URS

SOIL INVESTIGATION
PRECISION ENGINES FACILITY
EVERETT, WASHINGTON

For

PRECISION ENGINES
URS JOB NO.: 53-01000301.00
November 8, 2001

1.0 INTRODUCTION AND BACKGROUND

This report presents the results of URS Corporation's (URS') investigation of soils at the Precision Engines facility located at 3220 100th Street Southwest, Building E in Everett, Washington (Figure 1). Precision Engines leases approximately 3,900 square feet of Building E (the "site") from the Snohomish County Airport and uses the space as an aircraft engine carburetor remanufacturing facility. The purpose of this investigation was to assess the extent of petroleum-affected soils previously detected beneath the floor of the equipment room which is located inside the space leased by Precision Engines. The scope of work for the investigation was based on information collected from previous reports, a site visit to the subject property, and the requirements of the Sampling and Analysis Plan (SAP), which was prepared in accordance with Washington State Department of Ecology (Ecology) guidelines.

1.1 FACILITY SETTING AND DESCRIPTION

The site is located at the Snohomish County Airport in Everett, Washington. Building E, which contains the site, is bounded on the east by asphalt-paved parking and on the west by an asphalt-paved aircraft taxiway. Building E is bounded to the north and south by commercial buildings and offices. Land use in the site vicinity consists of commercial, manufacturing, and airport properties.

The approximate site elevation is 550 feet above mean sea level (msl). There is little topographic relief across the site. The nearest surface water is an unnamed wetland approximately 1/2 mile northeast of the site.

1.2 HYDROGEOLOGIC SETTING

A geologic map and hydrogeologic information indicates the site and site vicinity is underlain by unconsolidated glacial till of Quaternary age designated the Vashon till (Thomas et al., 1997). The till is typically about 70 feet thick, although in some areas it is up to 250 feet in thickness. The till is underlain by advance outwash deposits (designated the Esperance Sand) consisting predominantly of sand and gravel with some clay and silt.

URS has conducted extensive investigations for an unrelated client at the Boeing facility, approximately ½ mile north of the site which, indicate that perched water, if present, often occurs at the interface of the till and overlying fill materials. Where water is perched at the fill-till interface, it may occur at depths of less than 15 feet. However, groundwater was not encountered within undisturbed till during URS' investigations at the Boeing facility. Groundwater within the Esperance Sands is generally greater than 200 feet bgs in the site vicinity. Groundwater flow direction within the Esperance Sand in the site vicinity is generally to the west, toward the Puget Sound.

1.3 PREVIOUS ENVIRONMENTAL INVESTIGATION

Snohomish County Airport retained Camp Dresser & McKee (CDM) to perform an investigation of indoor air quality and potential soil contamination at the Snohomish County Airport offices building, where Precision Engines utilizes a portion of the building as a shop space (CDM, 2001). CDM conducted a subsurface investigation of soils underlying the Precision Engines tenant space and adjoining areas. A total

of ten borings were completed in the tenant space and adjoining Snohomish County Airport office space in November and December 2000 (Figure 2). The subsurface investigation allegedly identified diesel-range petroleum hydrocarbons in the soils at concentrations exceeding Model Toxics Cleanup Act (MTCA) Method A soil cleanup level in shallow soil samples collected from five of the borings (Table 1). Selected samples were also analyzed for gasoline-range petroleum hydrocarbons, volatile organic compounds (VOCs), and polycyclic aromatic compounds (PAHs), none of which were detected above laboratory reporting limits.

The lateral extent of the alleged petroleum-affected area was not delineated. Additionally, dense soil conditions prevented a delineation of the vertical extent of the alleged petroleum-affected area.

Air samples were collected from the tenant space and selected boreholes for chemical analysis. Volatile hydrocarbons were detected in these samples, but at concentrations well below applicable regulatory levels. CDM concluded that no long-term adverse health would be expected from the types of hydrocarbons detected during this air study.

2.0 PURPOSE AND SCOPE OF SERVICES

The principal objective of URS' investigation was to confirm the results of the CDM soil investigation and assess the extent of petroleum hydrocarbons in the soil. In order to accomplish this objective, URS completed six soil probe borings to collect soil samples for laboratory analysis. The soil borings were completed inside the Precision Engines tenant space and the adjoining Snohomish County Airport office space (Figure 2). URS completed the following scope of services:

- Prepared a SAP and a Quality Assurance/Quality Control Project Plan (QAPP) for the subsurface investigation. The SAP included a site specific Health and Safety Plan.
- Identified subgrade utilities in the vicinity of the proposed probe locations using a utility locating service and information made available by Precision Engines.
- Subcontracted ESN Northwest (ESN) to complete StrataProbe borings at the six boring locations.
- Collected soil samples continuously from approximately 1 foot below ground surface (bgs) to up to 15 feet bgs, visually inspected the soils for evidence of contamination, field screened the soils for organic vapor emissions with field instruments, and collected soil samples for laboratory analysis.
- Subcontracted with ESN Northwest (ESN), an Ecology accredited laboratory located in Lacey, Washington, to perform chemical analyses of the samples selected for analysis.
- Prepared this report summarizing the results of this investigation.

URS completed the work in general accordance with the SAP. However, only six of the seven proposed borings were completed due to difficult drilling conditions.

3.0 METHODS OF INVESTIGATION

In accordance with OSHA and state regulations, a site-specific Health and Safety plan was developed prior to initiation of the subsurface investigation at the site. Field personnel were required to implement the procedures presented in that document while conducting on site work.

Prior to subsurface sampling, URS contacted a service that notifies public and private utilities of the proposed subsurface investigation. Underground utility locations in the public right-of-way and easements at the subject property are identified by the responsible utilities. This notification was supplemented by a site-specific utility locating survey by a commercial locating service subcontracted by URS. Identified underground utilities were marked by painting the inferred locations of the utilities on the ground surface. The subsurface investigation was conducted on August 21 and 22, 2001.

3.1 SOIL BORINGS AND SAMPLING

Soil borings were completed using limited-access StrataProbe equipment operated by ESN of Lacey, Washington. The StrataProbe equipment was mobilized to the boring locations on either a tractor, or by hand. Prior to drilling, the concrete floor was cored for access to the subsurface soils, and the drilling equipment was anchored to the floor by expansion bolts. The six soil boring locations (Figure 2) were selected by URS based on historical information, visual observations, and access constraints. The borings were completed to refusal, which ranged from 2 to 15 feet bgs.

Soil samples were collected by driving the StrataProbe split-spoon sampler 1 to 2 feet into undisturbed soils. The soil was transferred from the split-spoon sampler to laboratory-prepared glassware using a clean stainless steel spoon. All samples were placed in a cooler with blue ice and transferred to the laboratory under standard chain of custody protocols.

The drilling and sampling was monitored in the field by a qualified URS geologist. A detailed log of the subsurface materials was maintained, including moisture, visual staining and odor. An organic vapor monitor (OVM) was also used to screen the soils for organic vapors. The soils were classified in general accordance with the Unified Soil Classification System.

The sampling equipment and any other down-hole equipment was decontaminated by washing with a dilute Alconox solution, rinsed with tap water, and then rinsed with distilled water after the completion of each sampling location. The boreholes were backfilled with bentonite chips hydrated with tap water. The top four inches of each borehole were filled with ready mix concrete.

3.2 LABORATORY ANALYSIS

Selected soil samples collected from the borings were submitted to ESN for analysis as summarized in Table 2. Selected soil samples were analyzed for diesel and heavy oil range petroleum hydrocarbons by Washington Method NWTPH Diesel Extended (NWTPH-Dx), gasoline-range hydrocarbons by Washington Method NWTPH-Gasoline Extended (NWTPH-Gx), selected VOCs by EPA Method 8021B, and PAHs by EPA Method 8270. Soil samples were selected for analysis to further delineate the extent of petroleum hydrocarbons previously detected during the investigation by CDM. Samples from Boring URS-B1-01

were not analyzed because the boring met refusal at 2 feet bgs. Samples were analyzed from the adjacent Boring URS-B2-01.

4.0 REGULATORY CLEANUP LEVELS

MTCA establishes procedures for calculating cleanup levels at sites where releases of hazardous substances pose a potential threat to human health or the environment. In order to assess whether the concentrations of hazardous substances detected in soils at the Precision Engines facility may be potentially significant, the analytical results were compared to applicable MTCA Method A cleanup levels.

MTCA Method A involves comparing measured concentrations of a detected compound to cleanup level specified in tables (Ecology, 2001). Method A cleanup levels are established for a limited number of common hazardous substances and are intended for use at sites undergoing routine cleanup actions or for sites with a limited number of hazardous substances, all of which must be listed in the Method A tables. Method A cleanup levels derived by Ecology were based on considerations of technical feasibility and aesthetics, as well as other considerations, and are not strictly based on toxicological properties of the listed compounds.

5.0 RESULTS OF INVESTIGATION

This section presents pertinent field observations and the results of the sample analyses. Figure 2 depicts the boring locations. Soil sample analytical results are summarized in Table 2. Laboratory reports and chain-of-custody forms are presented in Appendix B.

5.1 SUBSURFACE SOILS

Soils beneath the concrete floor typically consisted of approximately 1 to 2 feet of fill material composed of brown, medium sand with some gravel. The fill is underlain by dense gray silty fine sand (glacial till) to the total depth of the borings. The maximum depth explored was 15 feet bgs. Groundwater was not encountered in the borings.

Visual evidence of stained soil and hydrocarbon odor was noted in the subsurface investigation. OVM readings ranged from 130 ppm to over 2,000 ppm in soil samples collected for analysis. OVM readings greater than 500 ppm were observed in all six borings. The borings were located in areas within and surrounding the area of prior CDM borings, where elevated OVM readings were also reported. Hydrocarbon odors or staining were also noted in the borings completed as part of this investigation.

5.2 SOIL ANALYTICAL RESULTS

The results of the soil sample analyses indicate that while petroleum hydrocarbons were detected in soils samples collected from four of the five borings where soil samples were analyzed, only two of the samples indicated concentrations in excess of Method A cleanup standards. Detected petroleum hydrocarbons included diesel-, mineral spirit-, and mineral oil-range hydrocarbons. Diesel-range and mineral spirit-range petroleum hydrocarbons were detected at concentrations exceeding the MTCA Method A soil cleanup levels in samples collected from boring URS-B5-01. The boring encountered refusal prior to penetrating the full depth of TPH-affected soils. In addition, gasoline-range petroleum hydrocarbons (as mineral spirits) were

detected and exceeded MTCA Method A soil cleanup level in URS-B5-01, and low levels of xylenes were also detected.

Petroleum hydrocarbons were either not detected above laboratory reporting limits, or were well below the MTCA Method A soil cleanup levels at the remaining sampling locations, which were at perimeter locations surrounding the boring URS-B5-01 location and the locations of previous CDM borings where petroleum hydrocarbons were detected (Figure 2). VOCs and PAHs were not detected in samples collected from other selected borings (Table 2).

6.0 SUMMARY AND CONCLUSIONS

A subsurface soil investigation was conducted by URS at the Precision Engines facility in Everett, Washington. Six soil borings were completed in and adjacent to the former equipment room where petroleum hydrocarbons were already detected by CDM at concentrations above MTCA Method A soil cleanup levels. URS' borings were completed, and samples for analysis were selected, to confirm the presence and extent of any impacted soil.

Petroleum hydrocarbon concentrations detected in the soil samples were all below the MTCA Method A soil cleanup levels except at one boring (URS-B5-01). Soil samples analyzed from this boring contained mineral spirit and diesel-range hydrocarbons above the MTCA Method A cleanup level. Concentrations of hydrocarbons in these samples ranged from one to three times the applicable cleanup levels. These soil samples were collected at depths of up to 15 feet below ground surface. However, the boring encountered refusal prior to reaching the final depth of TPH-containing soils at that location.

Selected soil samples were analyzed for a variety of constituents including petroleum hydrocarbons, VOCs, and PAHs by URS and, previously, CDM. Diesel-range petroleum hydrocarbons were the only constituent that was consistently detected at levels in exceedance of MTCA cleanup levels. Gasoline-range petroleum hydrocarbons (as mineral spirits) were detected in one sample, which also contained concentrations of diesel-range petroleum hydrocarbons exceeding Method A levels. Diesel- and gasoline-range petroleum hydrocarbons are considered to be the constituents of concern at the site.

The lateral extent of soils containing petroleum hydrocarbon concentrations in exceedance of MTCA cleanup levels appears to be limited to approximately 250 square feet. URS could not confirm the vertical extent of the affected soils due to drilling refusal in the dense soils. However, the results indicate that concentrations decrease significantly with depth. Discussions with local drillers, as well as URS' experience at other sites in the vicinity, indicates that readily available equipment that could drill inside the equipment room, which is accessible only through a standard-height, double door, would not be able to drill deeper than the StrataProbe method used.

The affected soils consist of dense, fine-grained glacial till and are capped by the site building. There is no apparent ongoing source of contamination. Therefore, there is limited migration potential. Groundwater in the vicinity is typically in excess of 200 feet below grade. Impact to groundwater within this regional aquifer by petroleum hydrocarbons detected beneath the building is considered by URS to be highly unlikely. Additionally, a previous study did not detect elevated levels of petroleum hydrocarbons in the air within the site building; therefore, there does not appear to be a threat to building occupants.

Based upon the limited lateral extent of the impacted soil, absence of any direct threat to human health (i.e., exposure via dermal contact or inhalation), the difficult drilling conditions at the site, and the estimated depth to groundwater (about 200 feet), it is URS' opinion that further investigation is not warranted at this time.

Remediation of the soil beneath the building either by removal or in situ methods is not practical or necessary, given the current use of the building, the limited access, and the nature of the contamination. Instead, if Ecology deems it necessary, URS recommends that the property owner be asked to place a restrictive covenant on the property to control the limited potential for direct contact with the affected soil.

7.0 REFERENCES

Camp Dresser and McKee, Inc., 2001, Indoor Air Quality and Subsurface Soil Investigation, Snohomish County Airport Offices, Snohomish County, Washington, dated May 22.

Thomas, B.E., et al., 1997, The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington, U.S. Geological Survey Water-Resources Investigations Report 96-4312.

Washington Department of Ecology (Ecology), 2001 Model Toxics Cleanup Act, WAC 173-340, amended February.

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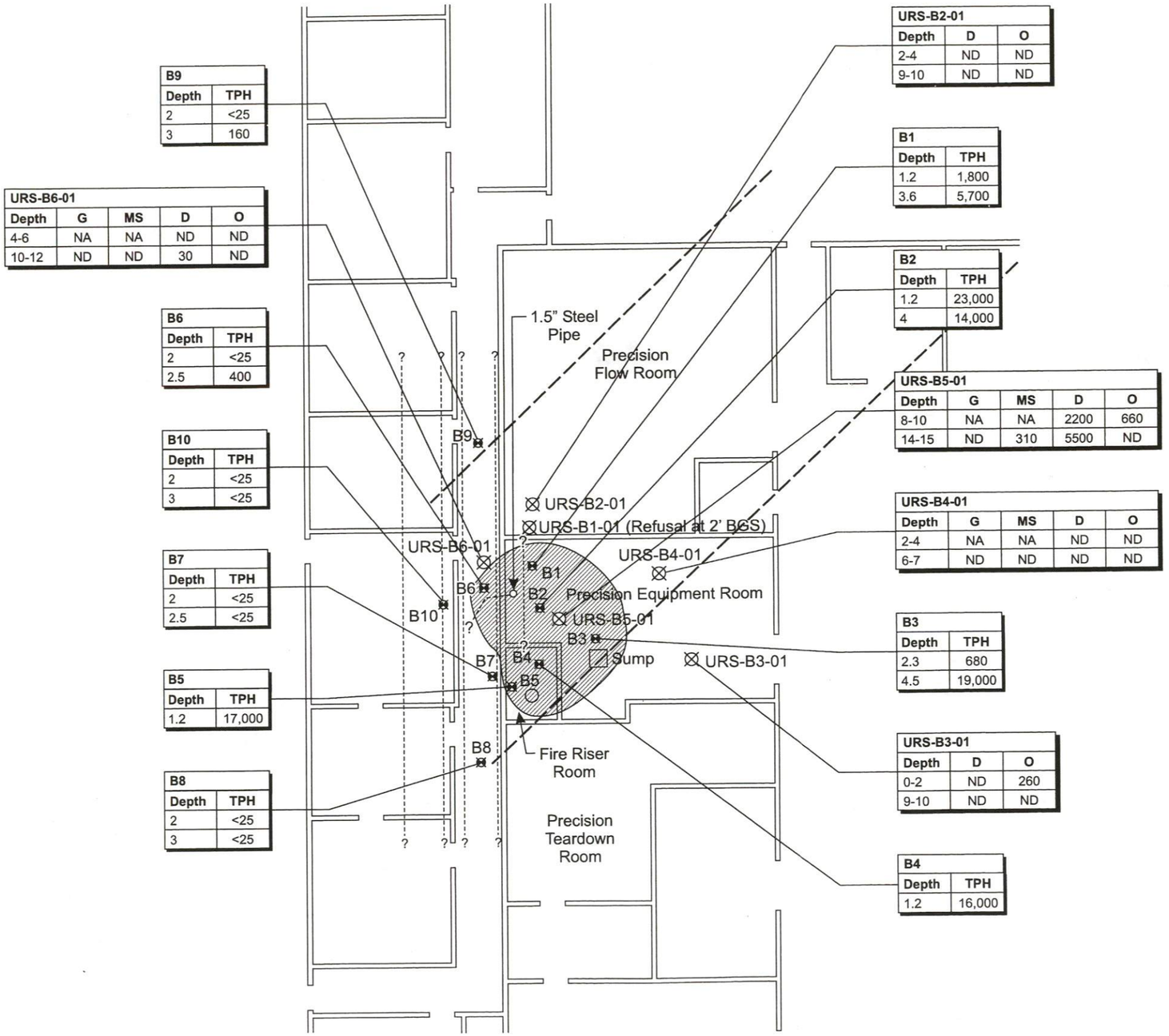

B9	
Depth	TPH
2	<25
3	160

URS-B6-01				
Depth	G	MS	D	O
4-6	NA	NA	ND	ND
10-12	ND	ND	30	ND

B6	
Depth	TPH
2	<25
2.5	400

B10	
Depth	TPH
2	<25
3	<25

B7	
Depth	TPH
2	<25
2.5	<25

B5	
Depth	TPH
1.2	17,000

B8	
Depth	TPH
2	<25
3	<25

URS-B2-01		
Depth	D	O
2-4	ND	ND
9-10	ND	ND

B1	
Depth	TPH
1.2	1,800
3.6	5,700

B2	
Depth	TPH
1.2	23,000
4	14,000

URS-B5-01				
Depth	G	MS	D	O
8-10	NA	NA	2200	660
14-15	ND	310	5500	ND

URS-B4-01				
Depth	G	MS	D	O
2-4	NA	NA	ND	ND
6-7	ND	ND	ND	ND

B3	
Depth	TPH
2.3	680
4.5	19,000

URS-B3-01		
Depth	D	O
0-2	ND	260
9-10	ND	ND

B4	
Depth	TPH
1.2	16,000

LEGEND

- CDM boring and diesel-range TPH concentrations (mg/kg)
- URS boring
- Underground power line
- 8" concrete storm line
- G Gasoline -range
- MS Mineral spirits
- D Diesel-range
- O Mineral oil
- ND Not detected
- NA Not analyzed
- Estimated extent of TPH-affected soils

Depth = feet below ground surface

0 12 24

Scale in Feet

SOURCE: Based on Camp, Dresser & McKee, 2001

Figure 2

Boring Location Map and Soil Analysis Results

Job No. 53-01000301.00

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Precision Engines
Everett, Washington

URS

November 8, 2001

Mr. Dave Cort
Precision Engines
3220 100th Street Southwest, Building E
Everett, Washington 98204

Soil Investigation
Precision Engines
Everett, Washington
URS Job No. 53-01000301.00

Dear Mr. Cort:

Presented in this report are the results of URS's subsurface investigation of soils at the Precision Engines facility located at 3220 100th Street Southwest, Building E, in Everett, Washington. The investigation was conducted in general accordance with URS's proposals to Precision Engines that were authorized on August 6 and August 21, 2001 and the Sampling and Analysis Plan dated August 20, 2001.

URS appreciates the opportunity to assist Precision Engines on this project and we trust this report meets your current requirements. Please contact us if you have questions regarding this report or require further assistance.

Respectfully submitted,

URS CORPORATION

James H. Flynn, R.G.
Senior Hydrogeologist

Vance Atkins
Project Hydrogeologist

cc: Mark Asplund, Land Powell Spears Lubersky

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TABLE 1
Summary of Camp Dresser McKee Soil Analytical Results
Precision Engines
Everett, Washington

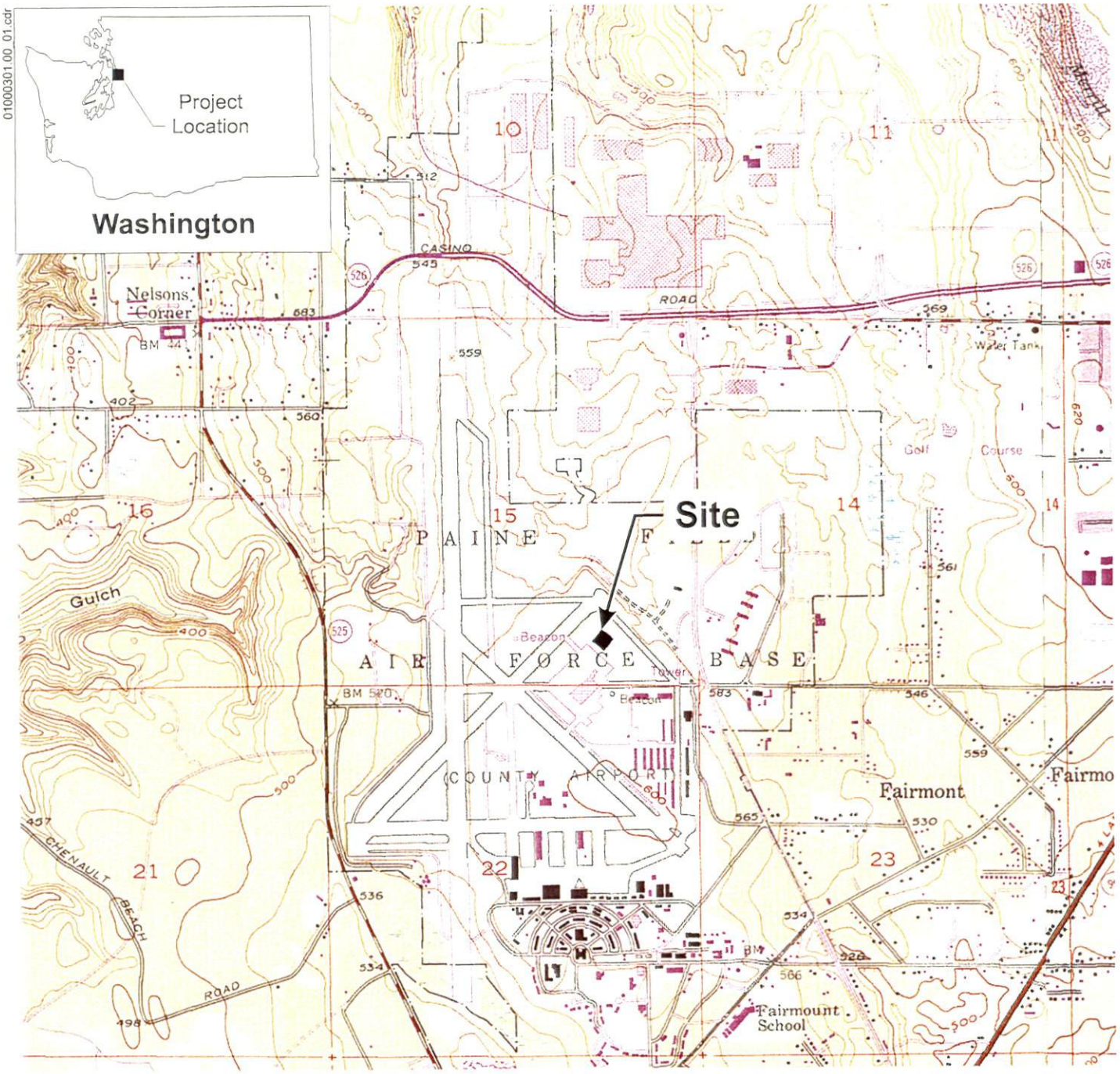
Sample #	Sample Depth (ft bgs)	Date Collected	Fuel Hydrocarbons: Total Petroleum Hydrocarbons-Gasoline Range (NWTPH-HCID)	Fuel Hydrocarbons: Total Petroleum Hydrocarbons-Diesel Range (NWTPH-HCID)	Fuel Hydrocarbons: Total Petroleum Hydrocarbons-Heavy Oil Range (NWTPH-HCID)	Fuel Hydrocarbons: Total Petroleum Hydrocarbons-Diesel Range (NWTPH-Dx) (mg/kg)	Volatile Organics (EPA 8260)	Polycyclic Aromatic Hydrocarbons (EPA 8270)
B-1	1.2	11/02/00	ND	D	D	1,800	ND	ND
B-1 38"	3.6	12/01/00	NA	NA	NA	**5,700**	NA	NA
B-2	1.2	11/02/00	ND	D	D	**23,000**	ND	ND
B-2 42"	4	12/01/00	NA	NA	NA	**14,000**	NA	NA
B-3	2.3	11/02/00	ND	D	ND	680	ND	ND
B-3 48"	4.5	12/01/00	NA	NA	NA	**19,000**	NA	NA
B-4	1.2	11/02/00	ND	D	D	**16,000**	ND	ND
B-5	1.2	11/02/00	ND	D	D	**17,000**	ND	ND
B-6 2'	2	12/07/00	NA	NA	NA	ND	NA	NA
B-6 2'6"	2.5	12/07/00	NA	NA	NA	400	NA	NA
B-7 2'	2	12/07/00	NA	NA	NA	ND	NA	NA
B-7 2'6"	2.5	12/07/00	NA	NA	NA	ND	NA	NA
B-8 2'	2	12/27/00	NA	NA	NA	ND	NA	NA
B-8 3'	3	12/27/00	NA	NA	NA	ND	NA	NA
B-9 2'	2	12/27/00	NA	NA	NA	ND	NA	NA
B-9 3'	3	12/27/00	NA	NA	NA	160	NA	NA
B-10 2'	2	12/27/00	NA	NA	NA	ND	NA	NA
B-10 3'	3	12/27/00	NA	NA	NA	ND	NA	NA
MTCA Method A Soil Cleanup Levels [1] (mg/kg)			100	2000	2000	2000	varies	varies

Notes:
[1] MTCA Cleanup Levels - Washington State Department of Ecology (Ecology). Model Toxics Control Act (MTCA), WAC 173-340, Amended February 12, 2001
Method A - Method A cleanup levels for unrestricted land uses
mg/kg - milligrams per kilogram
NA - Not Analyzed
D - Detected
ND - Not Detected
Bold - exceeds MTCA Method A soil cleanup Levels

TABLE 2
Summary of URS Soil Analytical Results
Precision Engines
Everett, Washington

			Fuel Hydrocarbons (NWTPH-Gx and NWTPH-Dx)				Volatile Organics (EPA Method 8021B)				
Sample #	Sample Depth (ft bgs)	Date Collected	Total Petroleum Hydrocarbons-Gasoline Range (mg/kg)	Total Petroleum Hydrocarbons-Mineral Spirits Range (mg/kg)	Total Petroleum Hydrocarbons-Diesel Range (mg/kg)	Total Petroleum Hydrocarbons-Mineral Oil Range (mg/kg)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Polycyclic Aromatic Hydrocarbons (EPA Method 8270) (mg/kg)
URS-B2-01 2-4	2-4	08/21/01	NA	NA	ND	ND	NA	NA	NA	NA	NA
URS-B2-01 2-4 (DUP)	2-4	08/21/01	NA	NA	ND	ND	NA	NA	NA	NA	NA
URS-B2-01 9-10	9-10	08/21/01	NA	NA	71	ND	NA	NA	NA	NA	NA
URS-B3-01 0-2	0-2	08/21/01	NA	NA	ND	260	NA	NA	NA	NA	NA
URS-B3-01 9-10	9-10	08/22/01	NA	NA	ND	ND	NA	NA	NA	NA	NA
URS-B4-01 2-4	2-4	08/22/01	NA	NA	ND	ND	NA	NA	NA	NA	NA
URS-B4-01 6-7	6-7	08/22/01	ND	ND	ND	ND	ND	ND	ND	ND	NA
URS-B5-01 8-10	8-10	08/22/01	NA	NA	**2000**	660	NA	NA	NA	NA	ND
URS-B5-01 14-15	14-15	08/22/01	ND	**310**	**5500**	ND	ND	ND	ND	5.6	NA
URS-B6-01 4-6	4-6	08/22/01	NA	NA	ND	ND	NA	NA	NA	NA	NA
URS-B6-01 10-12	10-12	08/22/01	ND	ND	30	ND	ND	ND	ND	ND	NA
MTCA Method A Soil Cleanup Levels [1] (mg/kg)			100	100	2000	2000	0.03	7	6	9	NA

Notes:
[1] MTCA Cleanup Levels - Washington State Department of Ecology (Ecology). Model Toxics Control Act (MTCA), WAC 173-340, Amended February 12, 2001
Method A - Method A cleanup levels for unrestricted land uses
mg/kg - milligrams per kilogram
NA - Not Analyzed
ND - Not Detected
Bold - exceeds MTCA Method A soil cleanup Levels



Map created with TOPO!™ © 1997 Wildflower Productions, www.topo.com, based on USGS topographic map

Figure 1
Site Location Map

Job No. 53-01000301.00

URS

Precision Engines
Everett, Washington

APPENDIX A

BORING LOGS

Project: Precision Engines
Project Location: Everett, Washington
Project Number: 53-01000301.00

Log of Boring URS-B1-01

Sheet 1 of 1

Date(s) Drilled	**8/21/01**	Logged By	**DTB**	Checked By	**VDA**
Drilling Method	**Direct Push**	Drilling Contractor	**ESN**	Total Depth of Borehole	**2 feet**
Drill Rig Type	**Limited Access StrataProbe**	Drill Bit Size/Type		Ground Surface Elevation	
Groundwater Level		Sampling Method	**1" & 2" Split Spoon**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet / Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
0		1		800		SW	Brown, fine to coarse SAND with some gravel (dry) (fill)	
							Boring was terminated at 2' bgs due to refusal. Groundwater was not encountered.	Lost sampler in 2'-4' advance.
5								
10								
15								
20								
25								
30								

URS

ENV W/O WELL I:\URSJOB-153-010-1.00P\01000301.GPJ URSSEA3.GLB URSSEA3.GDT 11/7/01

Project: Precision Engines
Project Location: Everett, Washington
Project Number: 53-01000301.00

Log of Boring URS-B2-01

Sheet 1 of 1

Date(s) Drilled	**8/21/01**	Logged By	**DTB**	Checked By	**VDA**
Drilling Method	**Direct Push**	Drilling Contractor	**ESN**	Total Depth of Borehole	**10 feet**
Drill Rig Type	**Limited Access StrataProbe**	Drill Bit Size/Type		Ground Surface Elevation	
Groundwater Level		Sampling Method	**1" & 2" Split Spoon**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0		1		150		SW	Brown, fine to coarse SAND and some gravel (dry) (fill)	
			2		1000		SM	Gray, fine to coarse SAND with some silt, trace gravel (dry) (till) (no odor, no stain)	
			3		140			(no odor, no stain)	
	5		4		950			(no odor, no stain)	
			5		55			(no odor, no stain)	
			6		--			Same as above (moist)	
	10							Boring was terminated at 10' bgs due to refusal. Groundwater was not encountered.	
	15								
	20								
	25								
	30								

ENV W/O WELL I:\URSJOB-1\53-010-1.00P\01000301.GPJ URSSEA3.GLB URSSEA3.GDT 11/7/01

URS

Project: Precision Engines
Project Location: Everett, Washington
Project Number: 53-01000301.00

Log of Boring URS-B3-01

Sheet 1 of 1

Date(s) Drilled	**8/21/01**	Logged By	**DTB**	Checked By	**VDA**
Drilling Method	**Direct Push**	Drilling Contractor	**ESN**	Total Depth of Borehole	**10 feet**
Drill Rig Type	**Limited Access StrataProbe**	Drill Bit Size/Type		Ground Surface Elevation	
Groundwater Level		Sampling Method	**1" & 2" Split Spoon**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0		1		775		SW	Brown, fine to coarse SAND with some fine gravel (dry) (fill) (strong petroleum odor)	
			2		150		SM	Gray, fine to coarse SAND with occasional fine gravel, some silt (dry) (till) (petroleum odor)	
	5		3		130				
			4		--				
			5		--				
			6		--				
			7		250				
			8		250				
	10							Boring was terminated at 10' bgs due to refusal. Groundwater was not encountered.	
	15								
	20								
	25								
	30								

URS

ENV W/O WELL I:\URSJOB-1\53-010-1.00P\01000301.GPJ URSSEA3.GLB URSSEA3.GDT 11/7/01

Project: Precision Engines
Project Location: Everett, Washington
Project Number: 53-01000301.00

Log of Boring URS-B4-01

Sheet 1 of 1

Date(s) Drilled	**8/22/01**	Logged By	**DTB**	Checked By	**VDA**
Drilling Method	**Direct Push**	Drilling Contractor	**ESN**	Total Depth of Borehole	**7 feet**
Drill Rig Type	**Limited Access StrataProbe**	Drill Bit Size/Type		Ground Surface Elevation	
Groundwater Level		Sampling Method	**1" & 2" Split Spoon**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0		1		600		SW	Brown, fine to coarse SAND with some gravel (dry) (fill) (strong petroleum odor)	
			2		1000		SM	Gray, fine to coarse SAND with occasional fine gravel, some silt (dry) (till) (strong petroleum odor)	
			3		>2000				
	5		4		>2000				
			5		>2000				
								Boring was terminated at 7' bgs due to refusal. Groundwater was not encountered.	
	10								
	15								
	20								
	25								
	30								

ENV W/O WELL I:\URSJOB~1\53-010~1.00P\01000301.GPJ URSSEA3.GLB URSSEA3.GDT 11/7/01

URS

Project: Precision Engines
Project Location: Everett, Washington
Project Number: 53-01000301.00

Log of Boring URS-B5-01

Sheet 1 of 1

Date(s) Drilled	**8/22/01**	Logged By	**DTB**	Checked By	**VDA**
Drilling Method	**Direct Push**	Drilling Contractor	**ESN**	Total Depth of Borehole	**15 feet**
Drill Rig Type	**Limited Access StrataProbe**	Drill Bit Size/Type		Ground Surface Elevation	
Groundwater Level		Sampling Method	**1" & 2" Split Spoon**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0		1		1600		SW	Brown, fine to coarse SAND with some gravel (dry) (fill) (strong petroleum odor)	
			2		1250		SM	Gray, fine to coarse SAND with occasional gravel, some silt (dry) (till) (strong petroleum odor)	
	5		3		1500				
			4		800				
			5		>2000			(grading from dry to moist)	
	10		6		>2000			(moist)	
			7		>2000			(soil grading from moist to dry)	
			8		>2000			(staining)	
	15							Boring was terminated at 15' bgs due to refusal. Groundwater was not encountered.	
	20								
	25								
	30								

ENV W/O WELL I:\URS\JOB-1\53-010-1.00P\01000301.GPJ URSSEA3.GLB URSSEA3.GDT 11/7/01

URS

Project: Precision Engines
Project Location: Everett, Washington
Project Number: 53-01000301.00

Log of Boring URS-B6-01

Sheet 1 of 1

Date(s) Drilled	**8/22/01**	Logged By	**DTB**	Checked By	**VDA**
Drilling Method	**Direct Push**	Drilling Contractor	**ESN**	Total Depth of Borehole	**12 feet**
Drill Rig Type	**Limited Access StrataProbe**	Drill Bit Size/Type		Ground Surface Elevation	
Groundwater Level		Sampling Method	**1" & 2" Split Spoon**	Hammer Data	
Borehole Backfill		Location			

Elevation, feet	Downhole Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES OVM (ppm)	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS AND OTHER TESTS
	0		1		>2000		SW	Brown, fine to coarse SAND with some gravel (dry) (fill) (strong petroleum odor)	
			2		>2000		SM	Gray, fine to coarse SAND with occasional fine gravel, some silt (dry) (till) (strong petroleum odor)	
	5		3		>2000				
			4		>2000				
			5		>2000			(dry to moist)	
			6		>2000			(moist)	
	10		7		1800			(moist to dry)	
								Boring was terminated at 12' bgs due to refusal. Groundwater was not encountered.	
	15								
	20								
	25								
	30								

URS

ENV W/O WELL I:\URSJOB~1\53-010~1.00P\01000301.GPJ URSSEA3.GLB URSSEA3.GDT 11/7/01

APPENDIX B

LABORATORY ANALYTICAL REPORTS

ESN NORTHWEST
Environmental Services Network

September 6, 2001

Vance Atkins
URS Corporation
2501 4th Ave., Suite 1500
Seattle, WA 98101-1662

Dear Mr. Atkins:

Please find enclosed the analytical data report for the Precision Engine Project in Everett, Washington. Direct Push services were conducted on August 21, 2001. Soil samples were analyzed for Diesel and Oil by NWTPH-Dx/Dx Extended, Gasoline by NWTPH-Gx, and BTEX by Method 8021B on August 23 – 31, 2001.

The results of the analyses are summarized in the attached tables. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this work is also enclosed.

ESN Northwest appreciates the opportunity to have provided analytical and geosampling services to URS Corporation for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Michael A Korosec

Michael A. Korosec
President

677 Woodland Square Lp. SE, Suite D ■ Lacey, Washington 98503 ■ 360.459.4670 ■ FAX 360.459.3432
Web Site: *www.ESN-USA.com* E-Mail: *esnnw@aol.com*

ESN NORTHWEST CHEMISTRY LABORATORY

PRECISION ENGINE PROJECT
Everett, Washington
URS
Client Project #53-01000301.00

Analyses of Gasoline (NWTPH-Gx) & BTEX (EPA Method 8021B) in Soil

Sample Number	Date Analyzed	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Gasoline (mg/kg)	Mineral Spirits (mg/kg)	Surrogate Recovery (%)
Method Blank	8/29/01	nd	nd	nd	nd	nd	nd	97
URS-B4-01 (6-7)	8/29/01	nd	nd	nd	nd	nd	nd	114
URS-B4-01 (6-7) Du	8/29/01	nd	nd	nd	nd	nd	nd	81
URS-B5-01 (14-15)	8/29/01	nd	nd	nd	5.6	*	310	114
URS-B6-01 (10-12)	8/29/01	nd	nd	nd	nd	nd	nd	100
Method Detection Limits		0.02	0.05	0.05	0.05	10	10	

" * " Indicates gas range hydrocarbons, see mineral spirits.
"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Chlorobenzene): 65% TO 135%

ANALYSES PERFORMED BY: Dean Phillips & Marilyn Farmer

ESN NORTHWEST CHEMISTRY LABORATORY

PRECISION ENGINE PROJECT
Everett, Washington
URS
Client Project #53-01000301.00

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)	Mineral Oil (mg/kg)
Method Blank	8/23/01	104	nd	nd	nd
Method Blank	8/24/01	129	nd	nd	nd
URS-B2-01 2-4	8/23/01	108	nd	nd	nd
URS-B2-01 2-4 Du	8/23/01	101	nd	nd	nd
URS-B2-01 9-10	8/23/01	106	71	nd	nd
URS-B3-01 0-2	8/23/01	107	nd	nd	260
URS-B3-01 9-10	8/24/01	75	nd	nd	nd
URS-B4-01 6-7	8/23/01	97	nd	nd	nd
URS-B5-01 8-10	8/23/01	int	2000	nd	660
URS-B5-01 14-15	8/23/01	int	5500	nd	nd
URS-B6-01 10-12	8/23/01	116	30	nd	nd
Method Detection Limits			20	40	40

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Dean Phillips

ESN NORTHWEST CHEMISTRY LABORATORY

PRECISION ENGINE PROJECT
Everett, Washington
URS
Client Project #53-01000-301-00

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Soil

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)	Mineral Oil (mg/kg)
Method Blank	8/31/01	133	nd	nd	nd
URS-B4-01 @ 2-4'	8/31/01	105	nd	nd	nd
URS-B6-01 @ 4-6'	8/31/01	102	nd	nd	nd
Method Detection Limits			20	40	40

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Marilyn Farmer & Dean Phillips

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

CHAIN-OF-CUSTODY RECORD

CLIENT: URS

ADDRESS: 1501 4th Ave Ste 1400; Seattle, WA 98101

PHONE: 206-438-2700 FAX: 206 438 2699

CLIENT PROJECT #: 53-01000301.00 PROJECT MANAGER: U. Atkins/J. Flynn

DATE: 8-22-01 PAGE 1 OF 3

PROJECT NAME: Precision Engine

LOCATION: Everett, WA

COLLECTOR: DTB DATE OF COLLECTION 8/21/01 8/22/01

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES: VOA 8010/8021B	VOA 8021B BTEX	VOA 8260	SEMI VOL 8270	TPH - HCID	TPH 8015 (gasoline)	TPH 8015 (diesel) ext	TPH 8015 (d & o)	PAH 8100	PCBs 8082	Pesticides 8081	TOTAL LEAD	pH	NOTES	Total Number of Containers	Laboratory Note Number
1. URS-B1-01	0-2	1030	S	4 oz. Jar																
2. " - B2 "	0-2	1110																		
3. " - B2 "	2-4	1120																		
4. " - " "	4-5	1130																		
5. " - " "	5-7	1140																		
6. " - " "	7-9	1150																		
7. " - " "	9-10	1200																		
8. URS-B3-01	0-2	1420																		
9.	2-4	1430																		
10.	4-5	1440																		
11.	5-6	1450																		
12.	6-7	1500																		
13.	7-8	1510																		
14.	8-9	1520																		
15.	9-10	1530																		
16.																				
17.																				
18.																				

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
DTB	8-22-01 1600	DTB	8-22-01 1600
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time:

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

CHAIN-OF-CUSTODY RECORD

CLIENT: URS

ADDRESS:

PHONE: 206 438-2700 FAX: 206-438-2699

CLIENT PROJECT #: 53-01000301.00 PROJECT MANAGER: V. Atkins

DATE: 8-22-01 PAGE 2 OF 3

PROJECT NAME: Precision Engine

LOCATION: Everett, WA

COLLECTOR: DTB DATE OF COLLECTION 8/21/01 8/22/01

Sample Number	Depth	Time	Sample Type	Container Type	ANALYSES: VOA 8010/8021B	VOA 8021B BTEX	VOA 8260	SEMI VOL 8270	TPH - HCID	TPH 8015 (gasoline)	TPH 8015 (diesel) ext.	TPH 8015 (d & o)	PAH 8100	PCBs 8082	Pesticides 8081	TOTAL LEAD	pH	NOTES	Total Number of Containers	Laboratory Note Number
1 URS-B4-01	0-2	0940	S	4/32 jar							X									
2.	2-4	0950																		
3.	4-5	1000																		
4.	5-6	1010																		
5.	6-7	1020															X			
6. URS-B5-01	0-2	1050																		
7.	2-4	1100																		
8.	4-6	1110																		
9.	6-8	1120																		
10.	8-10	1130														X				
11.	10-12	1140																		
12.	12-14	1145																		
13.	14-15	1200															X			
14.																				
15.																				
16.																				
17.																				
18.																				

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
DTB	8.22.01/1600		8-22-01/1600
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time:

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

CHAIN-OF-CUSTODY RECORD

CLIENT: URS

ADDRESS:

PHONE: 206-438-2700 FAX: 206-438-2699

CLIENT PROJECT #: 53-01000301.00 PROJECT MANAGER: V. Atkins

DATE: 8-22-01 PAGE 3 OF 3

PROJECT NAME: Precision Engine

LOCATION: Everett, WA

COLLECTOR: DTB DATE OF COLLECTION: 8/21/01 / 8/22/01

Sample Number	Depth	Time	Sample Type	Container Type	VOA 8010/8021B	VOA 8021B BTEX	VOA 8260	SEMI VOL 8270	TPH - HCID	TPH 8015 (gasoline)	TPH 8015 (diesel) ext	TPH 8015 (d & o)	PAH 8100	PCBs 8082	Pesticides 8081	TOTAL LEAD	pH							NOTES	Total Number of Containers	Laboratory Note Number
1. URS-B6-01	0-2	1420	S	4oz Jar																						
2.	2-4	1430																								
3.	4-6	1440									X															
4.	6-7	1450																								
5.	7-9	1500																								
6.	9-10	1510																								
7.	10-12	1520																	X								
8.																										
9.																										
10.																										
11.																										
12.																										
13.																										
14.																										
15.																										
16.																										
17.																										
18.																										

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
DBC	8-22-01/1400	[signature]	8-22-01/1600
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES: Add-on 2 Dx+ per Vance 8-31-01 DP

Turn Around Time:

ESN NORTHWEST
Environmental Services Network

September 6, 2001

Vance Atkins
URS Corporation
2501 4th Ave., Suite 1500
Seattle, WA 98101-1662

Dear Mr. Atkins:

Please find enclosed the analytical data report for the Precision Engine Project in Everett, Washington. One soil sample was analyzed for PAH's by Method 8270 on August 28, 2001.

The results of the analyses are summarized in the attached tables. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this work is also enclosed.

ESN Northwest appreciates the opportunity to have provided analytical services to URS Corporation for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Michael A Korosec

Michael A. Korosec
President

677 Woodland Square Lp. SE, Suite D ■ Lacey, Washington 98503 ■ 360.459.4670 ■ FAX 360.459.3432
Web Site: *www.ESN-USA.com* E-Mail: *esnnw@aol.com*

ESN SEATTLE CHEMISTRY LABORATORY
(425) 957-9872, fax (425) 957-9904

ESN Job Number:	S10824-7
Client:	URS
Client Job Name:	PRECISION ENGINE
Client Job Number:	53.01000301.00

Analytical Results

PAH(8270), mg/kg		MTH BLK	LCS	URS B5 8-10	Dup URS B5 8-10
Matrix	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	08/24/01	08/24/01	08/24/01	08/24/01
Date analyzed	Limits	8/28//01	8/28//01	8/28//01	8/28//01
Acenaphthene	0.10	nd		nd	nd
Acenaphthylene	0.10	nd	88%	nd	nd
Anthracene	0.10	nd		nd	nd
Benzo(a)anthracene	0.10	nd		nd	nd
Benzo(a)pyrene	0.10	nd		nd	nd
Benzo(b)fluoranthene	0.10	nd		nd	nd
Benzo(ghi)perylene	0.10	nd		nd	nd
Benzo(k)fluoranthene	0.10	nd		nd	nd
Chrysene	0.10	nd		nd	nd
Dibenzo(ah)anthracene	0.10	nd		nd	nd
Fluorene	0.10	nd		nd	nd
Fluoranthene	0.10	nd		nd	nd
Indeno(1,2,3-cd)pyrene	0.10	nd		nd	nd
Naphthalene	0.10	nd		nd	nd
Phenanthrene	0.10	nd		nd	nd
Pyrene	0.10	nd	86%	nd	nd
Surrogate recoveries:					
Fluorobiphenyl		116%	69%	101%	106%
o-Terphenyl		78%	99%	85%	81%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
M - matrix interference
J - estimated value
Results reported on dry-weight basis
Acceptable Recovery limits: 65% TO 135%
Acceptable RPD limit: 35%

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES

S10824-7

CHAIN-OF-CUSTODY RECORD

CLIENT: URS

ADDRESS:

PHONE: 206-438-2700 FAX: 206-438-2699

CLIENT PROJECT #: 53-01000301.00 PROJECT MANAGER: V. Atkins

DATE: 8-22-01 PAGE 2 OF 3

PROJECT NAME: Precision Engine

LOCATION: Everett, WA

COLLECTOR: DTB DATE OF COLLECTION 8/21/01 / 8/22/01

Sample Number	Depth	Time	Sample Type	Container Type	NOTES	Total Number of Containers	Laboratory Note Number
1 URS-B1-01	0-2	0940	S	4 oz Jar			
2.	2-4	0950					
3.	4-5	1000					
4.	5-6	1010					
5.	6-7	1020					
6. URS-B5-01	0-2	1050					
7.	2-4	1100					
8.	4-6	1110					
9.	6-8	1120					
10.	8-10	1130					
11.	10-12	1140					
12.	12-14	1145					
13.	14-15	1200					
14.							
15.							
16.							
17.							
18.							

ANALYSES: VOA 8010/8021B; VOA 8021B BTEX; VOA 8260; SEMI VOL 8270; TPH - HCID; TPH 8015 (gasoline); TPH 8015 (diesel) ext.; TPH 8015 (d & o); PAH 8100; PCBs 8082; Pesticides 8081; TOTAL LEAD; pH; PAH 8270

XX

RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME
DTC	8-22-01 1600		8-22-01 1600
RELINQUISHED BY (Signature)	DATE/TIME	RECEIVED BY (Signature)	DATE/TIME

SAMPLE DISPOSAL INSTRUCTIONS

☐ TEG DISPOSAL @ $2.00 each ☐ Return ☐ Pickup

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	
CHAIN OF CUSTODY SEALS Y/N/NA	
SEALS INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
NOTES:	

LABORATORY NOTES:

Turn Around Time: