

U.S. Army Corps of Engineers
2,4-D Site Report

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Prepared for: U.S. Army Corps of Engineers
Walla Walla District Corps of Engineers
Regional Airport, Building 614
Walla Walla, WA 99362

Prepared by: Cascade Earth Sciences, Ltd.
7515 N.E. Ambassador Place, Suite L
Portland, OR 97220
(503) 282-7502

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DRAFT

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1.0 PROJECT BACKGROUND/OBJECTIVE

The 2,4-D Site is located in the Hanford North Slope Area (Figure 1) approximately 25 miles north of the city of Richland, Washington. The site is located approximately 0.5 miles east of the Columbia River within Section 35, Township 27 East, Range 14 North. The site consists of an area approximately 60 feet in width by 440 feet in length which runs parallel to the base of a semi-stabilized sand dune which is approximately 60 feet in height (Figure 2). The area had been used to dispose of approximately 50 cubic yards of soil which had been impacted by 2,4-D. The impacted soil had resulted from the release of approximately 900 gallons from storage tanks located in Eltopia, Washington. After disposal of the soils in a shallow trench constructed at the base of the sand dune, the tanks themselves were flattened and buried at the site.

2,4-D is a chlorinated herbicide which was used to control vegetation. The herbicide can be metabolized by bacteria and is generally not as persistent in the environment as are most other herbicides. Previously, eight soil samples were collected at the site using a rotary auger drilling rig and analyzed in the field using a field screening test. Only one sample indicated the presence of 2,4-D, however, laboratory analysis of this sample and other selected samples did not contain detectable levels of chlorinated herbicides.

The objective of the current project was to obtain samples of soil adjacent to and beneath the flattened, buried tanks to assess possible impacts to site soils or groundwater. The project consisted of drilling four inclined borings to approximately 20 feet and the collection of four soil samples from each boring.

There are no surficial signs of the excavation or the buried tanks. The site was previously backfilled and leveled using native materials and native vegetation entirely covers the site. The locations of the tanks were determined using geophysical techniques (see Geophysics Survey, 2,4-D Site, Hanford-North Slope dated April 1994 by Shannon & Wilson, Inc.). Figure 2 shows the boundaries of the tank burial area as determined by geophysical techniques. These boundaries are marked at the site using flagging and were used to determine the drilling points for the current project.

2.0 FIELD INVESTIGATION

On July 19, 1994, an Environmental Technician and a Registered Professional Geologist from Cascade Earth Sciences, Ltd. met with Randy Chong and several representatives of the U.S. Army Corps of Engineers (COE) at the North Slope Job Shack. Two representatives of Environmental West Exploration (the drilling contractor), Driller Bob Sheldon and assistant Wendell Hawley, were also in attendance.

All parties mobilized to the access road to the 2,4-D site where a "tailgate" safety meeting was held from 7:45 am to 8:00 am. Concerns of access to the site from the main road were expressed, especially for the drill rig which was not 4-wheel drive equipped. A discussion of possible health hazards at the site included heat exhaustion, possible chemical exposure, and interaction with area wildlife. After discussions on the level of personal protection equipment (PPE) required by the site, it was determined that a modified Level D (including chemical resistant gloves) would be adequate unless specific site conditions warranted upgrading to respirators and Tyvek.

The driller and a representative of the COE walked the path to the site (approximately one-half mile) to assess the probability of accessing the site. After attempting to access the site, the drill rig became stuck in the loose sand approximately 100 yards from the site. A representative of CES and the COE went to Othello, Washington to purchase plywood to aid in moving the drill rig to the site. From 10:00 a.m. to 10:30 a.m., the drill rig was freed and moved into position at the 2,4-D Site

After walking the site, it was determined (in conjunction with COE representatives) that all four site borings would have to be performed along the eastern edge of the excavation boundary: access to the opposite side could not be accomplished by the drill rig due to the proximity of the sand dune. The borings were to be started approximately 6 feet from the outer edge of the boundary determined by geophysical methods. Figure 2 shows the locations of the four site borings with the electro-magnetic anomaly outline as a reference. The figure also shows the orientation of the inclined borings and the approximate horizontal extent beneath the anomaly after correction for the inclination. Figure 3 presents a cross-section showing the inclined borings and the approximate dimensions of the excavation based on available site information.

Drilling of the first inclined boring (designated S1) was initiated at 10:30 a.m. The orientation of the boring was approximately 235 degrees azimuth and the drilling stems were inclined 30 degrees from the vertical plane. In conjunction with Richard Fink of the COE, it was determined that split-spoon samples would be collected from the 5 to 7 feet, 10 to 12 feet, 15 to 17 feet, and 20 to 22 feet intervals. The second boring (S2) was initiated at 1:45 p.m. Boring S3 was initiated at 4:00 p.m. and S4 was initiated at 6:30 p.m. There was no evidence that the tanks were struck or penetrated during the drilling process.

Samples were collected into laboratory-prepared 9-ounce jars with Teflon-lined lids. The samples were placed on ice in a cooler for transportation to the laboratory. All sampling equipment and the split-spoons were decontaminated using a three-stage process consisting of a tap water wash, an Alconox wash, and a deionized water rinse. The augers and lead bit were steam cleaned between each boring. All decontamination fluids were placed in lined and sealed 55-gallon drums for disposal after sample results were obtained.

Soils encountered consisted of gray, dry to damp, loose, fine to medium-grained sand. Sand consisted of well-sorted, angular to sub-rounded grains predominantly of quartz and lithic fragments with feldspar and lesser white mica. Some samples showed iron-stained bands. No odors or other discolorations were noted. Refer to Appendix A for copies of the boring logs for the four site borings.

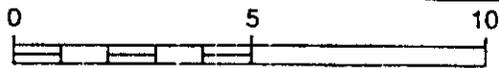
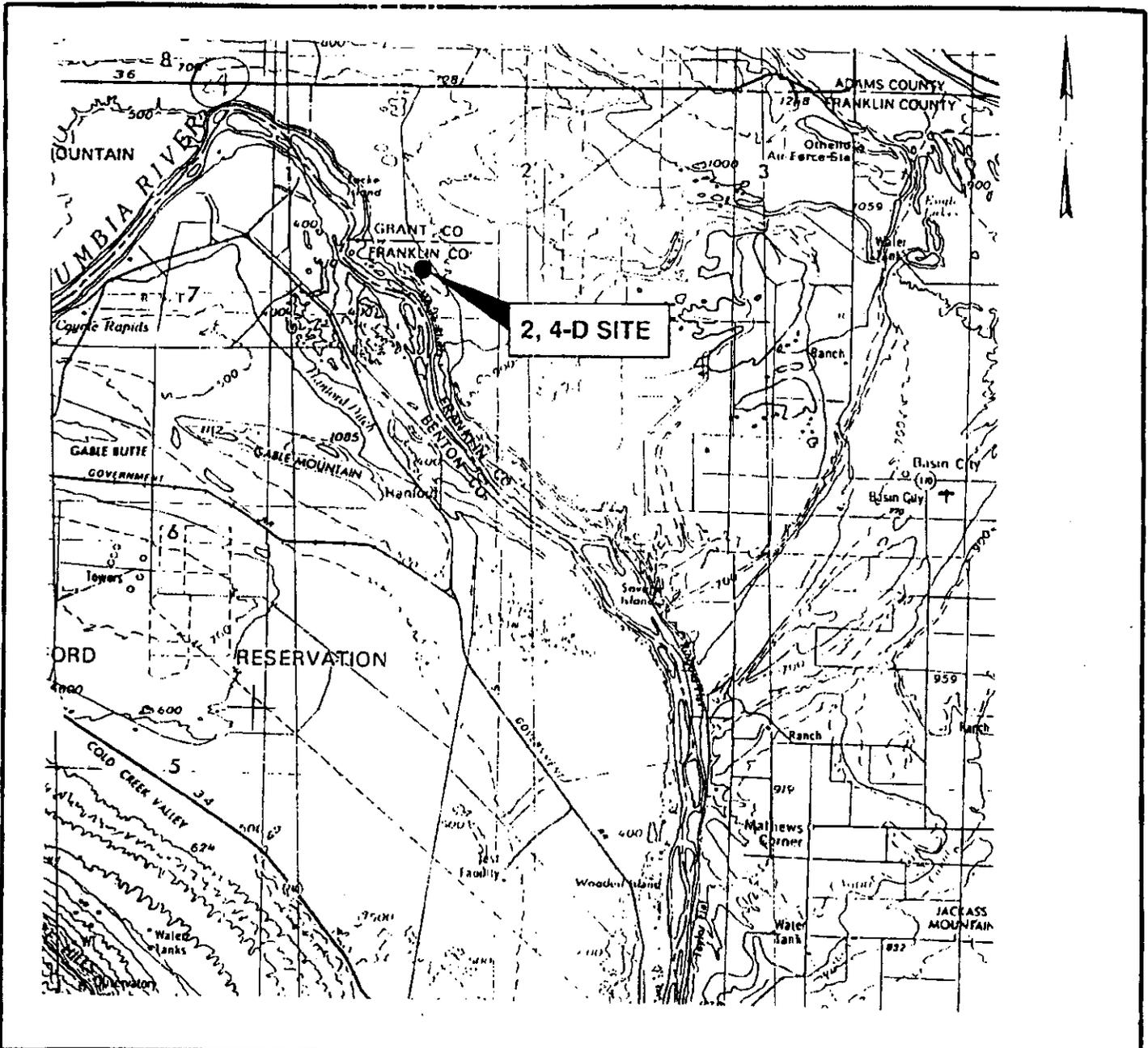
3.0 ANALYTICAL RESULTS/CONCLUSIONS

Eighteen soil samples (the four soil samples from each boring and two duplicate soil samples designated S1-S25 and S3-S25) were submitted to Columbia Analytical Services, Inc. (CAS) in Kelso, Washington. Additionally, a sample split from the first boring was provided to representatives of the Washington Department of Ecology and selected quality assurance samples were provided to the COE for analysis at their Troutdale, Oregon laboratory.

The eighteen soil samples collected from the site borings were analyzed for chlorinated herbicides including 2,4-D using EPA Method 8150A modified. No chlorinated herbicides were detected in these soil samples. The method detection limit for 2,4-D is 0.2 mg/Kg (ppm). Refer to the laboratory reports for the method detection limits for other chlorinated herbicides covered by EPA Method 8150A. The official Laboratory Reports and Chain-of-Custody documentation is presented in Appendix B.

Based on the soil samples collected adjacent to and beneath the 2,4-D Site (and submitted to CAS for analysis), the disposal of the tanks used to store 2,4-D have not significantly impacted the soils beneath the filled excavation. Accordingly, if samples analyzed by the COE Laboratory and the Department of Ecology display similar results, no further actions appear to be required to protect human health and the environment at this time. However, the investigation was not designed to discover all possible contaminants at the site. Future actions or changes in site conditions may warrant additional investigation and/or monitoring to protect the environment and/or limit exposure of site personnel.

B:\352059.RPT\COE24-D.RPT

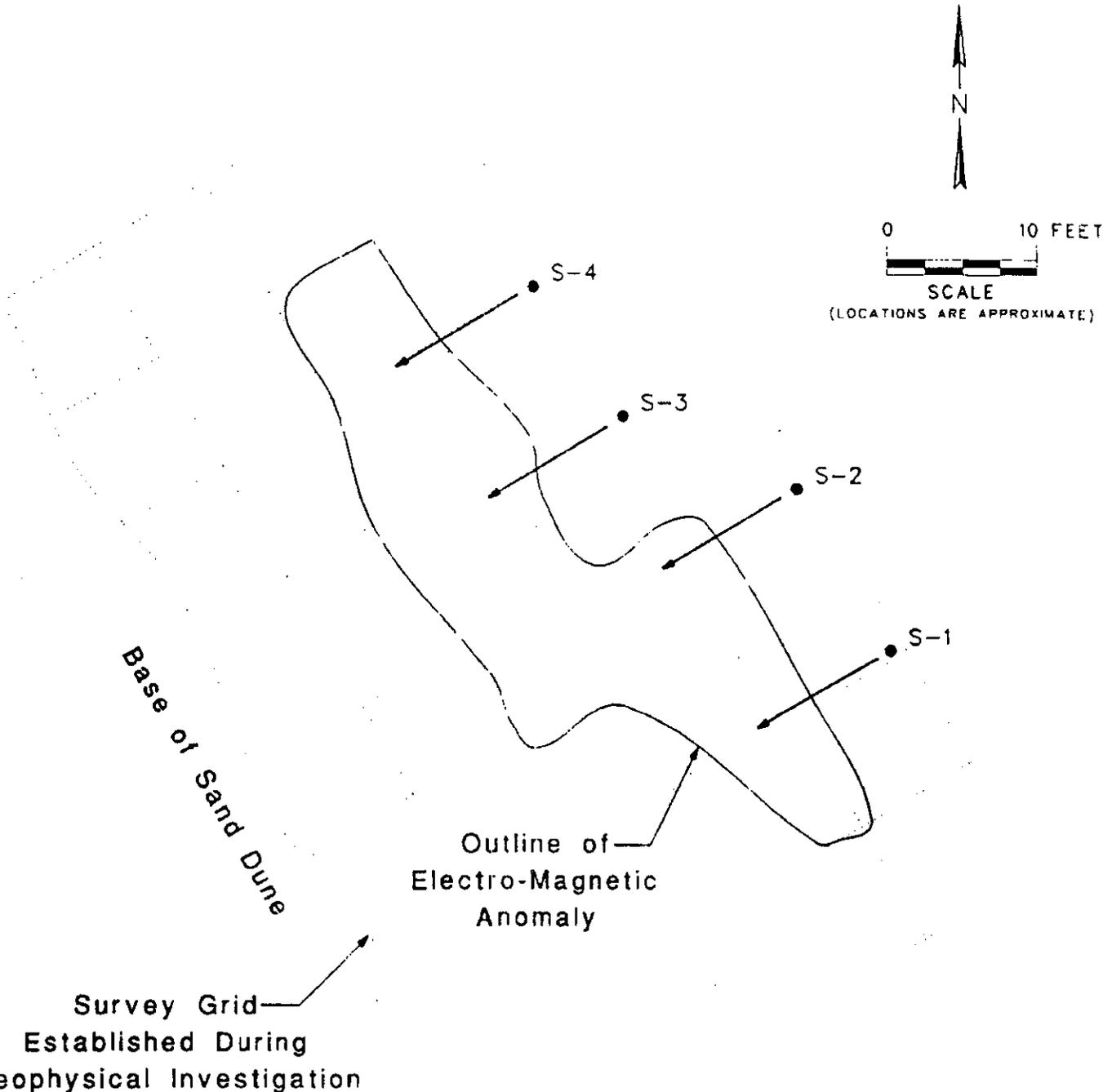


Scale in Miles
1:250,000

FIGURE 1 - Vicinity Map

CORPS OF ENGINEERS HANFORD 2,4-D SITE	
CONTRACT NO. W-33-61-1-100	
THE ENGINEERING CENTER WASHINGTON, D.C.	

(USGS TOPOGRAPHIC MAP OF
WALLA WALLA, WA, 1961)

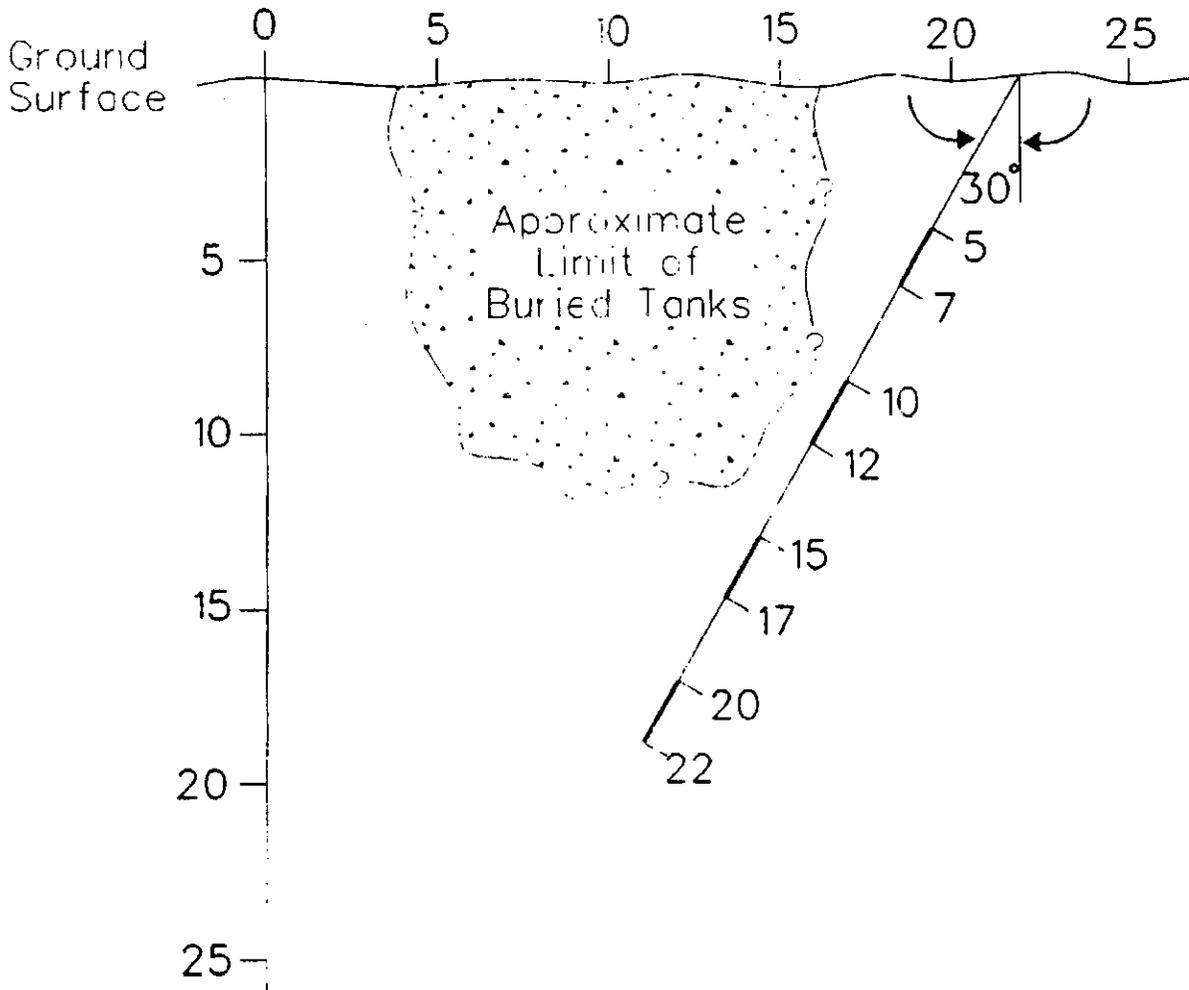


EXPLANATION

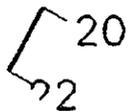
S-2 Boring Location with Direction and Horizontal Extent of Inclined Boring

FIGURE 2 - Site Plan

PROJECT NUMBER	352059	CORPS OF ENGINEERS HANFORD 2,4-D SITE
DATE	8/25/94	
DWG. NO.	352059F2	HANFORD, NORTH SLOPE
PROJECT MANAGER	SWC	
REVISIONS		 CASCADE EARTH SCIENCES, LTD Oregon - Washington - Idaho



EXPLANATION



Uncorrected sample depth interval

FIGURE 3 - Cross Section Showing Locations of Soil Sample Collection in Vertical Profile

PROJECT NUMBER	352059	CORPS OF ENGINEERS HANFORD 2,4-D SITE
DATE	8/24/94	
DWG NO	352059F3	HANFORD, NORTH SLOPE
PROJECT MANAGER	SWC	
REVISED		 CASCADE EARTH SCIENCES, LTD Oregon - Washington - Idaho

No vertical exaggeration

PROJECT COL NORTH SCORP			PROJECT NUMBER 02-59	MONITORING WELL NO.
BORING LOCATION S1 NORTH SCORP SOUTH BLEN ARROWAL			FIELD NUMBER 02-59	S2
DRILLED BY Bob Sh...		START DATE 7/19/94	COMPLETION DATE 7/19/94	
DRILLING EQUIPMENT B-80		APPROXIMATE DEPTH (FEET) 20		
*TOTAL DEPTH (FEET)	20	WELLHEAD ELEV (FEET)		
FILLER PACK INTERVAL (FEET)		WELL SCREEN ELEV (FEET)		
SEAL INTERVAL (FEET)		WELL ELEV (FEET)		
GROUND SURFACE ELEV (FT MSL)		WELL ELEV (FROM T/C)		
GROUP SYMBOL	INTERVAL (FT)	DESCRIPTION	DEPTH (FEET)	REMARKS (DRILLING CONDITION AND READINGS)
		SURFACE		Surface
	5.0-7.0	Light gray fine-grained...	10.0-12.0	at 14:00
	10.0-15.0	SAND Light gray fine-grained...	15.0-17.0	at 14:30
	15.0-17.0	SAND Gray fine-grained...	20.0-22.0	at 14:45
	20.0-22.0	SAND Light gray fine-grained...		Terminate drilling at 20.0

THIS SUMMARY APPLIES ONLY AT THE LOCATION INDICATED AT THE TIME OF DRILLING. SURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE OVER TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS LOG INTERPRETATION.

* DEPTHS IN FEET BELOW GROUND SURFACE

Best Available Copy



PROJECT CODE NORTH S1, JPL
 SENSING CODE 3017E JPL
 LOCATION NORTH ANOMAL

PROJECT NUMBER 00000001
 DATE 1987
 BY

MONITORING WELL
 S3

DRILLED Bob Sherman
 B.
 DRILLING EQUIPMENT 1-1/8" dia. bit

DATE 1987
 TIME 16:40
 LOCATION NORTH ANOMAL

* TOTAL DEPTH	10'	* WELL DEPTH	10'	WELL DEPTH	10'	WELL DEPTH	10'
* TOTAL DEPTH	10'	* WELL DEPTH	10'	WELL DEPTH	10'	WELL DEPTH	10'

FEEL INTERVAL (FT)	1-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
GROUND SURFACE ELEV. (FT MSL)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
DESCRIPTION	Loose fine-grained									

GROUP SYMBOL	INTERVAL (FT)	DESCRIPTION	WELL DEPTH (FT)							

SURFACE: Loose fine-grained
 Veg. vegetation

50-55 SAND Light gray to tan
 to tan, low-quantity
 clasts of sub-angular
 1/8" to 1/4" size

100-115 SAND light gray to tan
 to tan, low-quantity
 to medium-quantity
 to assigned larger (average
 fragments of volcanic
 stone bond approx.

150-170 SAND gray (10SP)
 coarse grained with abundant
 silt (dark, 1 mm to 2 mm
 approx.) Occasional
 volcanic lithic clasts
 smaller silt clasts

200-220 SAND Light gray to tan
 medium coarse grained with
 coarse sand, silt to 2 mm
 approx. 25% volcanic
 lithic fragments approx.
 25% silt approx. 10%
 surfounded

1100' Depth 16:40
 150-170 of 16:40
 100-115 of 16:30
 50-55 of 16:20

THIS SUMMARY APPLIES ONLY AT THE LOCATION AND TIME OF THE SURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND TIMES. THE MESSAGE CONDITIONS MAY SIMPLIFICATION OF ACTUAL CONDITIONS. * DEPTHS IN FEET BELOW GROUND SURFACE.

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MONITORING WELL LOG

S4

 PROJECT JOE JOPLIN SILVER
 OPENING S4 - JOPLIN EFF
 LOCATION NORTH ANJICA

 DRILLED BY Bob Sherman, Environmental Services, Inc.
 ADDRESS 1300 W. 10th St.

DRILLING EQUIPMENT 3-80 Air Motors

 DATE 10/1/94
 COMPLETION DATE 10/1/94
 ADDRESS 1300 W. 10th St.

* TOTAL DEPTH (FT)	* WELL DEPTH (FT)	WELL HEAD (FEET TO TOP)
50-0-5	49-0-0	10
10-0-15	9-0-0	1
15-0-17.0	14-0-0	1
20-0-22.0	19-0-0	1

SCAL	INTERVAL (FT)	DEPTH (FEET)	STATE W/	REMARKS
	0-10	50-0-40	FROM T/C	
	10-15	30-0-35		
	15-17.0	15-0-17.0		
	17.0-22.0	17-0-22.0		

GROUP SYMBOL	INTERVAL (FEET)	DESCRIPTION OF STRATA	DRILLING CONDITIONS	PIED READINGS (FEET)
	50-0-5	SAND light to fine grained, well sorted, silty, mica, quartz, iron, bitumens, tellospar		19-4
	10-0-15	SAND light gray (10YP) to dark gray, medium grained with some downward to fine grained and stained zones, silty, clayey some as above		19-0-19-0 at 19-00
	15-0-17.0	SAND gray (10YP) to dark gray, medium grained with occasional dark gray sand streaks, silty, clayey some as above. All subaqueous, fine grained		19-0-17.0 at 19-05
	20-0-22.0	MUD light gray to dark gray, medium grained with some silty, clayey some as above		19-0-22.0 at 19-40

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THE MONITORING WELL. SURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE WITH TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF ACTUAL CONDITIONS. ELEVATIONS ARE IN FEET.

* DEPTHS IN FEET BELOW GROUND SURFACE

Best Available Copy



August 12, 1994

Service Request No.: K944396

Stuart Childs
Cascade Earth Sciences, Ltd.
7515 N.E. Ambassador Place
Portland, OR 97220

Re: 2,4-D Hanford North Slope/Project #94-458

Dear Stuart:

Enclosed are the results of the sample(s) submitted to our laboratory on July 21, 1994. For your reference, these analyses have been assigned our service request number K944396.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 208.

Respectfully submitted,

Columbia Analytical Services, Inc.

A handwritten signature in black ink, appearing to read 'Kevin DeWhitt', is written over a horizontal line.

Kevin DeWhitt
Quality Assurance Coordinator

KD/td

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COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: U. S. Army Corps of Engineers
Project: 2,4-D Hanford North Slope/#94-458
Sample Matrix: Soil

Date Received: 07/21/94
Date Analyzed: 07/28/94
Work Order No.: K944396

Solids, Total
EPA Method Modified 160.3
Percent (%)

Sample Name	Lab Code	Result
94-24D-S3-S5	K944396-001	76.7
94-24D-S3-S10	K944396-002	97.8
94-24D-S3-S15	K944396-003	81.5
94-24D-S3-S20	K944396-004	93.7
94-24D-S3-S25	K944396-005	98.1
94-24D-S4-S5	K944396-006	97.8
94-24D-S4-S10	K944396-007	77.6
94-24D-S4-S15	K944396-008	97.8
94-24D-S4-S20	K944396-009	96.8
94-2,4D,S1-S5	K944396-010	92.6

Approved by



Date 8-12

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: US Army Corps of Engineers
Project: 2,4-D Hanford North Slope/#94-458
Sample Matrix: Soil

Date Collected: 7/19/94
Date Received: 7/21/94
Date Extracted: 7/28/94
Service Request: K944396

Chlorinated Herbicides
EPA Method Modified 8150A
Units mg/Kg (ppm)
Dry Weight Basis

Sample Name: 94-24D-S3-S5 94-24D-S3-S10 94-24D-S3-S15
Lab Code: K4396-001 K4396-002 K4396-003
Date Analyzed: 8/3/94 8/3/94 8/3/94

Analyte	MRL			
Dalapon	1	ND	ND	ND
MCPP	20	ND	ND	ND
Dicamba	0.1	ND	ND	ND
MCPA	20	ND	ND	ND
Dichloroprop	0.1	ND	ND	ND
2,4-D	0.2	ND	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND	ND
2,4,5-T	0.05	ND	ND	ND
Dinoseb	0.5	ND	ND	ND
2,4-DB	0.5	ND	ND	ND

Approved By  Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC

Analytical Report

Client: US Army Corps of Engineers
 Project: 2,4-D Hanford North Slope #94-458
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Service Request: K944396

Chlorinated Herbicides
 EPA Method Modified 8150A
 Units: mg/Kg (ppm)
 Dry Weight Basis

Sample Name: 94-24D-S3-S20 94-24D-S3-S25 94-24D-S4-S5
 Lab Code: K4396-004 K4396-005 K4396-006
 Date Analyzed: 8/3/94 8/3/94 8/3/94

Analyte	MRL	94-24D-S3-S20	94-24D-S3-S25	94-24D-S4-S5
Dalapon	1	ND	ND	ND
MCPP	20	ND	ND	ND
Dicamba	0.1	ND	ND	ND
MCPA	20	ND	ND	ND
Dichloroprop	0.1	ND	ND	ND
1-D	0.2	ND	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND	ND
2,4,5-T	0.05	ND	ND	ND
Dinoseb	0.5	ND	ND	ND
2,4-DB	0.5	ND	ND	ND

Approved By



Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: US Army Corps of Engineers
 Project: 2,4-D Hanford North Slope #94-458
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Service Request: K944396

Chlorinated Herbicides
 EPA Method Modified 8150A
 Units: mg/Kg (ppm)
 Dry Weight Basis

Sample Name:	94-24D-S4-S10	94-24D-S4-S15	94-24D-S4-S20
Lab Code:	K4396-007	K4396-008	K4396-009
Date Analyzed:	8/3/94	8/3/94	8/3/94

Analyte	MRL			
Dalapon	1	ND	ND	ND
MCPP	20	ND	ND	ND
Dicamba	0.1	ND	ND	ND
MCPA	20	ND	ND	ND
Dichloroprop	0.1	ND	ND	ND
4-D	0.2	ND	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND	ND
2,4,5-T	0.05	ND	ND	ND
Dinoseb	0.5	ND	ND	ND
2,4-DB	0.5	ND	ND	ND

Approved By *[Signature]* Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: US Army Corps of Engineers
 Project: 2,4-D Hanford North Slope/#94-458
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Service Request: K944396

Chlorinated Herbicides
 EPA Method Modified 8150A
 Units: mg/Kg (ppm)
 Dry Weight Basis

Sample Name: 94-2,4D,S1-S5 94-2,4D,S1-S10 94-2,4D-S1-S15
 Lab Code: K4396-010 K4396-011 K4396-012
 Date Analyzed: 8/3/94 8/3/94 8/3/94

Analyte	MRL	94-2,4D,S1-S5	94-2,4D,S1-S10	94-2,4D-S1-S15
Dalapon	1	ND	ND	ND
MCPP	20	ND	ND	ND
Dicamba	0.1	ND	ND	ND
MCPA	20	ND	ND	ND
Dichloroprop	0.1	ND	ND	ND
-D	0.2	ND	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND	ND
2,4,5-T	0.05	ND	ND	ND
Dinoseb	0.5	ND	ND	ND
2,4-DB	0.5	ND	ND	ND

Approved By Kam [Signature] Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

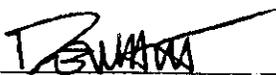
Client: US Army Corps of Engineers
 Project: 2,4-D Hanford North Slope #94-451
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Service Request: K944396

Chlorinated Herbicides
 EPA Method Modified 8150A
 Units: mg/Kg (ppm)
 Dry Weight Basis

Sample Name:	94-24D-S1-S20	94-24D-S1-S25	94-24D-S2-S5
Lab Code:	K4396-013	K4396-014	K4396-015
Date Analyzed:	8/3/94	8/3/94	8/3/94

Analyte	MRL			
Dalapon	1	ND	ND	ND
MCPP	20	ND	ND	ND
Dicamba	0.1	ND	ND	ND
MCPA	20	ND	ND	ND
Dichloroprop	0.1	ND	ND	ND
-D	0.2	ND	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND	ND
2,4,5-T	0.05	ND	ND	ND
Dinoseb	0.5	ND	ND	ND
2,4-DB	0.5	ND	ND	ND

Approved By   Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: US Army Corps of Engineers
 Project: 2,4-D Hanford North Slope #94-458
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Service Request: K944396

Chlorinated Herbicides
 EPA Method Modified 8150A
 Units: mg/Kg (ppm)
 Dry Weight Basis

Sample Name:	94-24D-S2-S10	94-24D-S2-S15	94-24D-S2-S20
Lab Code:	K4396-016	K4396-017	K4396-018
Date Analyzed:	8/3/94	8/3/94	8/3/94

Analyte	MRL			
Dalapon	1	ND	ND	ND
MCPPP	20	ND	ND	ND
Dicamba	0.1	ND	ND	ND
MCPA	20	ND	ND	ND
Dichloroprop	0.1	ND	ND	ND
1-D	0.2	ND	ND	ND
2,4,5-TP (Silvex)	0.05	ND	ND	ND
2,4,5-T	0.05	ND	ND	ND
Dinoseb	0.5	ND	ND	ND
2,4-DB	0.5	ND	ND	ND

Approved By Kenny B. [Signature] Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: US Army Corps of Engineers
Project: 2,4-D Hanford North Slope/#94-458
Sample Matrix: Soil

Date Collected: NA
Date Received: NA
Date Extracted: 7/28/94
Service Request: K944396

Chlorinated Herbicides
EPA Method Modified 8150A
Units: mg/Kg (ppm)
Dry Weight Basis

Sample Name: Method Blank
Lab Code: K4396-MB
Date Analyzed: 8/3/94

Analyte	MRL	
Dalapon	1	ND
MCPP	20	ND
Dicamba	0.1	ND
MCPA	20	ND
Dichloroprop	0.1	ND
1-D	0.2	ND
2,4,5-TP (Silvex)	0.05	ND
2,4,5-T	0.05	ND
Dinoseb	0.5	ND
2,4-DB	0.5	ND

Approved By



Date 8-12

APPENDIX A
LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: US Army Corps of Engineers
 Project: 2,4-D Hanford North Slope/#94-458
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Date Analyzed: 8/3/94
 Service Request: K944396

Surrogate Recovery Summary
 Chlorinated Herbicides
 EPA Method Modified 8150A

Sample Name	Lab Code	Percent Recovery 2,4-Dichlorophenylacetic Acid
94-24D-S3-S5	K4396-001	61
94-24D-S3-S10	K4396-002	72
94-24D-S3-S15	K4396-003	66
94-24D-S3-S20	K4396-004	75
94-24D-S3-S25	K4396-005	70
94-24D-S4-S5	K4396-006	76
94-24D-S4-S10	K4396-007	60
94-24D-S4-S15	K4396-008	50
94-24D-S4-S20	K4396-009	64
94-2,4D,S1-S5	K4396-010	70
94-2,4D,S1-S10	K4396-011	73
94-2,4D-S1-S15	K4396-012	75
94-24D-S1-S20	K4396-013	66
94-24D-S1-S25	K4396-014	70
94-24D-S2-S5	K4396-015	69
94-24D-S2-S10	K4396-016	64
94-24D-S2-S15	K4396-017	60
94-24D-S2-S20	K4396-018	71
94-24D-S3-S20	K4396-004MS	69
94-24D-S3-S20	K4396-004DMS	71
Lab Control Sample	K4396-LCS	74
Method Blank	K4396-MB	67

CAS Acceptance Limits: 36-116

Approved By Kami [Signature] Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: US Army Corps of Engineer.
 Project: 2,4-D Hanford North Slope #94-458
 Sample Matrix: Soil

Date Collected: 7/19/94
 Date Received: 7/21/94
 Date Extracted: 7/28/94
 Date Analyzed: 8/3/94
 Service Request: K944396

Matrix Spike/Duplicate Matrix Spike Summary
 Chlorinated Herbicides
 EPA Method Modified 8150A
 Units: mg/Kg (ppm)
 Dry Weight Basis

Sample Name 94-24D-S3-S20
 Lab Code: K4396-004

Analyte	Spike Level		Sample Result	Spike Result		Percent Recovery		CAS Acceptance Limits	Relative Percent Difference
	MS	DMS		MS	DMS	MS	DMS		
2,4-D	0.24	0.25	ND	0.23	0.22	96	88	35-125	9
2,4,5-TP (Silvex)	0.08	0.08	ND	0.06	0.06	75	75	33-108	<1
2,4,5-T	0.08	0.08	ND	0.06	0.06	75	75	32-108	<1

Approved By  Date 8-12

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: US Army Corps of Engineers
Project: 2,4-D Hanford North Slope #94-158
LCS Matrix: Soil

Date Collected: NA
Date Received: NA
Date Extracted: 7/28/94
Date Analyzed: 8/3/94
Service Request: K944396

Laboratory Control Sample Summary
Chlorinated Herbicides
EPA Method Modified 8150A
Units: mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
2,4-D	0.23	0.21	91	49-115
2,4,5-TP (Silvex)	0.08	0.06	75	40-96
2,4,5-T	0.08	0.06	75	43-105

Approved By

Date

8-12

APPENDIX B
CHAIN OF CUSTODY INFORMATION

CHAIN OF CUSTODY RECORD

- Medford
- Pocatello
- Portland
- Spokane

1133 S Riverside #222
 PO Box 2379, ID 83206
 7515 N.E. Ambassador Pl., OR 972
 PO Box 14725, WA 99214

(208) 237-7041
 (503) 262-7502
 (509) 921-0290

Shipped From:
 Albany 3425 Spicer Dr., OR 97... (503) 926-7737
 Bend 354 N.E. Greenwood Ave., OR 97701 (503) 385-5068
 LaGrande PO Box 2737, OR 97850 (503) 963-7756

THE EARTH SCIENCES, Ltd.

Report To: Medford North Slope PN: 352059
Normal Sampling Date: 7-19-94
Stuart Childs Location: Portland
 Provide Preliminary Results: YES Verbal / Fax (circle) Fax Number:
 Laboratory Name: CAS
 Address: 1317 S. 13th Ave Ketsco WA
 Contact: Kevin D Phone # 509-722

SAMPLE ID	DATE	TIME	LAB I.D.	PRESERVATIVE	SAMPLE MATRIX
94-24D-53-55	7-19	16:20		NONE	SOIL
94-24D-53-50		16:30			
94-24D-53-51S		16:40			
94-24D-53-52D		17:10			
94-24D-53-52S		17:10			
94-24D-54-55		18:45			
94-24D-54-51D		19:00			
94-24D-54-51S		19:20			
94-24D-54-52D		19:40			

ORGANIC ANALYSIS										INORGANIC ANALYSIS				OTHER	NUMBER OF CONTAINERS
Volatile Organics GC/MS 62/62x0	Semi-Volatile Organics GC/MS 625/6270	Halogenated Volatiles 801/8010	Aromatic Volatiles 802/8020 BTEX	Total Petroleum Hydrocarbons (circle) HCID G D	Total Petroleum Hydrocarbons EPA 418.1 418.1 MOD (circle)	Total Organic Carbon (TOC) 415/9080	Polyaromatic Hydrocarbons (PAH) 8310 8100 8270 (circle)	TCLP Metals As,Ba,Cd,Cr,Pb,Hg,Se,Ag	Metals (total or dissolved) List	Extractable Bases Ca,Na,Mg,K (circle)	Ph. Cond. Cl ₂ SO ₄ , PO ₄ , F, Br NO ₂ , NO ₃ (circle)	NH ₃ , N, COD, Total-P, TKN (circle)			
															1
															1

8150 Herbicides

COMMENTS:

Relinquished By: [Signature] Company: Cascade Earth Sci
 Relinquished By: _____ Company: _____
 Relinquished By: _____ Company: _____

INVOICE INFORMATION
 P.O. No.: _____
 Bill To: _____

SHIPMENT INFORMATION
 Shipped via: _____ Sample Receipt: _____
 Seals Intact: _____ Condition: _____
 Temp When Rcd.: _____ Seal No.: _____
 Samples Collected By: D. Mascareñas

Date/Time: 7-21-94 13:00 Received By: [Signature] Company: CAS 7/22/94
 Date/Time: _____ Received By: _____ Company: _____
 Date/Time: _____ Received By: _____ Company: _____

White - CES Yellow - Laboratory Pink - Sender

Laboratory:
 Please Return Original (White) with Results

CHAIN OF CUSTODY RECORD/LABORATORY ANALYSIS REQUEST FORM



CASCADE EARTH SCIENCES, Ltd.

Shipped From: () Albany 3425 Spicer Dr., OR 97321 (503) 926-7737 () Medford 1133 S Riverside #22, OR 97501 (503) 779-2280
 () Bend 354 N.E. Greenwood Ave., OR 97701 (503) 385-5068 () Pocatello PO Box 2379, ID 83206 (208) 237-7041
 () LaGrande PO Box 2737, OR 97850 (503) 963-7758 (X) Portland 7515 N.E. Ambassador Pl., OR 97220 (503) 282-7502
 () Spokane PO Box 14725, WA 99214 (509) 921-0290

Project: 24-D Hamford North Slope PN: 352059
 Turn Around: NORMAL Sampling Date: 7-19-94
 Send Report To: Stuart Childs Location: PORTLAND
 QA/QC Requirements: YES
 Provide Preliminary Results: Verbal / Fax (circle) Fax Number: _____
 Laboratory Name: CAS
 Address: 1317 S. 13th Ave Kelso, WA 99626
 Contact: KEVIN D Phone: 206 577-7222

SAMPLE ID	DATE	TIME	LAB I.D.	PRESERV- ATIVE	SAMPLE MATRIX	ORGANIC ANALYSIS										INORGANIC ANALYSIS				OTHER	NUMBER OF CONTAINERS			
						Volatile Organic GC/MS 824/8240	Semi-Volatile Organic GC/MS 825/8270	Halogenated Volatiles 601/6010	Aromatic Volatiles 602/6020 BTEX	Total Petroleum Hydrocarbons HCID G D (circle)	Total Petroleum Hydrocarbons EPA 418.1 418.1 MOD (circle)	Total Organic Carbon (TOC) 413/9080	Polycyclic Aromatic Hydrocarbons (PAH) 8310 8100 8270 (circle)	TCLP Metals As, Ba, Cd, Cr, Pb, Hg, Se, Ag	Metals (total or dissolved) List	Extractable Bases Ca, Na, Mg, K (circle)	Ph, Cond, Cl, SO ₄ , PO ₄ , F, Br NO ₂ , NO ₃ (circle)	NH ₃ , N, COD, Total-P, TKN (circle)						
1 94-24D- S1-S5	7-19	11:00		NONE	SOIL																			
2 94-24D- S1-S10	7-19	11:50		NONE	SOIL																			
3 94-24D- S1-S15	7-19	12:40		NONE	SOIL																			
4 94-24D- S1-S20	7-19	13:10		NONE	SOIL																			
5 94-24D- S1-S25	7-19	13:10		NONE	SOIL																			
94-24D-S2-S5	7-19	14:00																						
94-24D-S2-S10	7-19	14:20																						
94-24D-S2-S15	7-19	14:30																						
94-24D-S2-S20	7-19	14:45																						

COMMENTS

INVOICE INFORMATION
 P.O. No.: _____
 Bill To: _____

SHIPMENT INFORMATION
 Shipped via: _____ Sample Receipt: _____
 Seals Intact: _____ Condition: _____
 Temp When Rcd.: _____ Seal No.: _____
 Samples Collected By: D. Mascari

Relinquished By: [Signature] Company: Cascade Earth Sciences Date/Time: 7-21-94 1:00 PM Received By: [Signature] Company: CAS Date/Time: 7/22/94 0800

Relinquished By: _____ Company: _____ Date/Time: _____ Received By: _____ Company: _____

Relinquished By: _____ Company: _____ Date/Time: _____ Received By: _____ Company: _____

APPENDIX C

RAW DATA

SAMPLE DESCRIPTION

SERVICE REQUEST #: K944396

ANALYST: Kusthae Craven

DATE: 7/28/94

LAB ID	SAMPLE ID	DESCRIPTION
K4396-001	94-240-53-55	sand with water on top
-002	94-240-53-510	dry sand
-003	94-240-53-515	sand, rocks, water
-004	94-240-53-520	sand
-005	94-240-53-525	dry sand
-006	94-240-54-55	dry, sand & soil
-007	94-240-54-510	sand, water, rocks
-008	94-240-54-515	sand
-009	94-240-54-520	sand
00 010	94-2,40,51-55	wet sand
-011	94-2,40,51-510	wet sand
-012	94-2,40-51-515	water, rocks, sand
-013	94-240-51-520	dry sand
-014	94-240-51-525	wet sand
-015	94-240-52-55	wet sand
-016	94-240-52-510	dry ^{KC 7/28/94} wet sand
-017	94-240-52-515	wet sand
-018	94-240-52-520	sand

REVIEWED BY: Kyle K...

DATE: 8/2/94