CDM
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April 13, 2004

Mr. Andrew Rardin
Snohomish County Airport
3220 100th Street SW
Everett, Washington 98204-1390

Subject: Additional Evaluation of Petroleum Hydrocarbons
Underground Storage Tank Closure at Building 207
Paine Field Airport
Snohomish County, Washington

Dear Dale:

Introduction

This letter presents the results of Camp Dresser & McKee Inc.'s (CDM) additional evaluation of petroleum hydrocarbons in soil at the above referenced site. Ms. Michelle Allen at the Washington State Department of Ecology (Ecology) recommended additional sampling of residual hydrocarbons in soil and comparison to Model Toxics Control Act (MTCA) Method B cleanup levels. This work was conducted in accordance with our proposal dated January 27, 2004.

Background

In April 2003 CDM conducted closure of one 7,000-gallon heating oil tank and associated 180-gallon "nurse" tank located at Building 207 in Snohomish County Airport, also known as Paine Field, in Snohomish County, Washington. **Figure 1** shows the site location. Results of the underground storage tank (UST) closure assessment are detailed in a report dated July 29, 2003 [1] and summarized below.

The heating oil tank was closed in place by emptying, cleaning, and filling it with sand-cement slurry. The nurse tank was removed. Hydrocarbon-contaminated soil was removed to the extent practicable. Residual hydrocarbon-contaminated soil that exceeded the Model Toxics Control Act (MTCA) Method A cleanup level of 2,000 milligrams per kilogram (mg/kg) for diesel-range petroleum hydrocarbons was identified adjacent to the building. The cause of this contamination appeared to be from overflow of a vent line that had been cut

[1] CDM. 2003. UST Closure Assessment, Building 207, Snohomish County Airport, Snohomish County, Washington. Prepared for Snohomish County Public Works Department. Job Number 19947.38578.RPT. July 29.

to the ground surface. Immediately following the UST closure, CDM conducted additional investigation inside the building and around the underground storage tank using drive-point sampling methods to collect soil samples. Groundwater was not encountered. CDM concluded that petroleum hydrocarbon-contaminated soil that exceeded the MTCA Method A cleanup level was limited to about 8 to 17 cubic yards spread over an area approximately 8 feet (ft) wide by 22 ft long, which was overlain by 3 to 4 feet of clean fill.

Additional testing was not conducted in order to develop Method B cleanup levels specific to this site. Method B cleanup levels could result in allowable concentrations that are higher than 2,000 mg/kg. MTCA also requires a determination of whether a release of hazardous substances to the soil may pose a threat to the terrestrial environment. This site satisfies the criteria for exclusion from the terrestrial ecological evaluation due to the industrial development and lack of undeveloped contiguous undeveloped land. Also, although some samples exceed the residual saturation screening levels for heavy fuel oils, groundwater protection was not considered to be a concern because groundwater occurs at about 130 feet below ground surface (bgs) and a 55 to 75 thick layer of very dense glacial till separates hydrocarbon contamination from groundwater.

Ms. Michelle Allen informed CDM that Ecology generally concurred with our assessment. However, in order to grant closure with no further action, Ms. Allen requested that the two areas with the highest petroleum hydrocarbon concentrations (V1-3' and V2-4') be resampled and that a Method B cleanup level be developed in accordance with MTCA.

Purpose and Scope

The purpose of CDM's services was to conduct a MTCA Method B evaluation of residual hydrocarbons in site soils. To complete this investigation, CDM conducted the following tasks:

- Hand auger two test holes near prior test hole locations V1 and V2 and collect soil samples below the overlying clean fill.
- Submit collected soil samples for analysis of petroleum hydrocarbons.
- Calculate a site-specific MTCA Method B TPH soil cleanup level based on direct contact with soil.
- Prepare this letter report documenting investigation methods, analytical results and our evaluation of the data.

Methods

Sample Collection

On February 10, 2004 CDM collected two soil samples at approximately the same locations as former samples V1-3' and V2-4' (**Figure 2**). These samples are referred to as V1-3(2) and V2-4(2) and their locations are also shown on **Figure 2**. A hand auger was used to reach the desired depths prior to collecting the samples. During hand augering, soil was field screened for volatile organic compounds (VOC) by placing a representative portion of each sample into a resealable plastic bag and disaggregating the sample. VOC concentrations in the headspace were then measured using an organic vapor meter equipped with a photoionization detector (OVM-PID). This is not a compound-specific analysis and is affected by, among other influences, climate (e.g., temperature and humidity), soil type and conditions, instrument calibration and operation, and type of contamination present.

At V1 the hole was initially extended to 30 inches below ground surface (bgs) where refusal was encountered. Another hole was hand-augered 6-inches away from the first hole. At 33 inches the OVM-PID reading measured 129 parts per million (ppm). At 36 inches bgs the soil became very hard and the OVM-PID reading measured 262 ppm. The soil sample at V1-3(2) was collected at 36 inches bgs, the same depth as sample V1-3'.

At V2 the hole was initially extended to 43 inches bgs where a refusal was encountered. Another hole was hand augered about 7 inches away from the first hole. At 45 inches bgs the soil became very hard and the OVM-PID reading measured 123 ppm. The soil sample at V2-4(2) was collected at 46 inches bgs, approximately at the same depth as V2-4'.

Soil samples were collected in 4-ounce laboratory grade glass jars, labeled, sealed, and placed in a chilled cooler. The samples were transported under chain-of-custody protocol to CCI Analytical Laboratories, Inc. (CCI) in Everett, Washington.

Chemical Analysis

CCI received the samples in good condition on the same day they were collected. The laboratory report is included as **Attachment A**. Both samples were analyzed by the following methods:

- Total petroleum hydrocarbons as diesel and oil by Northwest Method NWTPH-Dx.
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Method 8021.

- Polycyclic aromatic hydrocarbons (PAH) by EPA Method 8270. Selective ion monitoring (SIM) was used with this method in order to achieve lower detection limits that would otherwise not be possible.
- Volatile petroleum hydrocarbons by WDOE-VPH.
- Extractable petroleum hydrocarbons by WDOE-EPH.

Chemical Results and Evaluation

Chemical results from the current testing are summarized in **Tables 1** and **2**. For comparison purposes, chemical results from the prior testing conducted during the UST closure assessment are also summarized in **Table 2**. V1-3(2) contained 1,000 mg/kg diesel-range petroleum hydrocarbons and 200 mg/kg oil-range petroleum hydrocarbons, as compared to V1-3' which contained 4,800 mg/kg diesel (oil was not detected). V2-4 (2) contained 880 mg/kg diesel and 250 mg/kg oil, as compared to V2-4' which contained 11,000 mg/kg diesel (oil was not detected). Low levels of PAH were detected in both samples. BETX were not detected in either sample.

Data Evaluation

CDM used Ecology's MTCATPH Workbook, Version MTCATPH10 to calculate cleanup levels based on human health risk. Copies of CDM's calculation work sheets are provided in **Attachment B**. Both soil samples passed Method B risk criteria for petroleum hydrocarbons based on unrestricted land use and industrial land use. The samples did not pass the criteria based on groundwater protection. They fail due to benzene even though benzene was not detected in the soil samples. This is because one-half the detection limit for benzene was used in the model. Even so, as stated previously, cleanup levels based on groundwater protection are not applicable because shallow groundwater is not present at the site and the aquifer is over 100 below ground surface and is separated from the contamination by over 55 feet of very dense glacial till.

The data from both samples were used to calculate cleanup levels based on direct contact for both unrestricted land use (Method B) and restricted land use (Method C) as summarized below.

Soil Cleanup Level - Direct Contact	V1-3(2) (mg/kg)	V2-4(2) (mg/kg)
Unrestricted Land Use	3,100	3,700
Restricted Land Use	38,600	45,900

Hydrocarbon concentrations during the resampling effort were significantly less than the calculated Method B cleanup levels. Both samples V1-3' and V2-4' collected during the UST closure assessment exceeded the Method B cleanup levels and one other sample (GP6-4' at 3,600 mg/kg) fell between the two Method B cleanup levels established above. None of the samples exceed Method C cleanup levels. The difference between hydrocarbon concentrations observed during the tank closure versus the current samples can be explained by the methods in which the samples were collected. During the tank closure, the samples were collected at the base of the excavation, essentially at the fill/till interface where the free phase product had accumulated and could not migrate vertically due to the density of the till. The recent samples were also collected from this fill/till interface, but sample interval was probably slightly thicker - about 6 inches. This indicates the residual hydrocarbon contaminated layer is very thin.

Conclusion

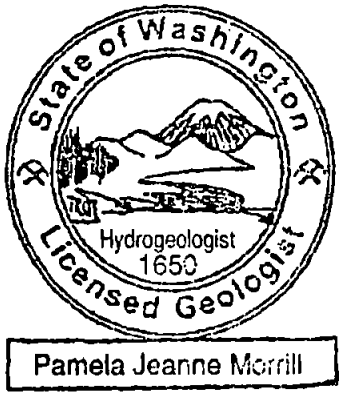
Current sampling indicates that residual petroleum hydrocarbon contamination does not exceed Method B risk criteria for petroleum hydrocarbons based on unrestricted land use. Therefore, we conclude that this site presents no significant risk to human health and the environment.

If you have any questions regarding this project, please feel free to call.

Very truly yours,

Pamela J. Morrill, CHMM, LG, LHG
Project Manager

Patrick Evans, PhD
Principal
Camp Dresser & McKee Inc.



Attachments

cc: Mr. Dale Topham, Snohomish Co. Public Works Dept.
Mr. Noel Wood, Dept. of Ecology
Ms. Michelle Allen, Dept. of Ecology

Table 1
Petroleum Hydrocarbon Analyses of V1-3(2) and V2-4(2)
Building 207 UST Closure Assessment
Paine Field
Snohomish County, Washington

Analyte	Sample I.D. V1-3(2) mg/kg	V2-4(2) mg/kg
Benzene	<0.1	<0.1
Toluene	<0.2	<0.2
Ethylbenzene	<0.2	<0.2
Xylenes	<0.8	<0.8
Naphthalene	1.0	0.18
1-Methylnaphthalene	1.6	0.64
2-Methylnaphthalene	2.1	0.68
Acenaphthylene	0.03	<0.02
Acenaphthene	<0.02	<0.02
Fluorene	0.30	0.17
Phenanthrene	0.63	0.36
Anthracene	0.05	0.04
Fluoranthene	0.05	<0.02
Pyrene	0.03	<0.02
Benzo(a)anthracene	<0.02	<0.02
Chrysene	0.02	<0.02
Benzo(b)fluoranthene	<0.02	<0.02
Benzo(k)fluoranthene	0.02	<0.02
Benzo(a)pyrene	<0.02	<0.02
Indeno(1,2,3-cd)pyrene	<0.02	<0.02
Dibenz(a,h)anthracene	<0.02	<0.02
Benzo(g,h,i)perylene	0.09	<0.02
Volatile Petroleum Hydrocarbons		
C5-C6 Aliphatics	<5	<5
>C6-C8 Aliphatics	<5	<5
>C8-C10 Aliphatics	24	12
>C8-C10 Aromatics	15	7
Total Aliphatics	30	17
Total Aromatics	15	7
Hexane	<0.2	<0.2
Extractable Petroleum Hydrocarbons		
>C10-C12 Aliphatics	40	38
>C12-C16 Aliphatics	180	200
>C16-C21 Aliphatics	260	290
>C21-C34 Aliphatics	100	310
>C10-C12 Aromatics	14	9
>C12-C16 Aromatics	41	36
>C16-C21 Aromatics	120	150
>C21-C34 Aromatics	90	92
Total Aliphatics	580	840
Total Aromatics	270	290

Notes:
mg/kg - milligrams per kilogram.
< - analyte not detected at or greater than the listed concentration.

Table 2
Analytical Summary - Residual Total Petroleum Hydrocarbons in Soil
Building 207 UST Closure Assessment
Paine Field
Snohomish County, Washington

Sample ID	Sample Location	Sample Depth (ft bgs)	HCID			NWTPH-Dx	
			Gas	Diesel	Oil	Diesel (mg/kg)	Lube Oil
UST Excavation							
SSW-5 1/2'	South sidewall - nurse tank	5.5	--	--	--	ND	
WSW-4'	West sidewall - nurse tank	4	--	--	--	76	97
NWSW-5-1/2'	North sidewall nurse tank, northwest sidewall main tank	5.5	--	--	--	ND	
WB-11'	Bottom - nurse tank/west end bottom of main tank	11	--	--	--	540	
WW-5'	North sidewall main tank, under product lines (resample, NSW-5')	5	--	--	--	26	57
NB-9'	North side of main tank, base of excavation	9	--	--	--	ND	ND
NSWV-5'	Northeast sidewall of main tank, under vent line.	5	--	--	--	ND	ND
WSW-8'	East end of main tank, base of excavation	8	--	--	--	140	55
WSW-5 1/2'	East sidewall of the main tank	5.5	--	--	--	360	220
Vent Line Excavation							
V1-3'	Under vent line	3	--	--	--	4,800	ND
V1-3 (2)	Resample on 2/10/04	3	--	--	--	1,000	200
V2-4'	Under storm-sewer line	4	--	--	--	11,000	ND
V2-4' (2)	Resample on 2/10/04	4	--	--	--	880	250
Stockpiles							
SPE	East side of stockpile		--	--	--	ND	
SPNE	Northeast side of stockpile		--	--	--	110	430
SPNW	Northwest side of stockpile		--	--	--	120	200
SPW	West side of stockpile		--	--	--	65	ND

Table 2
Analytical Summary - Residual Total Petroleum Hydrocarbons in Soil
Building 207 UST Closure Assessment
Paine Field
Snohomish County, Washington

Sample ID	Sample Location	Sample Depth (ft bgs)	HCID			NWTPH-Dx	
			Gas	Diesel	Oil	Diesel (mg/kg)	Lube Oil (mg/kg)
Test Hole Investigation							
GP1-4.5'	Inside boiler room, next to sump	4.5	--	--	--	ND	ND
GP2-2.5'	Inside boiler room, near product lines	2.5	--	--	--	ND	ND
GP2-4'	Inside boiler room, near product lines	4	--	--	--	ND J	ND J
GP3-2'	Inside boiler room, next to sump	2	--	--	--	ND	ND
GP4-2'	Inside boiler room, out from sump	2	--	--	--	ND	ND
GP5-2.5'	Between sewer and storm-sewer line.	2.5	--	--	--	ND	ND
GP5-5'	Between sewer and storm-sewer line.	5	--	--	--	73	53
GP6-4'	Next to storm-sewer run from boiler room.	4	--	--	--	3,600	ND
GP7-4'	Next to sewer line and product lines	4	--	--	--	44	330
GP8-2.5'	East of vent line	2.5	--	--	--	170	ND
GP9-4'	Next to main UST	4	--	--	--	ND	ND
GP10-3'	Farther east of vent line	3	--	--	--	ND	ND
GP11-3.5'	Between sewer and storm-sewer line.	3.5	--	--	--	ND	ND
Reporting Limit			20	50	100	25	50
Cleanup Level [a]						2,000	2,000

Notes:
a) Washington Administrative Code Chapter 173-340, Model Toxics Control Act Cleanup Regulation, Method A suggested soil cleanup level for unrestricted land uses; promulgated August 15, 2001.

Boxed value - method cleanup level exceeded.
mg/kg - milligram per kilogram.
ft bgs - feet below ground surface.
-- not analyzed.
J - estimated concentration. Sample was analyzed out of holding time.
D - detected.
ND - not detected.

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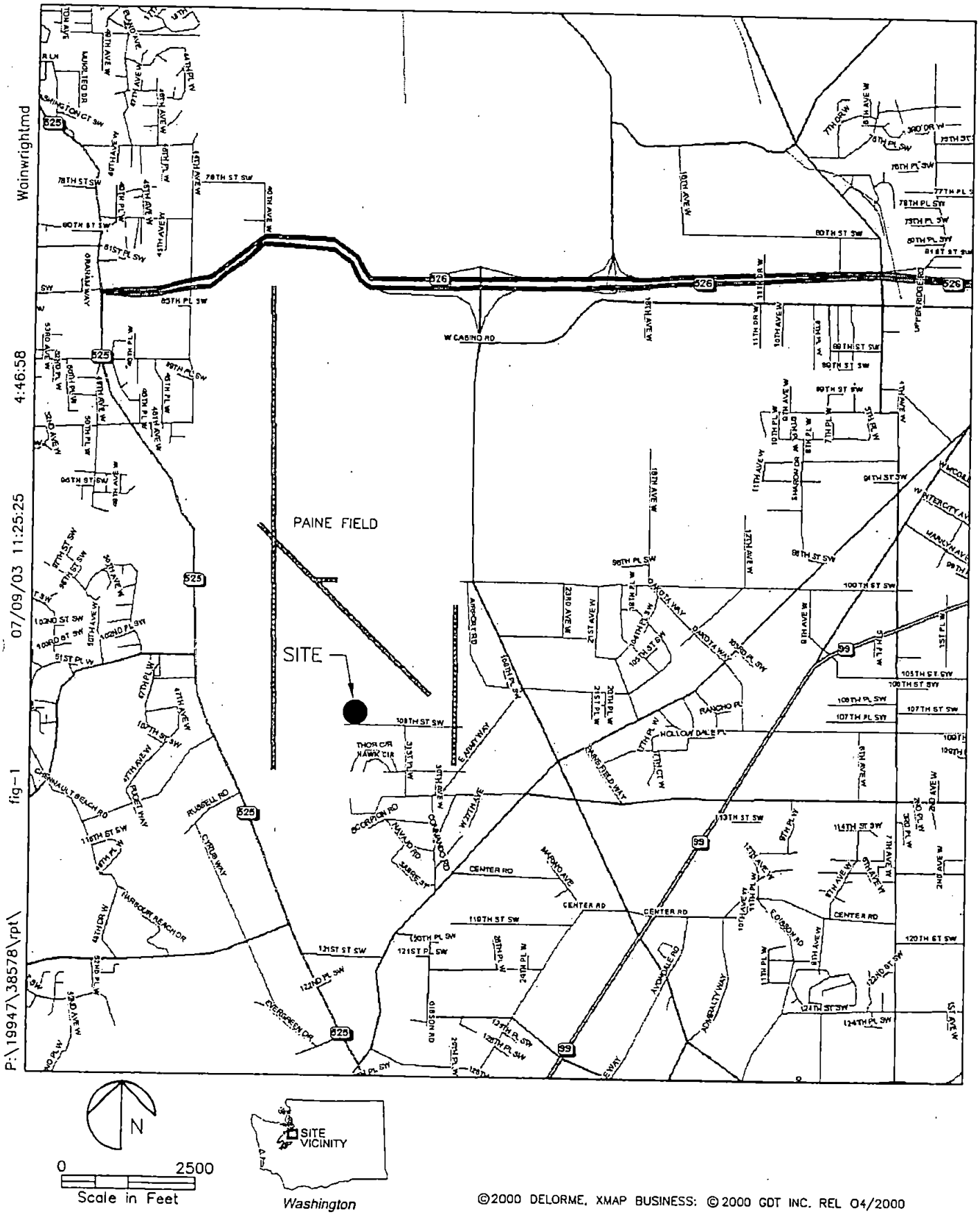
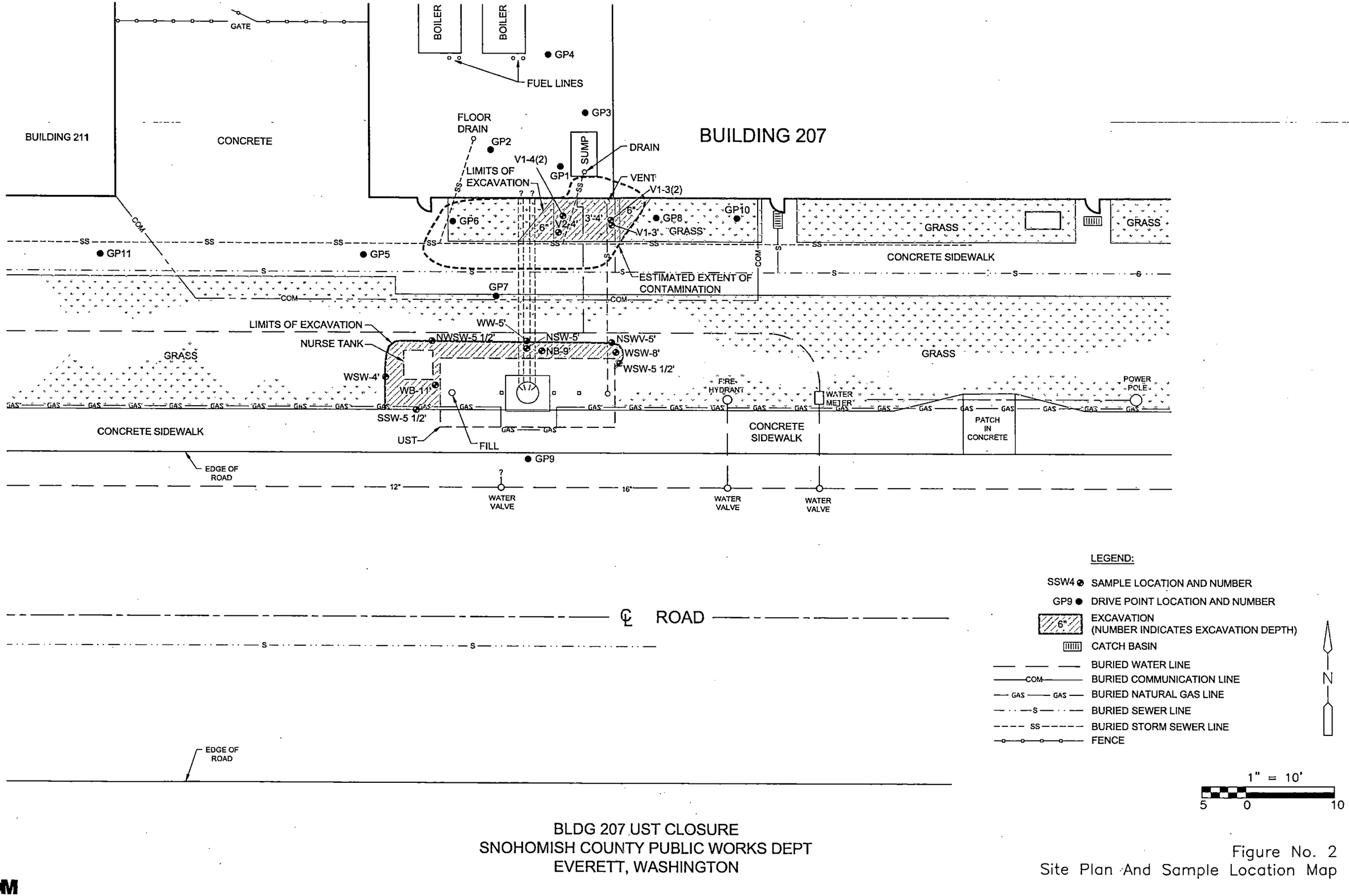


BLDG 207 UST CLOSURE
SNOHOMISH COUNTY PUBLIC WORKS DEPT
EVERETT, WASHINGTON

CDM

Figure No. 1
Vicinity Map



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BLDG 207 UST CLOSURE
SNOHOMISH COUNTY PUBLIC WORKS DEPT
EVERETT, WASHINGTON

CDM

Figure No. 2
Site Plan And Sample Location Map

CDM

Attachment A
Analytical Report

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
CCIL JOB #: 402034
CCIL SAMPLE #: 1
DATE RECEIVED: 2/10/04
WDOE ACCREDITATION #: C142

CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: V2-4(2) 2/10/04 1130

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
BENZENE	EPA-8021	ND(<0.1)	MG/KG	2/11/04	LAH
TOLUENE	EPA-8021	ND(<0.2)	MG/KG	2/11/04	LAH
ETHYLBENZENE	EPA-8021	ND(<0.2)	MG/KG	2/11/04	LAH
XYLENES	EPA-8021	ND(<0.8)	MG/KG	2/11/04	LAH
TPH-DIESEL RANGE	NWTPH-DX	880	MG/KG	2/11/04	DLC
TPH-LUBE OIL RANGE	NWTPH-DX	250	MG/KG	2/11/04	DLC
NAPHTHALENE	EPA-8270 SIM	0.18	MG/KG	2/13/04	CCN
1-METHYLNAPHTHALENE	EPA-8270 SIM	0.64	MG/KG	2/13/04	CCN
2-METHYLNAPHTHALENE	EPA-8270 SIM	0.68	MG/KG	2/13/04	CCN
ACENAPHTHYLENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
ACENAPHTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
FLUORENE	EPA-8270 SIM	0.17	MG/KG	2/13/04	CCN
PHENANTHRENE	EPA-8270 SIM	0.36	MG/KG	2/13/04	CCN
ANTHRACENE	EPA-8270 SIM	0.04	MG/KG	2/13/04	CCN
FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[A]ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
CHRYSENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[B]FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[K]FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO(A)PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
INDENO[1,2,3-CD]PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
DIBENZ[A,H]ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[G,H,I]PERYLENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN

NOTE: CHROMATOGRAM INDICATES SAMPLE CONTAINS PRODUCTS WHICH ARE LIKELY DIESEL FUEL AND LIGHT OIL

* "ND" INDICATES ANALYTE ANALYZED FOR BUT NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES OR AS FOLLOWS:
DIESEL RANGE REPORTING LIMIT IS 25 MG/KG
LUBE OIL RANGE REPORTING LIMIT IS 50 MG/KG

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY:

8620 Holly Drive • Everett, WA 98208 • 425 356-2600 • FAX 425 356-2626 • Seattle 206 292-9059

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CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: V2-4(2) 2/10/04 1130

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	REPORTING LIMIT	ANALYSIS DATE
VOLATILE PETROLEUM HYDROCARBONS					
C5-C6 ALIPHATICS	WDOE-VPH	U	MG/KG	5	2/18/04
>C6-C8 ALIPHATICS	WDOE-VPH	U	MG/KG	5	2/18/04
>C8-C10 ALIPHATICS	WDOE-VPH	12	MG/KG	5	2/18/04
>C8-C10 AROMATICS	WDOE-VPH	7	MG/KG	5	2/18/04
TOTAL ALIPHATICS		17	MG/KG	8	
TOTAL AROMATICS		7	MG/KG	3	
HEXANE	EPA-8021	U	MG/KG	0.2	2/18/04

SURROGATES	% RECOVERY
TFT (ALIPHATIC ANALYSIS)	99
TFT (AROMATIC ANALYSIS)	95

NOTE: TOTAL ALIPHATICS AND AROMATICS ARE BASED ON EC RANGE "U" RESULTS SUMMED AT 1/2 OF RPT LIMIT

* "U" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT
** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: CVM

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CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: V2-4(2) 2/10/04 1130

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	REPORTING LIMIT	ANALYSIS DATE
EXTRACTABLE PETROLEUM HYDROCARBONS					
>C10-C12 ALIPHATICS	WDOE-EPH	38	MG/KG	5	2/18/04
>C12-C16 ALIPHATICS	WDOE-EPH	200	MG/KG	5	2/18/04
>C16-C21 ALIPHATICS	WDOE-EPH	290	MG/KG	5	2/18/04
>C21-C34 ALIPHATICS	WDOE-EPH	310	MG/KG	5	2/18/04
>C10-C12 AROMATICS	WDOE-EPH	9	MG/KG	5	2/18/04
>C12-C16 AROMATICS	WDOE-EPH	36	MG/KG	5	2/18/04
>C16-C21 AROMATICS	WDOE-EPH	150	MG/KG	5	2/18/04
>C21-C34 AROMATICS	WDOE-EPH	92	MG/KG	5	2/18/04
TOTAL ALIPHATICS		840	MG/KG	10	
TOTAL AROMATICS		290	MG/KG	10	

SURROGATES	% RECOVERY
PENTACOSANE(C25)	81
P-TERPHENYL	69

NOTE: TOTAL ALIPHATICS AND AROMATICS ARE BASED ON EC RANGE "U" RESULTS SUMMED AT 1/2 OF REPORTING LIMIT

* "U" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: CVL

8620 Holly Drive • Everett, WA 98208 • 425 356-2600 • FAX 425 356-2626 • Seattle 206 292-9059

CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
CCIL JOB #: 402034
CCIL SAMPLE #: 2
DATE RECEIVED: 2/10/04
WDOE ACCREDITATION #: C142

CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: V1-3(2) 2/10/04 1030

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
BENZENE	EPA-8021	ND(<0.1)	MG/KG	2/11/04	LAH
TOLUENE	EPA-8021	ND(<0.2)	MG/KG	2/11/04	LAH
ETHYLBENZENE	EPA-8021	ND(<0.2)	MG/KG	2/11/04	LAH
XYLENES	EPA-8021	ND(<0.8)	MG/KG	2/11/04	LAH
TPH-DIESEL RANGE	NWTPH-DX	1000	MG/KG	2/11/04	DLC
TPH-LUBE OIL RANGE	NWTPH-DX	200	MG/KG	2/11/04	DLC
NAPHTHALENE	EPA-8270 SIM	1.0	MG/KG	2/13/04	CCN
1-METHYLNAPHTHALENE	EPA-8270 SIM	1.6	MG/KG	2/13/04	CCN
2-METHYLNAPHTHALENE	EPA-8270 SIM	2.1	MG/KG	2/13/04	CCN
ACENAPHTHYLENE	EPA-8270 SIM	0.03	MG/KG	2/13/04	CCN
ACENAPHTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
FLUORENE	EPA-8270 SIM	0.30	MG/KG	2/13/04	CCN
PHENANTHRENE	EPA-8270 SIM	0.63	MG/KG	2/13/04	CCN
ANTHRACENE	EPA-8270 SIM	0.05	MG/KG	2/13/04	CCN
FLUORANTHENE	EPA-8270 SIM	0.05	MG/KG	2/13/04	CCN
PYRENE	EPA-8270 SIM	0.03	MG/KG	2/13/04	CCN
BENZO[A]ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
CHRYSENE	EPA-8270 SIM	0.02	MG/KG	2/13/04	CCN
BENZO[B]FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[K]FLUORANTHENE	EPA-8270 SIM	0.02	MG/KG	2/13/04	CCN
BENZO(A)PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
INDENO[1,2,3-CD]PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
DIBENZ[A,H]ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[G,H,I]PERYLENE	EPA-8270 SIM	0.09	MG/KG	2/13/04	CCN

NOTE: CHROMATOGRAM INDICATES SAMPLE CONTAINS PRODUCTS WHICH ARE LIKELY DIESEL FUEL AND LUBE OIL

* "ND" INDICATES ANALYTE ANALYZED FOR BUT NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES OR AS FOLLOWS:
DIESEL RANGE REPORTING LIMIT IS 25 MG/KG
LUBE OIL RANGE REPORTING LIMIT IS 50 MG/KG

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

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CCI
ANALYTICAL
LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
CCIL JOB #: 402034
CCIL SAMPLE #: 2
DATE RECEIVED: 2/10/04
WDOE ACCREDITATION #: C142

CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: V1-3(2) 2/10/04 1030

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	REPORTING LIMIT	ANALYSIS DATE
VOLATILE PETROLEUM HYDROCARBONS					
C5-C6 ALIPHATICS	WDOE-VPH	U	MG/KG	5	2/18/04
>C6-C8 ALIPHATICS	WDOE-VPH	U	MG/KG	5	2/18/04
>C8-C10 ALIPHATICS	WDOE-VPH	24	MG/KG	5	2/18/04
>C8-C10 AROMATICS	WDOE-VPH	15	MG/KG	5	2/18/04
TOTAL ALIPHATICS		30	MG/KG	8	
TOTAL AROMATICS		15	MG/KG	3	
HEXANE	EPA-8021	U	MG/KG	0.2	2/18/04

SURROGATES	% RECOVERY
TFT (ALIPHATIC ANALYSIS)	89
TFT (AROMATIC ANALYSIS)	83

NOTE: TOTAL ALIPHATICS AND AROMATICS ARE BASED ON EC RANGE "U" RESULTS SUMMED AT 1/2 OF RPT LIMIT

* "U" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT
** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY:

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CCI
ANALYTICAL
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CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
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DATE RECEIVED: 2/10/04
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CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: V1-3(2) 2/10/04 1030

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	REPORTING LIMIT	ANALYSIS DATE
EXTRACTABLE PETROLEUM HYDROCARBONS					
>C10-C12 ALIPHATICS	WDOE-EPH	40	MG/KG	5	2/18/04
>C12-C16 ALIPHATICS	WDOE-EPH	180	MG/KG	5	2/18/04
>C16-C21 ALIPHATICS	WDOE-EPH	260	MG/KG	5	2/18/04
>C21-C34 ALIPHATICS	WDOE-EPH	100	MG/KG	5	2/18/04
>C10-C12 AROMATICS	WDOE-EPH	14	MG/KG	5	2/18/04
>C12-C16 AROMATICS	WDOE-EPH	41	MG/KG	5	2/18/04
>C16-C21 AROMATICS	WDOE-EPH	120	MG/KG	5	2/18/04
>C21-C34 AROMATICS	WDOE-EPH	90	MG/KG	5	2/18/04
TOTAL ALIPHATICS		580	MG/KG	10	
TOTAL AROMATICS		270	MG/KG	10	

SURROGATES	% RECOVERY
PENTACOSANE(C25)	74
P-TERPHENYL	51

NOTE: TOTAL ALIPHATICS AND AROMATICS ARE BASED ON EC RANGE "U" RESULTS SUMMED AT 1/2 OF REPORTING LIMIT

* "U" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: CWL

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CCI
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LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
CCIL JOB #: 402034

DATE RECEIVED: 2/10/04
WDOE ACCREDITATION #: C142

CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788

QUALITY CONTROL RESULTS

SURROGATE RECOVERY

CCIL SAMPLE ID	ANALYTE	SUR ID	% RECV
402034-01	EPA-8021	TFT	116
402034-01	NWTPH-DX	C25	116
402034-01	EPA-8270 SIM	TERPHENYL-d14	70
402034-02	EPA-8021	TFT	103
402034-02	NWTPH-DX	C25	122
402034-02	EPA-8270 SIM	TERPHENYL-d14	66

BLANK AND DUPLICATE RESULTS

METHOD	BLK RESULT	ASSOC SMPLS	DUP RESULT	ORIG RESULT	%RPD	ASSOC SMPLS
EPA-8021(BENZENE)	ND(<0.03)	402034-01, 02	ND(<0.03)	ND(<0.03)	****	SAME
EPA-8021(TOLUENE)	ND(<0.05)	402034-01, 02	ND(<0.05)	ND(<0.05)	****	SAME
EPA-8021(ETHYLBENZ)	ND(<0.05)	402034-01, 02	ND(<0.05)	ND(<0.05)	****	SAME
EPA-8021(XYLENE)	ND(<0.2)	402034-01, 02	ND(<0.2)	ND(<0.2)	****	SAME
NWTPH-DX (DSL)	ND(<25)	402034-01, 02	ND(<25)	ND(<25)	****	SAME
NWTPH-DX (OIL)	ND(<50)	402034-01, 02	ND(<50)	ND(<50)	****	SAME
WDOE-VPH HEXANE	ND(<0.2)	402034-01, 02	ND(<0.2)	ND(<0.2)	****	SAME
WDOE-VPH C5-C6 ALIPHATICS	ND(<5)	402034-01, 02	ND(<5)	ND(<5)	****	SAME
WDOE-VPH >C6-C8 ALIPHATICS	ND(<5)	402034-01, 02	ND(<5)	ND(<5)	****	SAME
WDOE-VPH >C8-C10 ALIPHATICS	ND(<5)	402034-01, 02	16	17	6	SAME
WDOE-VPH >C8-C10 AROMATICS	ND(<5)	402034-01, 02	12	12	****	SAME
WDOE-EPH >C10-C12 ALIPHATICS	ND(<5)	402034-01, 02	140	150	7	SAME
WDOE-EPH >C12-C16 ALIPHATICS	ND(<5)	402034-01, 02	930	1100	17	SAME
WDOE-EPH >C16-C21 ALIPHATICS	ND(<5)	402034-01, 02	810	970	18	SAME
WDOE-EPH >C21-C34 ALIPHATICS	ND(<5)	402034-01, 02	76	82	8	SAME
WDOE-EPH >C10-C12 AROMATICS	ND(<5)	402034-01, 02	8	9	****	SAME
WDOE-EPH >C12-C16 AROMATICS	ND(<5)	402034-01, 02	77	88	13	SAME
WDOE-EPH >C16-C21 AROMATICS	ND(<5)	402034-01, 02	410	510	21	SAME
WDOE-EPH >C21-C34 AROMATICS	ND(<5)	402034-01, 02	62	79	24	SAME
EPA-8270 SIM	SEE BLANK REPORT					

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CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
CCIL JOB #: 402034

DATE RECEIVED: 2/10/04
WDOE ACCREDITATION #: C142

CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788

QUALITY CONTROL RESULTS

SPIKE/ SPIKE DUPLICATE RESULTS

METHOD	SPIKE ID	ASSOCIATED SAMPLES	% SPIKE RECOVERY	% SPIKE DUP RECOVERY	REL % DIFF
EPA-8021	BENZENE	402034-01, 02	93	N/A	N/A
EPA-8021	TOLUENE	402034-01, 02	97	N/A	N/A
EPA-8021	ETHYLBENZENE	402034-01, 02	97	N/A	N/A
EPA-8021	XYLENE	402034-01, 02	96	N/A	N/A
NWTPH-DX	DIESEL	402034-01, 02	84	N/A	N/A
WDOE-VPH HEXANE	HEXANE	402034-01, 02	56*	N/A	N/A
WDOE-VPH C5-C6 ALIPHATICS	HEXANE	402034-01, 02	47*	N/A	N/A
WDOE-VPH >C6-C8 ALIPHATICS	OCTANE	402034-01, 02	102	N/A	N/A
WDOE-VPH >C8-C10 ALIPHATICS	DECANE	402034-01, 02	126	N/A	N/A
WDOE-VPH C8-C10 AROMATICS	TRIMETHYLBENZENE	402034-01, 02	106	N/A	N/A
WDOE-EPH >C10-C12 ALIPHATICS	DODECANE	402034-01, 02	102	N/A	N/A
WDOE-EPH >C12-C16 ALIPHATICS	HEXADECANE	402034-01, 02	104	N/A	N/A
WDOE-EPH >C16-C21 ALIPHATICS	HENEICOSANE	402034-01, 02	103	N/A	N/A
WDOE-EPH >C21-C34 ALIPHATICS	TETRATRIACONTANE	402034-01, 02	84	N/A	N/A
WDOE-EPH >C10-C12 AROMATICS	NAPHTHALENE	402034-01, 02	76	N/A	N/A
WDOE-EPH >C12-C16 AROMATICS	ACENAPHTHENE	402034-01, 02	73	N/A	N/A
WDOE-EPH >C16-C21 AROMATICS	PYRENE	402034-01, 02	80	N/A	N/A
WDOE-EPH >C21-C34 AROMATICS	BENZO(G,H,I)PERYLENE	402034-01, 02	71	N/A	N/A
EPA-8270 SIM	NAPHTHALENE	402034-01, 02	91	88	3
EPA-8270 SIM	ACENAPHTHENE	402034-01, 02	115	104	11
EPA-8270 SIM	PYRENE	402034-01, 02	71	69	3
EPA-8270 SIM	BENZO[g,h,I]PERYLENE	402034-01, 02	106	101	5

* SPIKE RECOVERY OUTSIDE OF CONTROL LIMITS OF 70-130% DUE TO SAMPLE INTERFERENCE
**** %RPD NOT REPORTED FOR VALUES <X5 THE REPORTING LIMIT

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LABORATORIES, INC.

CERTIFICATE OF ANALYSIS

CLIENT: CDM
11811 N.E. FIRST ST., SUITE 201
BELLEVUE, WA 98005

DATE: 2/24/04
CCIL JOB #: 402034
CCIL SAMPLE #: BLK
DATE RECEIVED: 2/10/04
WDOE ACCREDITATION #: C142

CLIENT CONTACT: PAM MORRILL

CLIENT PROJECT ID: 19947-41788
CLIENT SAMPLE ID: METHOD BLANK FOR EPA-8270 SIM

DATA RESULTS

ANALYTE	METHOD	RESULTS*	UNITS**	ANALYSIS DATE	ANALYSIS BY
NAPHTHALENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
1-METHYLNAPHTHALENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
2-METHYLNAPHTHALENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
ACENAPHTHYLENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
ACENAPHTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
FLUORENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
PHENANTHRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[A]ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
CHRYSENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[B]FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[K]FLUORANTHENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO(A)PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
INDENO[1,2,3-CD]PYRENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
DIBENZ[A,H]ANTHRACENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN
BENZO[G,H,I]PERYLENE	EPA-8270 SIM	ND(<0.02)	MG/KG	2/13/04	CCN

* "ND" INDICATES ANALYTE NOT DETECTED AT LEVEL ABOVE REPORTING LIMIT. REPORTING LIMIT IS GIVEN IN PARENTHESES

** UNITS FOR ALL NON LIQUID SAMPLES ARE REPORTED ON A DRY WEIGHT BASIS

APPROVED BY: CN

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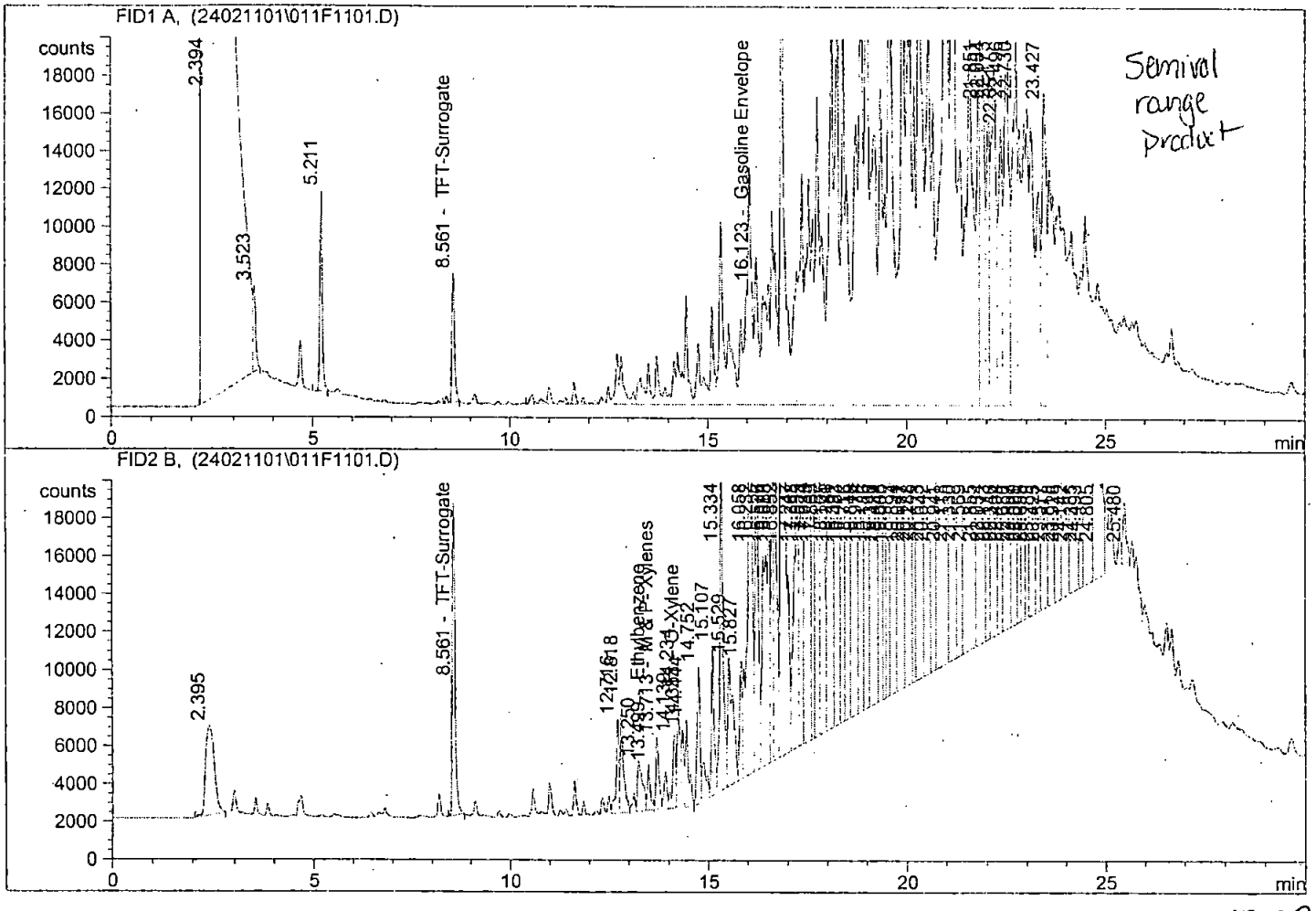
Gas/BTEX Instrument 2
Data File: C:\HPCHEM\2\DATA\24021101\011F1101.D
Injection Date & Time: 2/11/2004 3:42:24 PM
Report Created on: 2/11/2004 5:01:18 PM
Operator: LAH
Aquistion Method: GBTX1003.M
Analysis Method: C:\HPCHEM\2\METHODS\GBTX1003.M

FID1 A equivalent to FID analysis.
FID2 B equivalent to PID analysis.

Sample Name:402034-1 RR 25UL



13.30g

Ret. Time	Compound Name	Area	Amount ug/L
8.561	TFT-Surrogate	33641.980	2.503
16.123	Gasoline Envelope	4.744e+006	652.199

X4=10.012 = 100*100 = 100%

not detected

$$Gas < 50\,ug/L \times \frac{5mL}{0.025} \times \frac{0.01L}{13.30} < 10\,mg/kg$$

Ret. Time	Compound Name	Area	Amount ug/L
0.000	MTBE	0.000	0.000
0.000	Benzene	0.000	0.000
8.561	TFT-Surrogate	80087.055	2.907
0.000	Toluene	0.000	0.000
13.499	Ethylbenzene	12040.090	0.204
13.713	M & P- Xylenes	20099.309	0.000
14.353	O-Xylene	15869.196	0.191

116%

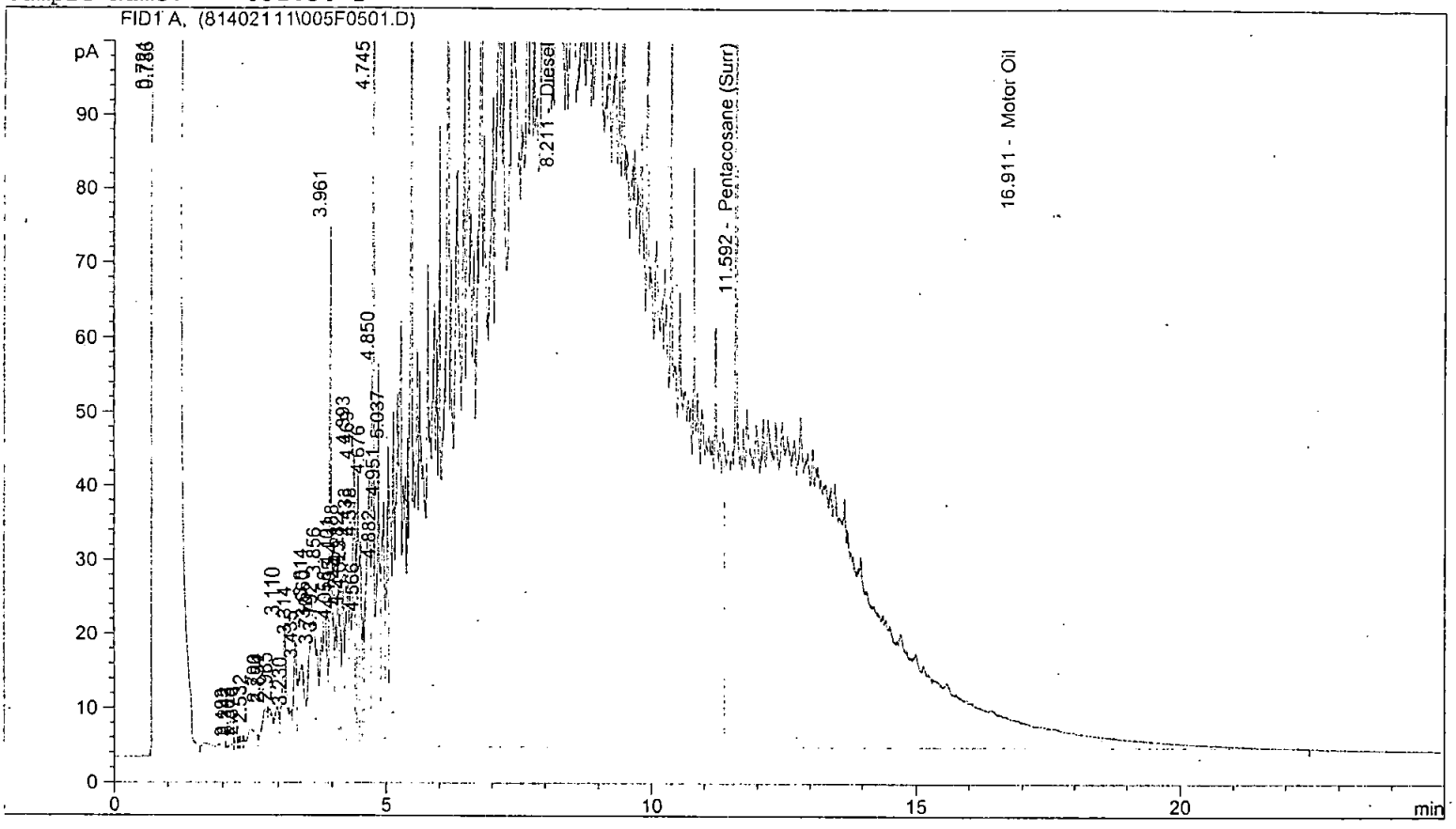
RECEIVED BY 21604

B <0.03 ~~4~~ <0.1 mg/kg T, E <0.2 mg/kg X <0.8 mg/kg

2-12-04 LH

Instrument #81 Data File: C:\HPCHEM\1\DATA\81402111\005F0501.D
Operator: DC
Method: C:\HPCHEM\1\METHODS\FDMO0603.M
Injection Date & Time: 2/11/04 10:21:10 AM 2/11/04 10:21:10 AM
Report Creation: 2/11/04 12:38:42 PM

Sample Name: 402034-1



Ret. Time	Signal	Compound Name	Response	Amount ug/mL
8.211	FID1 A,	Diesel	28638.428	2144.872
11.592		Pentacosane (Surr)	150.333	11.614 116 %
16.911		Motor Oil	7862.743	618.553

$D = 2144.872\ \mu g/mL \times \frac{10\ mL}{24.42\ g} = 880\ mg/kg$

Diesel Fuel

$MO = 618.553\ \mu g/mL \times \frac{10\ mL}{24.42\ g} = 250\ mg/kg$

Light oil

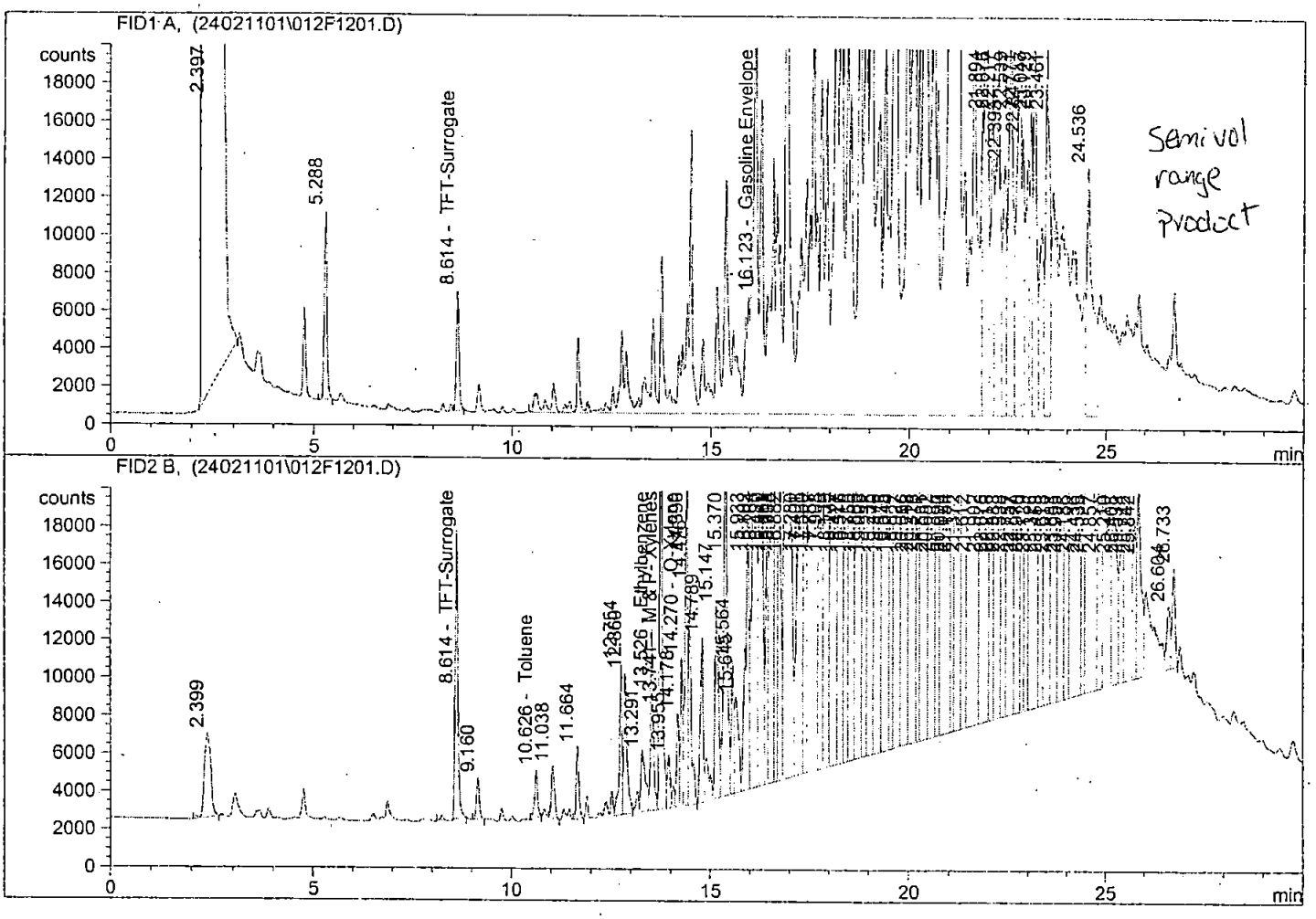
2-11-04 DC

[illegible] BY 2/6/04

Gas/BTEX . Instrument 2
Data File: C:\HPCHEM\2\DATA\24021101\012F1201.D
Injection Date & Time: 2/11/2004 4:18:35 PM
Report Created on: 2/11/2004 5:01:42 PM
Operator: LAH
Aquistion Method: GBTX1003.M
Analysis Method: C:\HPCHEM\2\METHODS\GBTX1003.M

FID1 A equivalent to FID analysis.
FID2 B equivalent to PID analysis.

Sample Name:402034-2 RR 25UL



Ret. Time	Compound Name	Area	Amount ug/L
8.614	TFT-Surrogate	29023.205	2.159
16.123	Gasoline Envelope	5.920e+006	821.572

13.07g

2.159 x 4 = 8.636 ÷ 10 x 100 = 86%

Gas < 10mg/kg

Not needed

REVIEWED BY
DATE 2-6-04

Ret. Time	Compound Name	Area	Amount ug/L
0.000	MTBE	0.000	0.000
0.000	Benzene	0.000	0.000
8.614	TFT-Surrogate	70980.422	2.584
10.626	Toluene	13240.652	0.262
13.526	Ethylbenzene	43044.035	0.665
13.741	M & P- Xylenes	113463.703	0.986
14.270	O-Xylene	31516.328	0.379

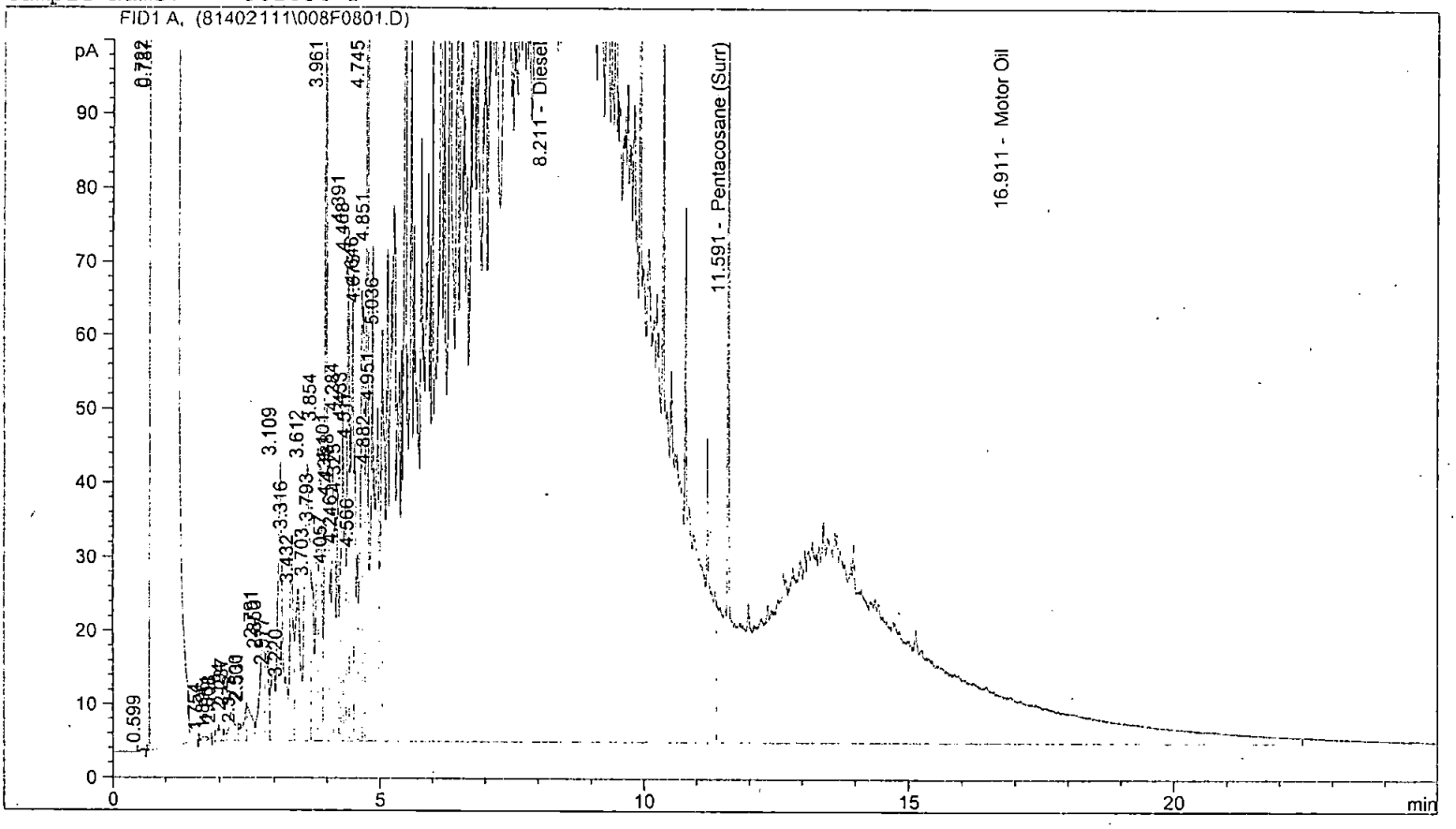
103%

B<0.1mg/kg T,E<0.2mg/kg X<0.8mg/kg

2-12-04LH

Instrument #81 Data File: C:\HPCHEM\1\DATA\81402111\008F0801.D
Operator: DC
Method: C:\HPCHEM\1\METHODS\FDM00603.M
Injection Date & Time: 2/11/04 11:52:18 AM 2/11/04 11:52:18 AM
Report Creation: 2/11/04 12:54:48 PM

Sample Name: 402034-2



Ret. Time	Signal	Compound Name	Response	Amount ug/mL
8.211	FID1 A,	Diesel	32014.160	2395.276
11.591		Pentacosane (Surr)	159.277	12.184 122%
16.911		Motor Oil	6256.702	482.859

$D = 2395.276\ \mu g/mL \times \frac{10mL}{23.89g} = 1000\ mg/kg$

Diesel fuel

$MO = 482.859\ \mu g/mL \times \frac{10mL}{23.89g} = 200\ mg/kg$

Lube oil

2-11-04 DC

REVIEWED BY
DATE 2/6/04

CCI Analytical Laboratories, Inc.
8620 Holly Drive
Everett, WA 98208
Phone (425) 356-2600
(206) 292-9059 Seattle
(425) 356-2626 Fax
http://www.ccilabs.com

Chain Of Custody/ Laboratory Analysis Request

CCI Job# (Laboratory Use Only): 460034

Date 2/10/04 Page 1 Of 1

PROJECT ID: 1993-4066
REPORT TO COMPANY: CDM
PROJECT MANAGER: Pam Morrill
ADDRESS: 11811 NE 1ST, Ste 201
Bellevue, WA 98005
PHONE: 425-453-8383 FAX: 425-646-9523
P.O. NUMBER: - E-MAIL: -
INVOICE TO COMPANY: CDM
ATTENTION: Pam Morrill
ADDRESS:

SAMPLE I.D.	DATE	TIME	TYPE	LAB#	NWTPH-HCID	NWTPH-DX	NWTPH-GX	BTEX by EPA-8021	MTBE by EPA-8021 ☐ EPA-8260 ☐	Halogenated Volatiles by EPA 8260	Volatile Organic Compounds by EPA 8260	Ethylene dibromide (EDB) by EPA-8260 ☐ EPA-504.1 ☐	1,2 Dichloroethene (EDC) by EPA-8260	Semivolatile Organic Compounds by EPA 8270	Polycyclic Aromatic Hydrocarbons (PAH) by EPA-8270 SIM ☐	PCB ☐ Pesticides ☐ by EPA 8081/8082	Metals-MTCA-5 ☐ RCRA-8 ☐ Pri Pol ☐ TAL ☐	Metals Other (Specify)	TCLP-Metals ☐ VOA ☐ Semi-Vol ☐ Pest ☐ Herbs ☐	OTHER (Specify)						NUMBER OF CONTAINERS	RECEIVED IN GOOD CONDITION?
																				VPH	EPH	PAH EPA 8270C w/ SIM						
1. VP-4(2)	2/10/04	1130	Soil	1		X		X												X	X	X					
2. VP-3(2)	2/10/04	1030	Soil	2		X		X												X	X	X					
3.																											
4.																											
5.																											
6.																											
7.																											
8.																											
9.																											
10.																											

REPORT COPY

SPECIAL INSTRUCTIONS

CCI Analytical Laboratories, Inc accepts and processes this request on the terms and conditions set forth on the reverse side. By its signature hereon, Customer accepts these terms and conditions.

SIGNATURES (Name, Company, Date, Time):

1. Relinquished By: [signature] CDM 2/10/04, 1250
   Received By: [signature] CCI 2-10-04 1250
2. Relinquished By: _____
   Received By: _____

TURNAROUND REQUESTED in Business Days*

Organic, Metals & Inorganic Analysis: (10 Standard) 5 3 2 1 SAME DAY

Fuels & Hydrocarbon Analysis: (5 Standard) 3 1 SAME DAY

OTHER: Specify: _____

* Turnaround request less than standard may incur Rush Charges

CDM

Attachment B
Worksheets for Calculating Method B Soil Cleanup Levels

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Status of Current Soil Risk

Soil Cleanup Levels: Worksheet for Data Entry

Refer to WAC 173-340-720, 740,745, 747, 750

Date: 03/15/04
Site Name: Building 207, Paine Field
Sample Name: V2-4(2)

1. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	2.5	0.22%
AL_EC >6-8	2.5	0.22%
AL_EC >8-10	12	1.04%
AL_EC >10-12	38	3.30%
AL_EC >12-16	200	17.37%
AL_EC >16-21	290	25.19%
AL_EC >21-34	310	26.93%
AR_EC >8-10	7	0.61%
AR_EC >10-12	9	0.78%
AR_EC >12-16	36	3.13%
AR_EC >16-21	150	13.03%
AR_EC >21-34	92	7.99%
Benzene	0.05	0.00%
Toluene	0.1	0.01%
Ethylbenzene	0.1	0.01%
Total Xylenes	0.4	0.03%
Total Naphthalenes	1.52	0.13%
n-Hexane	0	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.01	0.00%
Benzo(b)fluoranthene	0.01	0.00%
Benzo(k)fluoranthene	0.01	0.00%
Benzo(a)pyrene	0.01	0.00%
Chrysene	0.01	0.00%
Dibenzo(a,h)anthracene	0.01	0.00%
Indeno(1,2,3-cd)pyrene	0.01	0.00%
Sum	1151.24	100.00%

2. Enter Site-Specific Hydrogeological Data

Total soil porosity: default is 0.43	0.43	Unitless
Volumetric water content: default is 0.3	0.3	Unitless
Volumetric air content: default is 0.13	0.13	Unitless
Soil bulk density measured: default is 1.5	1.5	kg/l
Fraction Organic Carbon: default is 0.001	0.001	Unitless
Dilution Factor: default is 20	20	Unitless

Exposure Pathway		Pass or Fail?	HI	RISK
Soil Direct Contact	Unrestricted Land use			
	Industrial Land use			
Method B Potable Ground Water Protection				

Warning!!!
*Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required based on site-specific conditions and type of fuel (see WAC 173-340-7490~7494).
*Check Soil Residual Saturation Evaluation specified in WAC 173-340-747(10)

Note:

1. All data must be numeric values. Use of alphabetical characters (i.e., "ND", "NA", "<", ">", or "=") will cause an error.
2. Try to avoid double counting: The Petroleum Equivalent Carbon (EC) fractions include many individual substances that must be analyzed separately. When entering the concentration of petroleum EC fraction into the data entry cell, make sure you subtract the concentration of individual substances from the appropriate EC fraction. (See User's Guide)
3. For the values of soil measurement below the method detection limit, substitute one-half the method detection limit as required by WAC173-340-740-(7). For the values for soil measurement above the method detection limit but below the practical quantitation limit, substitute the method detection limit. However, for a hazardous substance or petroleum fraction which has never been detected in any sample at a site and these substances are not suspected of being present at the site based on site history and other knowledge, enter "0" for that hazardous substances or petroleum fraction for further calculation. Refer to WAC173-340-740(7) for detail.
4. For detail analytical testing requirements for petroleum contaminated sites, refer to WAC 173-340-820, 830 and 840, and Table 830-1.
5. For detail information on site-specific hydrogeological conditions, refer to WAC 173-340-747.

REMARK:
One half the detection limit use when compound is undetected.

Worksheet for Calculating Soil Cleanup Level for Soil Direct Contact pathway: Method B-Unrestricted Land use (Refer to WAC 173-340-740)

Date: 3/15/04
Site Name: Building 207, Paine Field
Sample Name: V2-4(2)

a. "TPH Test" button below is for testing adjusted condition at a specified TPH concentration.
b. Check columns at left for Pass/Fail detail.

Chemical of Concern or EC Group	Measured Soil Conc dry basis	Exposure Parameters				Toxicity Parameters		Current Condition			Adjusted Condition			
		ABI	AF	ABS_d	GI	RfD_o	CPF_o	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	mg/cm^2-day	unitless	unitless	mg/kg-day	kg-day/mg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction														
AL_EC >5-6	2.5	1	0.2	0.03	0.8	5.7		5.9E-06			8.01E+00	1.90E-05		
AL_EC >6-8	2.5	1	0.2	0.03	0.8	5.7		5.9E-06			8.01E+00	1.90E-05		
AL_EC >8-10	12	1	0.2	0.03	0.8	0.03		5.41E-03			3.85E+01	1.74E-02		
AL_EC >10-12	38	1	0.2	0.03	0.8	0.03		1.71E-02			1.22E+02	5.49E-02		
AL_EC >12-16	200	1	0.2	0.1	0.5	0.03		1.20E-01			6.41E+02	3.85E-01		
AL_EC >16-21	290	1	0.2	0.1	0.5	2		2.61E-03			9.30E+02	8.37E-03		
AL_EC >21-34	310	1	0.2	0.1	0.5	2		2.79E-03			9.94E+02	8.94E-03		
AR_EC >8-10	7	1	0.2	0.03	0.8	0.05		1.89E-03			2.24E+01	6.07E-03		
AR_EC >10-12	9	1	0.2	0.03	0.8	0.05		2.44E-03			2.89E+01	7.81E-03		
AR_EC >12-16	36	1	0.2	0.1	0.5	0.05		1.30E-02			1.15E+02	4.15E-02		
AR_EC >16-21	150	1	0.2	0.1	0.5	0.03		9.00E-02			4.81E+02	2.89E-01		
AR_EC >21-34	92	1	0.2	0.1	0.5	0.03		5.52E-02			2.95E+02	1.77E-01		
Benzene	0.05	1	0.2	0.0005	0.95	0.003	0.055	2.09E-04	2.75E-09		1.60E-01	6.69E-04	8.83E-09	
Toluene	0.1	1	0.2	0.03	1	0.2		6.66E-06			3.21E-01	2.14E-05		
Ethylbenzene	0.1	1	0.2	0.03	0.92	0.1		1.34E-05			3.21E-01	4.29E-05		
Total Xylenes	0.4	1	0.2	0.03	0.9	2		2.68E-06			1.28E+00	8.60E-06		
Total Naphthalenes	1.52	1	0.2	0.13	0.89	0.02		1.26E-03			4.87E+00	4.02E-03		
n-Hexane	0	1	0.2	0.03	0.8	0.06					0.00E+00	0.00E+00		
MTBE	0										0.00E+00			
Ethylene Dibromide (EDB)	0	1	0.2	0.03	0.8	0.000057	85		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	1	0.2	0.03	0.8	0.03	0.091		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09	*for*	3.21E-02		3.09E-08	*for*
Benzo(b)fluoranthene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09	*all*	3.21E-02		3.09E-08	*all*
Benzo(k)fluoranthene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09	*cPAHs*	3.21E-02		3.09E-08	*cPAHs*
Benzo(a)pyrene	0.01	1	0.2	0.13	0.89		7.3		9.65E-08		3.21E-02		3.09E-07	
Chrysene	0.01	1	0.2	0.13	0.89		0.073		9.65E-10		3.21E-02		3.09E-09	
Dibenzo(a,h)anthracene	0.01	1	0.2	0.13	0.89		2.92		3.86E-08		3.21E-02		1.24E-07	
Indeno(1,2,3-cd)pyrene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09		3.21E-02		3.09E-08	
Sum	**1151.24**							3.12E-01	1.77E-07		3.69E+03	1.00E+00	5.69E-07	

Current Condition

TPH, mg/kg= 1151.240
HI= 3.119E-01
Cancer RISK= 1.773E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

Adjusted Condition

TPH, mg/kg= 3690.575
HI= 1.000E+00
Cancer RISK= 5.685E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

Exposure Parameters		
for Non-carcinogens		Units
Average Body Weight, ABW	16	kg
Averaging Time, AT	6	yr
Exposure Frequency, EF	1	unitless
Exposure Duration, ED	6	yr
Soil Ingestion Rate, SIR	200	mg/day
Dermal Surface Area, SA	2200	cm^2
for Carcinogens		
Averaging time, AT_C	75	yr

Worksheet for Calculating Soil Cleanup Level for Soil Direct Contact Pathway: Method C-Industrial Land Use (Refer to MTCA WAC 173-340-745)

Date: 15-Mar-04
Site Name: Building 207, Paine Field
Sample Name: V2-4(2)

Chemical of Concern or EC Group	Measured Soil Conc dry basis	Exposure Parameters				Toxicity Parameters		Current Condition			Adjusted Condition			
		AB1	AF	ABS_d	GI	RfD_o	CPF_o	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	mg/cm^2-day	unitless	unitless	mg/kg-day	kg-day/mg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction														
AL_EC >5-6	2.5	1	0.2	0.03	0.8	5.7		3.0E-07			9.96E+01	1.20E-05		
AL_EC >6-8	2.5	1	0.2	0.03	0.8	5.7		3.0E-07			9.96E+01	1.20E-05		
AL_EC >8-10	12	1	0.2	0.03	0.8	0.03		2.75E-04			4.78E+02	1.10E-02		
AL_EC >10-12	38	1	0.2	0.03	0.8	0.03		8.71E-04			1.51E+03	3.47E-02		
AL_EC >12-16	200	1	0.2	0.1	0.5	0.03		1.00E-02			7.97E+03	3.98E-01		
AL_EC >16-21	290	1	0.2	0.1	0.5	2		2.18E-04			1.16E+04	8.67E-03		
AL_EC >21-34	310	1	0.2	0.1	0.5	2		2.33E-04			1.24E+04	9.26E-03		
AR_EC >8-10	7	1	0.2	0.03	0.8	0.05		9.63E-05			2.79E+02	3.83E-03		
AR_EC >10-12	9	1	0.2	0.03	0.8	0.05		1.24E-04			3.59E+02	4.93E-03		
AR_EC >12-16	36	1	0.2	0.1	0.5	0.05		1.08E-03			1.43E+03	4.30E-02		
AR_EC >16-21	150	1	0.2	0.1	0.5	0.03		7.50E-03			5.98E+03	2.99E-01		
AR_EC >21-34	92	1	0.2	0.1	0.5	0.03		4.60E-03			3.67E+03	1.83E-01		
Benzene	0.05	1	0.2	0.0005	0.95	0.003	0.055	8.38E-06	3.69E-10		1.99E+00	3.34E-04	1.47E-08	
Toluene	0.1	1	0.2	0.03	1	0.2		3.25E-07			3.98E+00	1.29E-05		
Ethylbenzene	0.1	1	0.2	0.03	0.92	0.1		6.63E-07			3.98E+00	2.64E-05		
Total Xylenes	0.4	1	0.2	0.03	0.9	2		1.33E-07			1.59E+01	5.31E-06		
Total Naphthalenes	1.52	1	0.2	0.13	0.89	0.02		9.35E-05			6.06E+01	3.73E-03		
n-Hexane	0	1	0.2	0.03	0.8	0.06					0.00E+00	0.00E+00		
MTBE	0										0.00E+00			
Ethylene Dibromide (EDB)	0	1	0.2	0.03	0.8	0.000057	85		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	1	0.2	0.03	0.8	0.03	0.091		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		3.98E-01		9.54E-08	
Benzo(b)fluoranthene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		3.98E-01		9.54E-08	
Benzo(k)fluoranthene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		3.98E-01		9.54E-08	
Benzo(a)pyrene	0.01	1	0.2	0.13	0.89		7.3		2.40E-08		3.98E-01		9.54E-07	
Chrysene	0.01	1	0.2	0.13	0.89		0.073		2.40E-10		3.98E-01		9.54E-09	
Dibenzo(a,h)anthracene	0.01	1	0.2	0.13	0.89		2.92		9.58E-09		3.98E-01		3.82E-07	
Indeno(1,2,3-cd)pyrene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		3.98E-01		9.54E-08	
Sum	1151.24							2.51E-02	4.37E-08		4.59E+04	1.00E+00	1.74E-06	

a. "TPH Test" button below is for testing adjusted condition at a specified TPH concentration.
b. Check columns at left for Pass/Fail detail.

Current Condition

TPH, mg/kg= 1151.240
HI= 2.510E-02
Cancer RISK= 4.372E-08
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

Adjusted Condition

TPH, mg/kg= 45867.158
HI= 1.000E+00
Cancer RISK= 1.742E-06
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

Exposure Parameters		
for Non-carcinogens		Units
Average Body Weight, ABW	70	kg
Averaging Time, AT	20	yr
Exposure Frequency, EF	0.7	unitless
Exposure Duration, ED	20	year
Soil Ingestion Rate, SIR	50	mg/day
Dermal Surface Area, SA	2500	cm^2
for Carcinogens		
Parameters for Carcinogens		unit
Averaging time, AT_C	75	yr

Worksheet for Calculating Soil Cleanup Level for the Protection of Potable Ground Water (Refer to WAC 173-340-747)

Date: 3/15/04
Site Name: Building 207, Paine Field
Sample Name: V2-4(2)

Chemical of Concern or EC Group	Measured Soil Conc dry basis	Ground Water Cleanup Level Method A	Adjusted Condition: Soil Conc being tested	Predicted Conc @Well	HQ @ Well	RISK @ Well	Pass or Fail?
	mg/kg	ug/l	mg/kg	ug/l	unitless	unitless	
Petroleum EC Fraction							
AL_EC >5-6	2.5		2.50E+00	1.33E+01	2.91E-04	0.00E+00	
AL_EC >6-8	2.5		2.50E+00	1.41E+00	3.10E-05	0.00E+00	
AL_EC >8-10	12		1.20E+01	4.11E-01	1.71E-03	0.00E+00	
AL_EC >10-12	38		3.80E+01	8.43E-02	3.51E-04	0.00E+00	
AL_EC >12-16	200		2.00E+02	7.98E-03	1.66E-05	0.00E+00	
AL_EC >16-21	290		2.90E+02	1.46E-05	4.56E-10	0.00E+00	
AL_EC >21-34	310		3.10E+02	1.23E-10	3.83E-15	0.00E+00	
AR_EC >8-10	7		7.00E+00	3.33E+01	8.33E-02	0.00E+00	
AR_EC >10-12	9		9.00E+00	1.64E+01	4.11E-02	0.00E+00	
AR_EC >12-16	36		3.60E+01	1.41E+01	1.76E-02	0.00E+00	
AR_EC >16-21	150		1.50E+02	4.21E+00	8.76E-03	0.00E+00	
AR_EC >21-34	92		9.20E+01	2.66E-02	5.55E-05	0.00E+00	
Benzene	0.05	5	5.00E-02	5.46E+00	2.27E-01	6.86E-06	*Fail*
Toluene	0.1	1000	1.00E-01	4.34E+00	2.71E-03	0.00E+00	
Ethylbenzene	0.1	700	1.00E-01	1.49E+00	1.86E-03	0.00E+00	
Total Xylenes	0.4	1000	4.00E-01	5.96E+00	3.73E-04	0.00E+00	
Total Naphthalenes	1.52	160	1.52E+00	3.62E+00	2.26E-02	0.00E+00	
n-Hexane	0		0.00E+00	0.00E+00	0.00E+00	0.00E+00	
MTBE	0	20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Ethylene Dibromide (EDB)	0	0.01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.01		1.00E-02	4.33E-06	0.00E+00	3.61E-11	*for*
Benzo(b)fluoranthene	0.01		1.00E-02	6.26E-07	0.00E+00	5.22E-12	*all*
Benzo(k)fluoranthene	0.01		1.00E-02	3.34E-07	0.00E+00	2.79E-12	*cPAHs*
Benzo(a)pyrene	0.01		1.00E-02	6.76E-07	0.00E+00	5.64E-11	
Chrysene	0.01		1.00E-02	7.38E-07	0.00E+00	6.16E-13	
Dibenzo(a,h)anthracene	0.01		1.00E-02	9.41E-07	0.00E+00	3.14E-11	
Indeno(1,2,3-cd)pyrene	0.01		1.00E-02	8.39E-09	0.00E+00	7.00E-14	
Sum	1151.240		1.15E+03	1.04E+02	4.08E-01	6.86E-06	
Testing Total Soil Conc (mg/kg) is:			1151.24				

a. "TPH Test" button below is for testing adjusted condition at a specified TPH concentration.
b. Check columns at left for Pass/Fail detail.

Site-Specific Hydrogeological Characteristics

Item	Symbol	Value	Units
Total soil porosity: default is 0.43	n	0.43	unitless
Volumetric water content: default is 0.3	Θ_w	0.3	unitless
Initial volumetric air content: default is 0.13	Θ_a	0.13	unitless
Soil bulk density measured: default is 1.5	ρ_b	1.5	kg/l
Fraction Organic Carbon: default is 0.001	f_{oc}	0.001	unitless
Dilution Factor: default is 20	DF	20	unitless

Back-Calculate Target Soil TPH Cleanup Levels

Based on HI=1.0 @Ground Water:
Based on total Cancer RISK =1.0E-5@Ground Water:
Based on Benzene Ground Water Cleanup Level:

TPH OUTPUT

Total Soil Concentration (mg/kg) tested:	**1151.240**
Pass or Fail?	**Fail**
Predicted TPH (ug/l) @Well:	**1.04E+02**
Cancer Risk @ Well:	**6.86E-06**
Hazard Index @Well:	**4.08E-01**
Initial Weighted Average MW of NAPL (g/mol):	240.2
Equilibrated Weighted Average MW of NAPL (g/mol):	240.8
Initial Weighted Average Density of NAPL (kg/l):	0.850
Volumetric NAPL Content, Θ_{NAPL} :	0.002
NAPL Saturation (%), Θ_{NAPL}/n:	0.47%
Type of model used for computation:	*4-Phase Model*
Computation completed?	*Yes!*

Mass Distribution Pattern @ 4-phase in soil pore system:

Total Mass distributed in Water Phase: 0.04%	in Solid: 0.82%
Total Mass distributed in Air Phase: 0.09%	in NAPL: 99.06%

Please Check Soil Residual Saturation TPH Levels: Refer to Table 747-5!

Washington State Department of Ecology, Toxics Cleanup Program: Soil Cleanup Level for TPH Sites - Main Data Entry Form and Status of Current Soil Risk

Soil Cleanup Levels: Worksheet for Data Entry

Refer to WAC 173-340-720, 740,745, 747, 750

Date: 03/15/04
Site Name: Building 207, Paine Field
Sample Name: VI-3 (2)

1. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	2.5	0.28%
AL_EC >6-8	2.5	0.28%
AL_EC >8-10	24	2.70%
AL_EC >10-12	35.26	3.96%
AL_EC >12-16	180	20.23%
AL_EC >16-21	260	29.22%
AL_EC >21-34	100	11.24%
AR_EC >8-10	15	1.69%
AR_EC >10-12	14	1.57%
AR_EC >12-16	41	4.61%
AR_EC >16-21	120	13.49%
AR_EC >21-34	90	10.12%
Benzene	0.05	0.01%
Toluene	0.1	0.01%
Ethylbenzene	0.1	0.01%
Total Xylenes	0.4	0.04%
Total Naphthalenes	4.74	0.53%
n-Hexane	0	0.00%
MTBE	0	0.00%
Ethylene Dibromide (EDB)	0	0.00%
1,2 Dichloroethane (EDC)	0	0.00%
Benzo(a)anthracene	0.01	0.00%
Benzo(b)fluoranthene	0.01	0.00%
Benzo(k)fluoranthene	0.02	0.00%
Benzo(a)pyrene	0.01	0.00%
Chrysene	0.02	0.00%
Dibenzo(a,h)anthracene	0.01	0.00%
Indeno(1,2,3-cd)pyrene	0.01	0.00%
Sum	889.74	100.00%

2. Enter Site-Specific Hydrogeological Data

Total soil porosity: default is 0.43	0.43	Unitless
Volumetric water content: default is 0.3	0.3	Unitless
Volumetric air content: default is 0.13	0.13	Unitless
Soil bulk density measured: default is 1.5	1.5	kg/l
Fraction Organic Carbon: default is 0.001	0.001	Unitless
Dilution Factor: default is 20	20	Unitless

Exposure Pathway		Pass or Fail?	HI	RISK
Soil Direct Contact	Unrestricted Land use	Pass	2.91E-01	1.88E-07
	Industrial Land use	Pass	2.31E-02	4.64E-08
Method B Potable Ground Water Protection		Fail	6.26E-01	6.81E-06

Warning!!!
*Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required based on site-specific conditions and type of fuel (see WAC 173-340-7490~7494).

Note:

1. All data must be numeric values. Use of alphabetical characters (i.e., "ND", "NA", "<", ">", or "=") will cause an error.
2. Try to avoid double counting: The Petroleum Equivalent Carbon (EC) fractions include many individual substances that must be analyzed separately. When entering the concentration of petroleum EC fraction into the data entry cell, make sure you subtract the concentration of individual substances from the appropriate EC fraction. (See User's Guide)
3. For the values of soil measurement below the method detection limit, substitute one-half the method detection limit as required by WAC173-340-740-(7). For the values for soil measurement above the method detection limit but below the practical quantitation limit, substitute the method detection limit. However, for a hazardous substance or petroleum fraction which has never been detected in any sample at a site and these substances are not suspected of being present at the site based on site history and other knowledge, enter "0" for that hazardous substances or petroleum fraction for further calculation. Refer to WAC173-340-740(7) for detail.
4. For detail analytical testing requirements for petroleum contaminated sites, refer to WAC 173-340-820, 830 and 840, and Table 830-1.
5. For detail information on site-specific hydrogeological conditions, refer to WAC 173-340-747.

REMARK:
AL-EC>10-12 adjusted downward to avoid double counting naphthalenes. One half the detection limit used when compound is undetected.

Worksheet for Calculating Soil Cleanup Level for Soil Direct Contact pathway: Method B-Unrestricted Land use (Refer to WAC 173-340-740)

Date: 3/15/04
Site Name: Building 207, Paine Field
Sample Name: V1-3 (2)

a. "TPH Test" button below is for testing adjusted condition at a specified TPH concentration.
b. Check columns at left for Pass/Fail detail.

Chemical of Concern or EC Group	Measured Soil Conc dry basis	Exposure Parameters				Toxicity Parameters		Current Condition			Adjusted Condition			
		AB1	AF	ABS_d	GI	RfD_o	CPF_o	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	mg/cm^2-day	unitless	unitless	mg/kg-day	kg-day/mg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction														
AL_EC >5-6	2.5	1	0.2	0.03	0.8	5.7		5.9E-06			8.60E+00	2.04E-05		
AL_EC >6-8	2.5	1	0.2	0.03	0.8	5.7		5.9E-06			8.60E+00	2.04E-05		
AL_EC >8-10	24	1	0.2	0.03	0.8	0.03		1.08E-02			8.25E+01	3.72E-02		
AL_EC >10-12	35.26	1	0.2	0.03	0.8	0.03		1.59E-02			1.21E+02	5.47E-02		
AL_EC >12-16	180	1	0.2	0.1	0.5	0.03		1.08E-01			6.19E+02	3.71E-01		
AL_EC >16-21	260	1	0.2	0.1	0.5	2		2.34E-03			8.94E+02	8.05E-03		
AL_EC >21-34	100	1	0.2	0.1	0.5	2		9.00E-04			3.44E+02	3.10E-03		
AR_EC >8-10	15	1	0.2	0.03	0.8	0.05		4.06E-03			5.16E+01	1.40E-02		
AR_EC >10-12	14	1	0.2	0.03	0.8	0.05		3.79E-03			4.82E+01	1.30E-02		
AR_EC >12-16	41	1	0.2	0.1	0.5	0.05		1.48E-02			1.41E+02	5.08E-02		
AR_EC >16-21	120	1	0.2	0.1	0.5	0.03		7.20E-02			4.13E+02	2.48E-01		
AR_EC >21-34	90	1	0.2	0.1	0.5	0.03		5.40E-02			3.10E+02	1.86E-01		
Benzene	0.05	1	0.2	0.0005	0.95	0.003	0.055	2.09E-04	2.75E-09		1.72E-01	7.17E-04	9.47E-09	
Toluene	0.1	1	0.2	0.03	1	0.2		6.66E-06			3.44E-01	2.29E-05		
Ethylbenzene	0.1	1	0.2	0.03	0.92	0.1		1.34E-05			3.44E-01	4.61E-05		
Total Xylenes	0.4	1	0.2	0.03	0.9	2		2.68E-06			1.38E+00	9.23E-06		
Total Naphthalenes	4.74	1	0.2	0.13	0.89	0.02		3.91E-03			1.63E+01	1.35E-02		
n-Hexane	0	1	0.2	0.03	0.8	0.06					0.00E+00	0.00E+00		
MTBE	0										0.00E+00			
Ethylene Dibromide (EDB)	0	1	0.2	0.03	0.8	0.000057	85		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	1	0.2	0.03	0.8	0.03	0.091		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09	*for*	3.44E-02		3.32E-08	*for*
Benzo(b)fluoranthene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09	*all*	3.44E-02		3.32E-08	*all*
Benzo(k)fluoranthene	0.02	1	0.2	0.13	0.89		0.73		1.93E-08	*cPAHs*	6.88E-02		6.64E-08	*cPAHs*
Benzo(a)pyrene	0.01	1	0.2	0.13	0.89		7.3		9.65E-08		3.44E-02		3.32E-07	
Chrysene	0.02	1	0.2	0.13	0.89		0.073		1.93E-09		6.88E-02		6.64E-09	
Dibenzo(a,h)anthracene	0.01	1	0.2	0.13	0.89		2.92		3.86E-08		3.44E-02		1.33E-07	
Indeno(1,2,3-cd)pyrene	0.01	1	0.2	0.13	0.89		0.73		9.65E-09		3.44E-02		3.32E-08	
Sum	889.74							2.91E-01	1.88E-07		3.06E+03	1.00E+00	6.46E-07	

Current Condition

TPH, mg/kg= 889.740
HI= 2.907E-01
Cancer RISK= 1.880E-07
Pass or Fail? Pass

Adjusted Condition

TPH, mg/kg= 3060.318
HI= 1.000E+00
Cancer RISK= 6.465E-07
Pass or Fail? Pass

Check Residual Saturation (WAC340-747(10))

Exposure Parameters for Non-carcinogens		Units
Average Body Weight, ABW	16	kg
Averaging Time, AT	6	yr
Exposure Frequency, EF	1	unitless
Exposure Duration, ED	6	yr
Soil Ingestion Rate, SIR	200	mg/day
Dermal Surface Area, SA	2200	cm^2
for Carcinogens		
Averaging time, AT_C	75	yr

Worksheet for Calculating Soil Cleanup Level for Soil Direct Contact Pathway: Method C-Industrial Land Use (Refer to MTCA WAC 173-340-745)

Date: 15-Mar-04
Site Name: Building 207, Paine Field
Sample Name: V1-3 (2)

a. "TPH Test" button below is for testing adjusted condition at a specified TPH concentration.
b. Check columns at left for Pass/Fail detail.

Chemical of Concern or EC Group	Measured Soil Conc dry basis	Exposure Parameters				Toxicity Parameters		Current Condition			Adjusted Condition			
		ABI	AF	ABS_d	GI	RfD_o	CPF_o	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	mg/cm^2-day	unitless	unitless	mg/kg-day	kg-day/mg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction														
AL_EC >5-6	2.5	1	0.2	0.03	0.8	5.7		3.0E-07			1.08E+02	1.31E-05		
AL_EC >6-8	2.5	1	0.2	0.03	0.8	5.7		3.0E-07			1.08E+02	1.31E-05		
AL_EC >8-10	24	1	0.2	0.03	0.8	0.03		5.50E-04			1.04E+03	2.39E-02		
AL_EC >10-12	35.26	1	0.2	0.03	0.8	0.03		8.08E-04			1.53E+03	3.50E-02		
AL_EC >12-16	180	1	0.2	0.1	0.5	0.03		9.00E-03			7.81E+03	3.90E-01		
AL_EC >16-21	260	1	0.2	0.1	0.5	2		1.95E-04			1.13E+04	8.46E-03		
AL_EC >21-34	100	1	0.2	0.1	0.5	2		7.50E-05			4.34E+03	3.25E-03		
AR_EC >8-10	15	1	0.2	0.03	0.8	0.05		2.06E-04			6.51E+02	8.94E-03		
AR_EC >10-12	14	1	0.2	0.03	0.8	0.05		1.93E-04			6.07E+02	8.35E-03		
AR_EC >12-16	41	1	0.2	0.1	0.5	0.05		1.23E-03			1.78E+03	5.33E-02		
AR_EC >16-21	120	1	0.2	0.1	0.5	0.03		6.00E-03			5.20E+03	2.60E-01		
AR_EC >21-34	90	1	0.2	0.1	0.5	0.03		4.50E-03			3.90E+03	1.95E-01		
Benzene	0.05	1	0.2	0.0005	0.95	0.003	0.055	8.38E-06	3.69E-10		2.17E+00	3.63E-04	1.60E-08	
Toluene	0.1	1	0.2	0.03	1	0.2		3.25E-07			4.34E+00	1.41E-05		
Ethylbenzene	0.1	1	0.2	0.03	0.92	0.1		6.63E-07			4.34E+00	2.88E-05		
Total Xylenes	0.4	1	0.2	0.03	0.9	2		1.33E-07			1.73E+01	5.78E-06		
Total Naphthalenes	4.74	1	0.2	0.13	0.89	0.02		2.92E-04			2.06E+02	1.26E-02		
n-Hexane	0	1	0.2	0.03	0.8	0.06					0.00E+00	0.00E+00		
MTBE	0										0.00E+00			
Ethylene Dibromide (EDB)	0	1	0.2	0.03	0.8	0.000057	85		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	1	0.2	0.03	0.8	0.03	0.091		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		4.34E-01		1.04E-07	
Benzo(b)fluoranthene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		4.34E-01		1.04E-07	
Benzo(k)fluoranthene	0.02	1	0.2	0.13	0.89		0.73		4.79E-09		8.67E-01		2.08E-07	
Benzo(a)pyrene	0.01	1	0.2	0.13	0.89		7.3		2.40E-08		4.34E-01		1.04E-06	
Chrysene	0.02	1	0.2	0.13	0.89		0.073		4.79E-10		8.67E-01		2.08E-08	
Dibenzo(a,h)anthracene	0.01	1	0.2	0.13	0.89		2.92		9.58E-09		4.34E-01		4.15E-07	
Indeno(1,2,3-cd)pyrene	0.01	1	0.2	0.13	0.89		0.73		2.40E-09		4.34E-01		1.04E-07	
Sum	**889.74**							2.31E-02	4.64E-08		3.86E+04	1.00E+00	2.01E-06	

Current Condition

TPH, mg/kg= 889.740
HI= 2.306E-02
Cancer RISK= 4.635E-08
Pass or Fail? Pass

Adjusted Condition

TPH, mg/kg= 38586.233
HI= 1.000E+00
Cancer RISK= 2.010E-06
Pass or Fail? Pass

Check Residual Saturation (WAC340-747(10))

Exposure Parameters		
for Non-carcinogens		Units
Average Body Weight, ABW	70	kg
Averaging Time, AT	20	yr
Exposure Frequency, EF	0.7	unitless
Exposure Duration, ED	20	year
Soil Ingestion Rate, SIR	50	mg/day
Dermal Surface Area, SA	2500	cm^2
for Carcinogens		
Parameters for Carcinogens		unit
Averaging time, AT_C	75	yr

Worksheet for Calculating Soil Cleanup Level for the Protection of Potable Ground Water (Refer to WAC 173-340-747)

Date: 3/15/04
Site Name: Building 207, Paine Field
Sample Name: V1-3 (2)

Chemical of Concern or EC Group	Measured Soil Conc dry basis	Ground Water Cleanup Level Method A	Adjusted Condition: Soil Conc being tested	Predicted Conc @Well	HQ @ Well	RISK @ Well	Pass or Fail?
	mg/kg	ug/l	mg/kg	ug/l	unitless	unitless	
Petroleum EC Fraction							
AL_EC >5-6	2.5		2.50E+00	9.69E+00	2.12E-04	0.00E+00	
AL_EC >6-8	2.5		2.50E+00	1.51E+00	3.30E-05	0.00E+00	
AL_EC >8-10	24		2.40E+01	9.55E-01	3.98E-03	0.00E+00	
AL_EC >10-12	35.26		3.53E+01	9.17E-02	3.82E-04	0.00E+00	
AL_EC >12-16	180		1.80E+02	8.44E-03	1.76E-05	0.00E+00	
AL_EC >16-21	260		2.60E+02	1.53E-05	4.79E-10	0.00E+00	
AL_EC >21-34	100		1.00E+02	4.65E-11	1.45E-15	0.00E+00	
AR_EC >8-10	15		1.50E+01	8.09E+01	2.02E-01	0.00E+00	
AR_EC >10-12	14		1.40E+01	2.95E+01	7.39E-02	0.00E+00	
AR_EC >12-16	41		4.10E+01	1.87E+01	2.34E-02	0.00E+00	
AR_EC >16-21	120		1.20E+02	3.95E+00	8.23E-03	0.00E+00	
AR_EC >21-34	90		9.00E+01	3.07E-02	6.39E-05	0.00E+00	
Benzene	0.05	5	5.00E-02	5.42E+00	2.26E-01	6.81E-06	*Fail*
Toluene	0.1	1000	1.00E-01	4.68E+00	2.92E-03	0.00E+00	
Ethylbenzene	0.1	700	1.00E-01	1.69E+00	2.11E-03	0.00E+00	
Total Xylenes	0.4	1000	4.00E-01	6.76E+00	4.23E-04	0.00E+00	
Total Naphthalenes	4.74	160	4.74E+00	1.31E+01	8.21E-02	0.00E+00	
n-Hexane	0		0.00E+00	0.00E+00	0.00E+00	0.00E+00	
MTBE	0	20	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Ethylene Dibromide (EDB)	0	0.01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0	5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0.01		1.00E-02	5.09E-06	0.00E+00	4.24E-11	*for*
Benzo(b)fluoranthene	0.01		1.00E-02	7.36E-07	0.00E+00	6.14E-12	*all*
Benzo(k)fluoranthene	0.02		2.00E-02	7.85E-07	0.00E+00	6.55E-12	*cPAHs*
Benzo(a)pyrene	0.01		1.00E-02	7.95E-07	0.00E+00	6.63E-11	
Chrysene	0.02		2.00E-02	1.74E-06	0.00E+00	1.45E-12	
Dibenzo(a,h)anthracene	0.01		1.00E-02	1.11E-06	0.00E+00	3.69E-11	
Indeno(1,2,3-cd)pyrene	0.01		1.00E-02	9.87E-09	0.00E+00	8.23E-14	
Sum	889.740		8.90E+02	1.77E+02	6.26E-01	6.81E-06	
Testing Total Soil Conc (mg/kg) is:			**890.00**				

a. "TPH Test" button below is for testing adjusted condition at a specified TPH concentration.
b. Check columns at left for Pass/Fail detail.

Site-Specific Hydrogeological Characteristics

Item	Symbol	Value	Units
Total soil porosity: default is 0.43	n	0.43	unitless
Volumetric water content: default is 0.3	Θ_w	0.3	unitless
Initial volumetric air content: default is 0.13	Θ_a	0.13	unitless
Soil bulk density measured: default is 1.5	ρ_b	1.5	kg/l
Fraction Organic Carbon: default is 0.001	f_{oc}	0.001	unitless
Dilution Factor: default is 20	DF	20	unitless

Back-Calculate Target Soil TPH Cleanup Levels

Based on HI=1.0 @Ground Water:
Based on total Cancer RISK =1.0E-5 @Ground Water:
Based on Benzene Ground Water Cleanup Level:

TPH OUTPUT

Total Soil Concentration (mg/kg) tested:	**890.000**
Pass or Fail?	**Fail**
Predicted TPH (ug/l) @Well:	**1.77E+02**
Cancer Risk @ Well:	**6.81E-06**
Hazard Index @Well:	**6.26E-01**
Initial Weighted Average MW of NAPL (g/mol):	215.4
Equilibrated Weighted Average MW of NAPL (g/mol):	217.0
Initial Weighted Average Density of NAPL (kg/l):	0.862
Volumetric NAPL Content, Θ_{NAPL} :	0.002
NAPL Saturation (%), Θ_{NAPL}/n:	0.35%
Type of model used for computation:	***4-Phase Model***
Computation completed?	***Yes!***

Mass Distribution Pattern @ 4-phase in soil pore system:

Total Mass distributed in Water Phase: 0.08%	in Solid: 1.43%
Total Mass distributed in Air Phase: 0.10%	in NAPL: 98.39%