**6.345**	44.8182 U	38.3846 U	**4.1707 J**
Benzyl alcohol	SW8270DSIM						1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
bis(2-Ethylhexyl)phthalate	SW8270D				47	78	3.7597 U	5.0538 U	3.0679 U	1.4529 U	**0.7839 J**	44.8182 U	**27.6154 J**	11.6341 U
Butylbenzyl phthalate	SW8270D				4.9	64	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	*17.9091 U*	*15.3846 U*	4.6585 U
Diethyl phthalate	SW8270DSIM				61	110	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.385 U	4.6585 U
Dimethyl phthalate	SW8270DSIM				53	53	0.3721 U	2.151 U	0.3086 U	0.1441 U	0.1103 U	4.4545 U	3.8462 U	1.1707 U
Di-n-butyl phthalate	SW8270D				220	1700	1.5039 U	2.1398 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Di-n-octyl phthalate	SW8270D				58	4500	1.5039 U	2.1183 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Hexachlorobenzene	SW8270DSIM				0.38	2.3	0.3721 U	*0.5054 U*	0.3086 U	0.1441 U	0.1103 U	*4.4545 U*	*3.8462 U*	*1.1707 U*
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8270DSIM				3.9	6.2	0.3721 U	0.5054 U	0.3086 U	0.1441 U	0.1103 U	*4.4545 U*	3.8462 U	1.1707 U
n-Nitrosodiphenylamine	SW8270DSIM				11	11	0.3721 U	0.5054 U	0.3086 U	0.1441 U	0.1103 U	4.4545 U	3.8462 U	1.1707 U
Pentachlorophenol	SW8270DSIM						**0.1938 J**	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Phenol	SW8270DSIM						**0.7907**	**0.6989**	**0.4877**	**0.3794**	**0.3678**	**5.8182**	**5.2308**	**2.6585**
Semivolatile Organics (µg/kg)														
1,2,4-Trichlorobenzene	SW8270DSIM	31		64			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
1,2-Dichlorobenzene	SW8270DSIM	35		110			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
1,4-Dichlorobenzene	SW8270DSIM	110		120			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
2,4-Dimethylphenol	SW8270DSIM	29		210	29	29	24.2 UJ	23.5 UJ	24.8 UJ	24.7 UJ	24.1 UJ	24.7 UJ	25 UJ	23.9 UJ
2-Methylphenol (o-Cresol)	SW8270DSIM	63		77	63	63	**3 J**	4.7 U	5 U	**4.7 J**	**3.6 J**	4.9 U	5 U	4.8 U

Table 4

Location ID							DU-1-180102	DU-2-180102	DU-3-180104	DU-4-180104	DU-5-180104	SG-1-180103	SG-2-180103	SG-3-180103
Sample ID							DU-1-180102	DU-2-180102	DU-3-180104	DU-4-180104	DU-5-180104	SG-1-180103	SG-2-180103	SG-3-180103
DMMU							DMMU1	DMMU2	DMMU3	DMMU4	DMMU5	--	--	--
Sample Date							1/2/2018	1/2/2018	1/4/2018	1/4/2018	1/4/2018	1/3/2018	1/3/2018	1/3/2018
Depth							0 - 2.5 feet	0 - 2.5 feet	0 - 2.5 feet	0 - 2.5 feet	0 - 2.5 feet	0 - 10 cm	0 - 10 cm	0 - 10 cm
Matrix							SO	SO	SO	SO	SO	SE	SE	SE
	Method	DMMP SL	DMMP BT	DMMP ML	SMS Marine SCO SCUM II	SMS Marine CSL SCUM II								
4-Methylphenol (p-Cresol)	SW8270DSIM	670		3600	670	670	4.8 U	4.7 U	5 U	**3 J**	**15.9**	4.9 U	5 U	**4.3 J**
Benzoic acid	SW8270DSIM	650		760	650	650	**114**	**70.2**	**108**	**167**	**276**	49.3 U	49.9 U	**17.1 J**
Benzyl alcohol	SW8270DSIM	57		870	57	73	19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
bis(2-Ethylhexyl)phthalate	SW8270D	1300		8300			48.5 U	47 U	49.7 U	49.4 U	**34.1 J**	49.3 U	**35.9 J**	47.7 U
Butylbenzyl phthalate	SW8270D	63		970			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Diethyl phthalate	SW8270DSIM	200		1200			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Dimethyl phthalate	SW8270DSIM	71		1400			4.8 U	20 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
Di-n-butyl phthalate	SW8270D	1400		5100			19.4 U	19.9 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Di-n-octyl phthalate	SW8270D	6200		6200			19.4 U	19.7 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Hexachlorobenzene	SW8270DSIM	22	168	230			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8270DSIM	11		270			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
n-Nitrosodiphenylamine	SW8270DSIM	28		130			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
Pentachlorophenol	SW8270DSIM	400	504	690	360	690	**2.5 J**	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Phenol	SW8270DSIM	420		1200	420	1200	**10.2**	**6.5**	**7.9**	**12.9**	**16**	**6.4**	**6.8**	**10.9**
Polycyclic Aromatic Hydrocarbons (mg/kg-OC)														
2-Methylnaphthalene	SW8270D				38	64	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Acenaphthene	SW8270D				16	57	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	*17.9091 U*	15.3846 U	4.6585 U
Acenaphthylene	SW8270D				66	66	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Anthracene	SW8270D				220	1200	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Benzo(a)anthracene	SW8270D				110	270	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Benzo(a)pyrene	SW8270D				99	210	1.5039 U	2.0215 U	1.2284 U	**0.1971 J**	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Benzo(b,j,k)fluoranthenes	SW8270D						**1.2248 J**	4.043 U	**0.6296 J**	**0.4676 J**	**0.577 J**	35.9091 U	30.7692 U	9.3171 U
Benzo(g,h,i)perylene	SW8270D				31	78	1.5039 U	2.0215 U	1.2284 U	0.5794 U	**0.1885 J**	17.9091 U	15.3846 U	4.6585 U
Chrysene	SW8270D				110	460	**0.4186 J**	2.0215 U	**0.4259 J**	0.5794 U	**0.223 J**	17.9091 U	15.3846 U	**1.2439 J**
Dibenzo(a,h)anthracene	SW8270DSIM				12	33	0.3721 U	0.5054 U	0.3086 U	0.1441 U	0.1103 U	4.4545 U	3.8462 U	1.1707 U
Dibenzofuran	SW8270D				15	58	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	*17.9091 U*	*15.3846 U*	4.6585 U
Fluoranthene	SW8270D				160	1200	**0.4109 J**	2.0753 U	**0.4691 J**	**0.3118 J**	**0.3034 J**	**15.0909 J**	15.3846 U	**1.439 J**
Fluorene	SW8270D				23	79	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Indeno(1,2,3-c,d)pyrene	SW8270D				34	88	1.5039 U	2.0215 U	1.2284 U	0.5794 U	0.4437 U	17.9091 U	15.3846 U	4.6585 U
Naphthalene	SW8270D				99	170	**0.5736 J**	2.0215 U	**0.7407 J**	**0.4324 J**	**0.3816 J**	17.9091 U	15.3846 U	**1.3171 J**
Phenanthrene	SW8270D				100	480	**0.6047 J**	2.0215 U	**0.6667 J**	**0.3824 J**	**0.3586 J**	**20.3636**	15.3846 U	**1.5122 J**
Pyrene	SW8270D				1000	1400	**0.4574 J**	2.0215 U	1.2284 U	**0.2529 J**	**0.2184 J**	**14 J**	15.3846 U	**1.3659 J**
Total Benzofluoranthenes (b,j,k) (U = 0)					230	450	**1.2248 J**	4.043 U	**0.6296 J**	**0.4676 J**	**0.577 J**	35.9091 U	30.7692 U	9.3171 U
Total HPAH (SMS) (U = 0)					960	5300	**2.5116 J**	4.043 U	**1.5247 J**	**1.2294 J**	**1.5103 J**	**29.0909 J**	30.7692 U	**4.0488 J**
Total LPAH (SMS) (U = 0)					370	780	**1.1783 J**	2.0215 U	**1.4074 J**	**0.8147 J**	**0.7402 J**	**20.3636**	15.3846 U	**2.8293 J**
Polycyclic Aromatic Hydrocarbons (µg/kg)														
2-Methylnaphthalene	SW8270D	670		1900			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Acenaphthene	SW8270D	500		2000			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Acenaphthylene	SW8270D	560		1300			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Anthracene	SW8270D	960		13000			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Benzo(a)anthracene	SW8270D	1300		5100			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Benzo(a)pyrene	SW8270D	1600		3600			19.4 U	18.8 U	19.9 U	**6.7 J**	19.3 U	19.7 U	20 U	19.1 U
Benzo(b,j,k)fluoranthenes	SW8270D						**15.8 J**	37.6 U	**10.2 J**	**15.9 J**	**25.1 J**	39.5 U	40 U	38.2 U
Benzo(g,h,i)perylene	SW8270D	670		3200			19.4 U	18.8 U	19.9 U	19.7 U	**8.2 J**	19.7 U	20 U	19.1 U
Chrysene	SW8270D	1400		21000			**5.4 J**	18.8 U	**6.9 J**	19.7 U	**9.7 J**	19.7 U	20 U	**5.1 J**
Dibenzo(a,h)anthracene	SW8270DSIM	230		1900			4.8 U	4.7 U	5 U	4.9 U	4.8 U	4.9 U	5 U	4.8 U
Dibenzofuran	SW8270D	540		1700			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Fluoranthene	SW8270D	1700	4600	30000			**5.3 J**	19.3 U	**7.6 J**	**10.6 J**	**13.2 J**	**16.6 J**	20 U	**5.9 J**
Fluorene	SW8270D	540		3600			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Indeno(1,2,3-c,d)pyrene	SW8270D	600		4400			19.4 U	18.8 U	19.9 U	19.7 U	19.3 U	19.7 U	20 U	19.1 U
Naphthalene	SW8270D	2100		2400			**7.4 J**	18.8 U	**12 J**	**14.7 J**	**16.6 J**	19.7 U	20 U	**5.4 J**
Phenanthrene	SW8270D	1500		21000			**7.8 J**	18.8 U	**10.8 J**	**13 J**	**15.6 J**	**22.4**	20 U	**6.2 J**
Pyrene	SW8270D	2600	11980	16000			**5.9 J**	18.8 U	19.9 U	**8.6 J**	**9.5 J**	**15.4 J**	20 U	**5.6 J**
Total Benzofluoranthenes (b,j,k) (U = 0)		3200		9900			**15.8 J**	37.6 U	**10.2 J**	**15.9 J**	**25.1 J**	39.5 U	40 U	38.2 U
Total HPAH (DMMP) (U = 0)		12000		69000			**32.4 J**	37.6 U	**24.7 J**	**41.8 J**	**65.7 J**	**32 J**	40 U	**16.6 J**
Total LPAH (DMMP) (U = 0)		5200		29000			**15.2 J**	18.8 U	**22.8 J**	**27.7 J**	**32.2 J**	**22.4**	20 U	**11.6 J**
Pesticides (µg/kg)														
4,4'-DDD (p,p'-DDD)	SW8081B	16					**1.42**	**2.44**	**9.4**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
4,4'-DDE (p,p'-DDE)	SW8081B	9					**7.91**	**11.5**	**28.8**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
4,4'-DDT (p,p'-DDT)	SW8081B	12					**9.17**	**18.6**	**49.9**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
Aldrin	SW8081B	9.5					0.49 U	0.49 U	0.49 U	0.49 U	0.5 U	0.5 U	0.48 U	0.5 U

Table 4

Location ID							**DU-1-180102**	**DU-2-180102**	**DU-3-180104**	**DU-4-180104**	**DU-5-180104**	**SG-1-180103**	**SG-2-180103**	**SG-3-180103**
Sample ID							**DU-1-180102**	**DU-2-180102**	**DU-3-180104**	**DU-4-180104**	**DU-5-180104**	**SG-1-180103**	**SG-2-180103**	**SG-3-180103**
DMMU							**DMMU1**	**DMMU2**	**DMMU3**	**DMMU4**	**DMMU5**	**--**	**--**	**--**
Sample Date							**1/2/2018**	**1/2/2018**	**1/4/2018**	**1/4/2018**	**1/4/2018**	**1/3/2018**	**1/3/2018**	**1/3/2018**
Depth							**0 - 2.5 feet**	**0 - 2.5 feet**	**0 - 2.5 feet**	**0 - 2.5 feet**	**0 - 2.5 feet**	**0 - 10 cm**	**0 - 10 cm**	**0 - 10 cm**
Matrix							**SO**	**SO**	**SO**	**SO**	**SO**	**SE**	**SE**	**SE**
	Method	**DMMP SL**	**DMMP BT**	**DMMP ML**	**SMS Marine SCO SCUM II**	**SMS Marine CSL SCUM II**								
Chlordane, alpha- (Chlordane, cis-)	SW8081B						0.49 U	0.49 U	0.49 U	0.49 U	0.5 U	0.5 U	0.48 U	0.5 U
Chlordane, beta- (Chlordane, trans-)	SW8081B						0.49 U	0.49 U	0.49 U	0.49 U	0.5 U	0.5 U	0.48 U	0.5 U
Dieldrin	SW8081B	1.9		1700			**8.4**	**9.93**	**23.3**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
Heptachlor	SW8081B	1.5		270			0.49 U	0.49 U	0.49 U	0.49 U	0.5 U	0.5 U	0.48 U	0.5 U
Nonachlor, cis-	SW8081B						0.99 U	0.98 U	0.97 U	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
Nonachlor, trans-	SW8081B						0.99 U	0.98 U	**1.4**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
Oxychlordane	SW8081B						0.99 U	0.98 U	0.97 U	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
Sum 4,4 DDT, DDE, DDD (U = 0)			50	69			**18.5**	**32.54**	**88.1**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
Total DMMP Chlordane (U = 0)		2.8	37				0.99 U	0.98 U	**1.4**	0.97 U	0.99 U	0.99 U	0.95 U	0.99 U
PCB Aroclors (mg/kg-OC)														
Total DMMP PCB Aroclors (U = 0)			38		12	65	0.3023 U	0.4194 U	0.2407 U	0.1147 U	0.092 U	3.6364 U	2.9231 U	0.9756 U
PCB Aroclors (µg/kg)														
Aroclor 1016	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1221	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1232	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1242	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1248	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1254	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1260	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1262	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Aroclor 1268	SW8082A						3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U
Total DMMP PCB Aroclors (U = 0)		130		3100			3.9 U	3.9 U	3.9 U	3.9 U	4 U	4 U	3.8 U	4 U

Notes:

🟨 indicates detected concentration is greater than DMMP SL
🟦 Detected concentration is greater than DMMP BT
🟩 indicates detected concentration is greater than DMMP ML
🟧 Detected concentration is greater than SMS Marine SCO SCUM II screening level
🟧 Detected concentration is greater than SMS Marine CSL SCUM II screening level
Italicized indicates non-detected concentration is above one or more identified screening levels
Bold indicates detected result
µg/kg: microgram per kilogram
BT: bioaccumulation trigger
cm: centimeter
CSL: cleanup screening level
DMMP: Dredged Material Management Program
DMMU: Dredged Material Management Unit
ft: feet
HPAH: high-molecular-weight polycyclic aromatic hydrocarbon
J: estimated value
LPAH: low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg: milligram per kilogram
mg/kg-OC: milligram per kilogram total organic carbon normalized
ML: maximum level
N: normal environmental sample
PCB: polychlorinated biphenyl
pct: percent
R: rejected
SCO: sediment cleanup objective
SCUM II: Sediment Cleanup Users Manual II
SE: sediment
SL: screening level
SMS: Sediment Management Standards
SO: soil
U: compound analyzed, but not detected above detection limit
UJ: compound analyzed, but not detected above estimated detection limit

Table 5
Pesticides Exceedance Summary

	DMMP Criteria (µg/kg)			Sample Results (µg/kg)			Average of DMMU1, DMMU2, DMMU3 (µg/kg)			
Compound	**SL**	**ML**	**BT**	**DMMU1**	**DMMU2**	**DMMU3**	**AVG**	**AVG/2**	**AVG/4**	**AVG/10**
Dieldrin	1.9	1,700	-	8.4	9.9	23.3	13.9	6.9	1.7	0.2
4,4-DDE	9	-	-	7.91	11.5	28.8	16.1	8	2	0.2
4,4-DDD	16	-	-	1.42	2.44	9.4	4.4	2.2	0.6	0.1
4,4-DDT	12	-	-	9.17	18.6	49.9	25.9	12.9	3.2	0.3
Total 4,4-DDX	-	69	50	18.5	32.54	88.1	46.4	23.2	5.8	0.6
TOC	-	-	-	1.29 J	0.93 J	1.62	-	-	-	-
Gravel	-	-	-	40.2	13.6	0.2	-	-	-	-
Sand	-	-	-	20.5	30.4	19.2	-	-	-	-
Fines	-	-	-	39.3	56.1	80.8	-	-	-	-

Notes:

🟨 indicates concentration is greater than DMMP screening level

🟩 indicates concentration is greater than DMMP maximum level or bioaccumulation trigger.

µg/kg: microgram per kilogram

AVG: the average of the three composite samples from the East Tidal Channel area.

AVG/X: a dilution factor representative of settled erosional material that has mixed with other sediments (other erosional areas from upstream)

BT: bioaccumulation trigger

DMMP: Dredged Material Management Program

DMMU: Dredged Material Management Unit

ML: maximum level

SL: screening level

TOC: total organic compound