UST # 008527

LUST # 1556
PUGET POWER
KING

DEPARTMENT OF ECOLOGY
NWRO/TCP TANKS UNIT

INTERIM CLEANUP REPORT	☒
SITE CHARACTERIZATON	☒
FINAL CLEANUP REPORT	☐
OTHER	☐
AFFECTED MEDIA: SOIL	☒
OTHER ____ GW	☐
INSPECTOR (INIT.) DJ DATE 1-26-94	

REPORT OF GEOTECHNICAL SERVICES
SUBSURFACE CONTAMINATION STUDY
FORMER RENTON TRANSPORTATION CENTER
RENTON, WASHINGTON
FOR
PUGET SOUND POWER & LIGHT CO.

Independent Action Report Update

Site Name: PUGET POWER - RENTON

Inc. #: 1556 Date of Report: 7-26-88

County: KING Date Report Rec'd: 1-6-94

Reviewed by: JOHN BAILS

Comments (please include: free prod., tank info., media, contaminant migration, GW conc. trends, PCS treated/fate?):

SITE CHECK - INVESTIGATED SOIL AND GROUNDWATER IN VICINITY OF 4 UST's. FOUND EVIDENCE OF PCS AROUND TANKS # 226 + 227. LOW LEVELS OF TPH IN GW BUT NOT IN EXCESS OF CLEAN-UP STANDARDS. LUST SITE 1556 WAS ESTABLISHED FOR REMOVAL OF TANKS 217 + 218 AND A WASTE OIL TRANSFORMER TANK.

TRANSPORTATION CENTER

PUGET POWER

January 6, 1994

Mr. Joseph Hickey
Washington State Department
of Ecology
3190 - 160th Avenue SE
Bellevue, WA 98008-5452

Dear Mr. Hickey:

Enclosed are the following underground tank reports:

- Report of Geotechnical Services, Subsurface Contamination Study, former Renton Transportation Center, Renton, Washington, for Puget Sound Power & Light Company, dated July 26, 1988.

- Report of Remedial Action, Underground Storage Tank Removal, Stores Building, Renton Service Center, Renton, Washington, for Puget Sound Power & Light Company, dated February 7, 1991.

These reports were prepared by our consultant GeoEngineers, Inc. and summarize activities related to a subsurface contamination study and two underground storage tank removals (Tank #226 and #227) at Puget Sound Power & Light Company's Renton Service Center located at 620 South Grady Way in Renton, Washington.

If you have any questions regarding these reports, please call Gary Reid at 462-3077, me at 462-3066, or Kathy Killman of GeoEngineers at 861-6000.

Very truly yours,

Ted Van Decar

Ted Van Decar
Staff Environmental Engineer

Enclosure

GeoEngineers

Geotechnical,
Geoenvironmental and
Geologic Services

July 26, 1988

Puget Sound Power & Light Company
P.O. Box 0868
Bellevue, Washington 98009

Attention: Mr. Gary Reid

Gentlemen:

We are submitting five copies of our subsurface contamination study at the site of the Puget Sound Power & Light Company former Transportation Center in Renton, Washington. Our services were authorized by Mr. Gary Reid on April 18, 1988. Contractual terms for our services are described in the blanket contract between GeoEngineers, Inc. and PSP&L.

We appreciate the opportunity to be of continued service to PSP&L. Please call if you have any questions regarding this report.

Yours very truly,

GeoEngineers, Inc.

for

James A. Miller
Principal

DJK:SCP:JAM:cs

File No. 0186-78-4

GeoEngineers, Inc.
8410 154th Avenue N.E.
Redmond, WA 98052
Telephone (206) 861-6000
Fax (206) 861-6050

TABLE OF CONTENTS

	Page No.
INTRODUCTION	1
SITE CONDITIONS	2
GENERAL	2
SUBSURFACE SOIL CONDITIONS	3
GROUND WATER CONDITIONS	3
SUBSURFACE CONTAMINATION	4
CONCLUSIONS AND RECOMMENDATIONS	5
LIMITATIONS	8

List of Figures

	Figure No.
VICINITY MAP	1
SITE PLAN	2

APPENDIX A

	Page No.
FIELD EXPLORATIONS	A-1
DRILLING AND SOIL SAMPLING PROGRAM	A-1
MONITOR WELL CONSTRUCTION	A-1
GROUND WATER SAMPLING PROGRAM	A-2
GROUND WATER ELEVATIONS	A-2
HYDROCARBON VAPOR CONCENTRATIONS	A-3
CHEMICAL ANALYTICAL PROGRAM	A-3

List of Appendix A Figures

	Figure No.
SOIL CLASSIFICATION SYSTEM	A-1
KEY TO BORING LOG SYMBOLS	A-2
LOGS OF MONITOR WELLS	A-3 thru A-6

APPENDIX B

	Page No.
GROUND WATER TEST RESULTS	B-1 thru B-12
SOIL TEST RESULTS	B-13 thru B-28
VAPOR TEST RESULTS	B-29 thru B-31

APPENDIX C

	Page No.
ECOLOGY'S SOIL CLEANUP GUIDELINES	C-1

REPORT OF GEOTECHNICAL SERVICES
SUBSURFACE CONTAMINATION STUDY
FORMER RENTON TRANSPORTATION CENTER
RENTON, WASHINGTON
FOR
PUGET SOUND POWER & LIGHT CO.

INTRODUCTION

The results of our investigation of subsurface fuel-related contamination at the site of the Puget Sound Power & Light Company (PSP&L) former Transportation Center in Renton, Washington are presented in this report. The site is located at 620 South Grady Way. The site location is shown relative to surrounding physical features in Figure 1. The general layout of the site is shown in Figure 2.

Norton Corrosion Limited, Inc. (NCL) investigated potential subsurface contamination at this site in October 1987. Their findings indicated the presence of oil and grease contamination within the backfill of one of the four underground storage tanks located at this site.

The purpose of our services is to further explore and evaluate subsurface fuel-related contamination at the site. The scope of services completed for this study is listed below.

1. Drilling four exploration borings at the site and obtaining soil samples from the three borings located near underground tanks.
2. Installing monitor well casings with flush-grade surface monuments in each boring.
3. Developing the well screens by hand bailing with a stainless steel bailer.
4. Determining the monitor well casing elevations to an accuracy of 0.01 feet using our engineer's level and an assumed site datum.
5. Measuring the air space in each well casing for hydrocarbon vapors using a TLV Sniffer.
6. Measuring water table elevations for all of the wells and sampling each well for the presence of free (floating) hydrocarbons.

7. Obtaining ground water samples from the wells for laboratory analysis.
8. Testing a ground water sample from each well for the presence of fuel hydrocarbons.
9. Testing a soil sample from each boring located near an underground tank for the presence of fuel hydrocarbons.
10. Evaluating the field and laboratory data with regard to existing regulatory concerns.

SITE CONDITIONS

GENERAL

The site of PSP&L's former Transportation Center is located within the Renton city limits, about 3500 feet south of the Cedar River. The ground surface at the site slopes gently downward toward the northwest. The ground surface elevation is about 35 feet above sea level in the vicinity of the underground storage tanks.

The transportation center building is currently vacant and is undergoing renovation. Other active facilities at the site location include an office building, warehouse building, truck bays and line headquarters. An active fuel service island and four buried fuel storage tanks lie adjacent to and north of the former transportation center building. The active parts of the site are fully enclosed with fencing.

The four fuel storage tanks that formerly served the Transportation Center are designated as PSP&L Tank Nos. 224, 225, 226 and 227. Tank No. 226, a 10,000-gallon unleaded fuel tank, is located west of and adjacent to the service island. A 1000-gallon diesel tank (No. 227) is located east of the service island. Tank Nos. 224 and 225, 1000-gallon and 550-gallon waste oil tanks, respectively, are located west of Tank No. 226. The locations of the tanks are shown in Figure 2.

Norton Corrosion Limited, inc. drilled eight core holes in October 1987 to investigate the soil corrosion potential in the vicinity of these four underground storage tanks. The locations of NCL's cores are shown in Figure 2. Hydrocarbons were noted by NCL during drilling of Core Hole No. T2, which was drilled adjacent to Tank No. 227. NCL selected soil

samples from this core hole for further analysis. The samples selected and analytical results are summarized on Table 1. The analytical method used by NCL was EPA Method 413.2 (Total Recoverable Oil and Grease). This analytical method may indicate higher concentrations than the more commonly used analytical methods for characterizing petroleum hydrocarbons.

Table 1

Results of Analytical Testing of Soil Samples by Norton Corrosion Limited, Inc.

Core No.	Soil Sample Depth (ft)	Tank Vicinity	*Oil and Grease (ppm)
T2	4	227	1400
T2	7	227	650

*Note: EPA Method 413.2

SUBSURFACE SOIL CONDITIONS

Subsurface soil conditions were explored on May 13, 1988 by drilling four test borings at the locations indicated in Figure 2. The borings extended to depths of 15 to 15.5 feet below grade. Details of the field exploration program are presented in Appendix A.

All soil borings encountered a 2- to 4-foot-thick layer of fill consisting of fine to medium sand with gravel. Beneath the sand fill, the borings encountered a second unit of fill, which consists of coal fragments to depths of between 6 and 8 feet. The soils beneath the fill consist of grayish-black silty sand and interbedded gray to black silt and sand. Detailed descriptions of the soils encountered in the borings are given in the boring logs in Appendix A.

GROUND WATER CONDITIONS

Ground water conditions at the site were explored by installing a monitor well casing in each boring. Construction details for the wells are given in Appendix A. We measured the depth to the water table on May 18, 1988, five days after the wells were installed.

The water table at the site was 5 to 7 feet beneath the ground surface at the time of our measurements. Water table elevations at each monitor well are shown in Figure 2. The local ground water flow direction beneath the site appears to be toward the southwest, as indicated in Figure 2.

SUBSURFACE CONTAMINATION

Fuel-related subsurface contamination at the site was investigated by:

1. Physical examination of soil samples and noting the presence of petroleum odor in the samples.
2. Measuring the air space in the monitor well casing for hydrocarbon vapors with a TLV Sniffer.
3. Sampling the water table interface in each well for the presence of free (floating) hydrocarbons.
4. Testing soil samples from the borings located next to an underground tank or fuel line for petroleum hydrocarbons.
5. Testing ground water samples from each boring for petroleum hydrocarbons.

The results of GeoEngineers' field and analytical testing at the former Transportation Center are summarized in Table 2. The laboratory data are presented in Appendix B. Vapor measurements and ground water samples were collected on May 18, 1988.

Fuel odors were not detected in soil samples from the four borings. Hydrocarbon vapors were detected in the four monitor well casings. The vapor concentrations were measured at 1900 ppm in Monitor Well MW-1, 1400 ppm in Monitor Well MW-2, 2400 ppm in Monitor Well MW-3, and >10,000 ppm in Monitor Well MW-4.

On July 7, 1988 we returned to the site to collect a vapor sample from Monitor Well MW-4 for further chemical analysis. The sample was analyzed for total volatile hydrocarbons and methane. The results of the analysis are presented in Appendix B. The sample was found to contain less than 10 ppm total volatile hydrocarbons and 109,000 ppm (10.9 percent by volume) methane.

Based upon site conditions and analytical testing data, we believe that the vapor concentrations noted in the other wells represent, for the most part, methane gas which is most likely derived from the coal fill. We do not believe that total hydrocarbon vapor measurements are a reliable indicator of fuel-related contamination at this site.

Selected soil samples were analyzed for the presence of fuel hydrocarbons and specific volatile aromatic hydrocarbons. In general, the fuel hydrocarbon analysis detects gasoline and diesel fuels and the volatile aromatic hydrocarbons analysis detects specific components of gasoline (i.e., benzene).

Low concentrations of diesel hydrocarbons were detected in the soil samples from Borings MW-2 (34 ppm) and MW-3 (19 ppm). Aromatic volatile hydrocarbons, indicators of gasoline contamination, were detected in the soil samples obtained in Borings MW-1 and MW-2 (Table 2).

Free (floating) hydrocarbons were not found in the monitor wells. No detectable levels of volatile aromatic compounds were found in ground water samples obtained from Wells MW-1 through MW-4. Low levels of total petroleum hydrocarbons (from 0.4 to 2.9 ppm) were detected in the ground water samples obtained from all four monitor wells (MW-1 through MW-4). Hydrocarbons derived from the coal fill may have contributed to the reported concentrations of total petroleum hydrocarbons in ground water.

CONCLUSIONS AND RECOMMENDATIONS

No free product was detected in the monitor wells at this site. Aromatic volatile hydrocarbons (BETX) were not detected in the ground water samples from the four monitor wells (MW-1 through MW-4). Low levels of petroleum hydrocarbons were detected in the ground water samples from the monitor wells. None of the chemical analyses performed on ground water samples exceed current regulatory guidelines or criteria established by the Northwest Regional Office of Washington Department of Ecology (Ecology).

Ecology has established cleanup guidelines for soils surrounding underground storage tanks (Appendix C). A concentration of 200 ppm total petroleum hydrocarbons has been established for diesel fuel. Concentrations of oil and grease found in samples obtained by Norton Corrosion Limited in their Test Boring T2 (from the backfill of Tank No. 227) exceed this

guideline. Based on the NCL data (Table 1), we believe that the backfill around this tank has hydrocarbon concentrations that exceed current Ecology cleanup guidelines. The low concentrations of diesel detected in soil samples from Borings MW-2 and MW-3 do not exceed Ecology cleanup guidelines.

Ecology has established cleanup guidelines for two of the aromatic volatile compounds analyzed for at this site, benzene and toluene. The soil sample obtained from Boring MW-1 exceeds the cleanup guideline level for benzene. We understand that precision testing of Tank Nos. 226 and 227 and associated fuel distribution lines did not detect any leaks. The contamination noted is most likely localized to the vicinity of the tank and may be the result of minor spills during tank filling and fueling activities. Fuel-contaminated soils should be expected surrounding both tanks.

We recommend that any future tank removal, replacement or maintenance program which may involve excavation of the tank backfill or fuel lines include provisions for testing, removal and disposal of hydrocarbon contaminated backfill and soils. Modified cleanup goals may be negotiated with Ecology due to possible background hydrocarbon levels attributed to the coal fill.

The ground water flow direction was anticipated to be to the northwest and ground water monitor well locations were selected based upon that assumption. Subsequent measurements show the ground water flow direction to be to the southwest. Monitor Wells MW-1, MW-2 and MW-3 are each located within 10 feet of the nearest underground storage tank. The results of chemical testing of ground water did not show detectable concentrations of BETX. Low concentrations of total petroleum hydrocarbons were detected. Even though the wells are not located directly downgradient of the tanks, we feel that their close proximity to the underground storage tanks is adequate to identify significant levels of soil and ground water contamination associated with the tanks.

Monitoring wells on site will not intercept on site contaminant migrati

The results of the ground water analysis indicate that fuel-related contamination is localized around the tanks, service island and surrounding soils, and that petroleum-derived contaminants are not present at significant concentrations in the ground water. It is our opinion that there is little potential at this site for significant off-site subsurface migration of fuel-related contamination.

High concentrations of hydrocarbon vapors (1400 to >10,000 ppm) were detected in the monitor wells. As a result of our chemical analysis of vapor samples, we believe that the vapors can be attributed to the coal fragment fill. The flammable vapors are comprised largely of methane gas. We do not feel that further testing for the vapors would be productive for the evaluation of fuel-related contamination. The accumulation of flammable vapors, whether fuel-related or derived from the coal backfill, can present a hazard. We recommend that the potential for the presence of these vapors be considered during future site development or construction activities.

Washington State water well regulations require proper abandonment of unused wells. We recommend that the monitor wells be abandoned in accordance with these regulations at a time when they are no longer serving beneficial use. We can provide you assistance with well abandonment procedures at that time.

Our recommendations can be summarized as follows:

1. Fuel-contaminated soils can be expected in the backfill surrounding Tank Nos 226 and 227. Remediation of this contaminated soil can be addressed during tank removal. At the time of tank removal, alternative cleanup goals may be considered due to possible interference of natural hydrocarbons in the coal fill with chemical analysis for petroleum hydrocarbons.
2. We recommend against using combustible vapor measurements as an indicator of fuel hydrocarbon contamination at this site. Methane vapors comprised over 99 percent of the hydrocarbon vapor levels detected in the well casing for Monitor Well MW-4. The potential presence of high methane concentrations should be considered during site development activities.

3. We recommend that the monitor wells be properly abandoned when they are no longer serving a beneficial use.

LIMITATIONS

We have prepared this report for use by Puget Sound Power & Light Company. This report can be made available to regulatory agencies. The report is not intended for use by others and the information contained herein may not be applicable to other sites.

Our interpretations of subsurface conditions are based on data from widely spaced boreholes at the site. It is possible that areas with undetected contamination exist in areas of the site that were not explored by drilling.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time the report was prepared. No other conditions, express or implied, should be understood.

- o O o -

Please call if you have questions concerning our report.

Respectfully submitted,
GeoEngineers, Inc.

Stephen C. Perrigo
Waste Management Specialist

James A. Miller
Principal

DJK:SCP:JAM:cs

Table 2

Summary of GeoEngineers' Field Observation and Chemical Testing Data

Boring/ Well Number	Soil Odor During Drilling	Hydrocarbon Vapor Levels(1) (ppm)	Water Table Conditions	Soil Analysis							Water Analysis				
				Depth of Soil Sample Tested	Fuel Hydrocarbons(2) (ppm)		Aromatic Volatiles(3) (ppb)				Aromatic Volatiles(5) (ppb)				Total Petroleum Hydrocarbons(4) (ppm)
					Gasoline	Diesel	B	E	T	X	B	E	T	X	
MW-1	No	1900	No sheen	8.5	<5	<5	93	140	410	820	<0.5	<0.5	<0.5	<0.5	0.67
MW-2	No	1400	No sheen	3.5	<5	34	<25	<25	<25	149	<0.5	<0.5	<0.5	<0.5	0.53
MW-3	No	2400	No sheen	2.5	<5	19	<25	<25	<25	<25	<0.5	<0.5	<0.5	<0.5	0.40
MW-4	No	>10,000	No sheen	--	--	--	NT	NT	NT	NT	<0.5	<0.5	<0.5	<0.5	2.9
Ecology's currently enforced cleanup levels(6)					--	200	66	--	143,000	--					

(1) Measurements obtained in monitor wells using a Bacharach TLV Sniffer calibrated to hexane (110 ppm = 1% LEL hexane). Values less than 400 ppm are not considered to be significant concentrations and probably represent interference with moisture and/or carbon dioxide.

(2) Modified Method 8015.

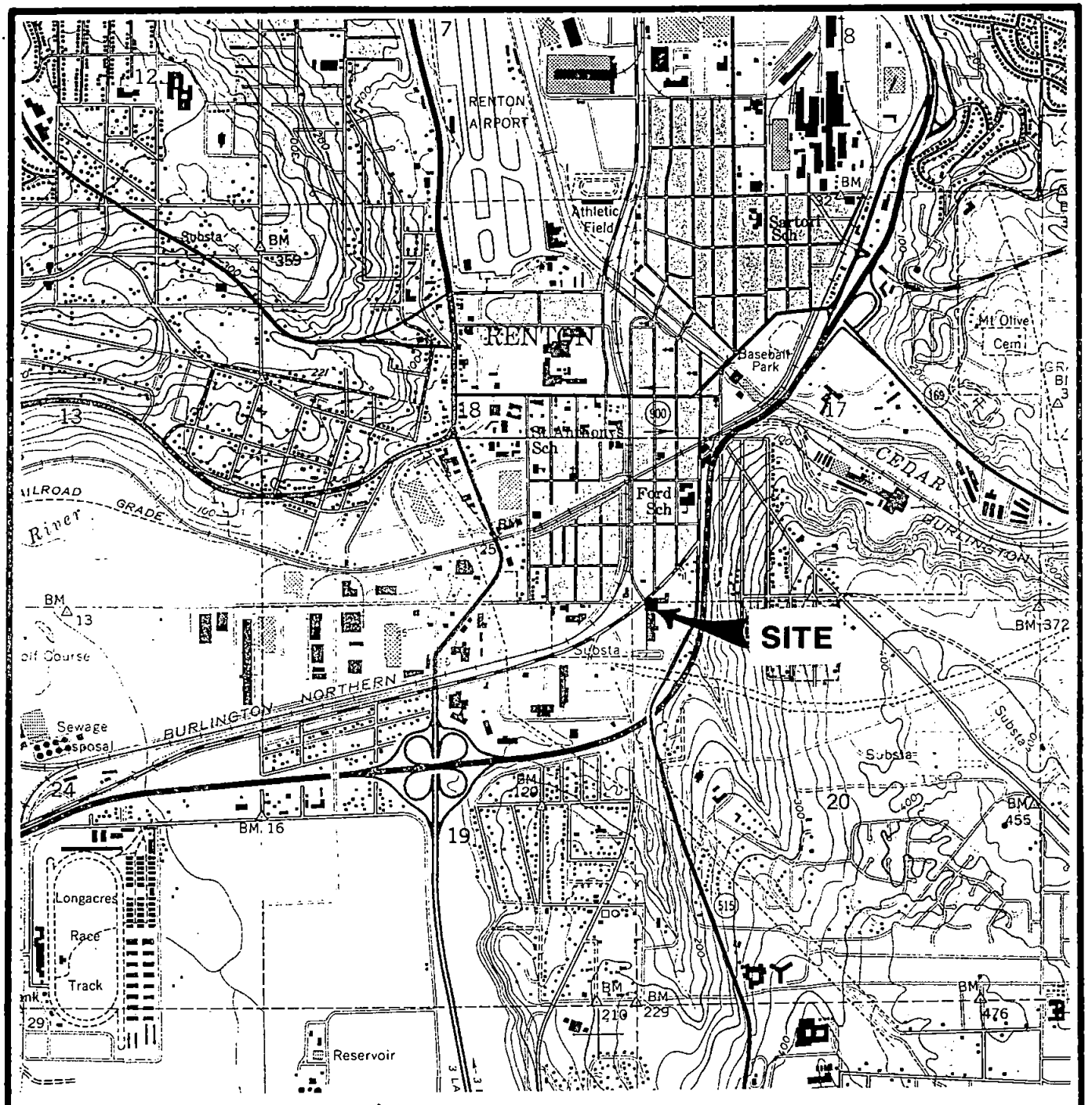
(3) EPA Method 8020. B = benzene, E = ethylbenzene, T = toluene, X = sum of m, p, o xylenes.

(4) EPA Method 418.1.

(5) EPA Method 602. B = benzene, E = ethylbenzene, T = toluene, X = sum of m, p, o xylenes.

(6) Ecology memorandum "Soil Sampling for Underground Storage Tanks," 3/8/88 (see Appendix C).

Note: "<" signifies "less than"
">" signifies "greater than"
"ND" signifies "none detected"
"ppb" signifies "parts per billion"
"ppm" signifies "parts per million"

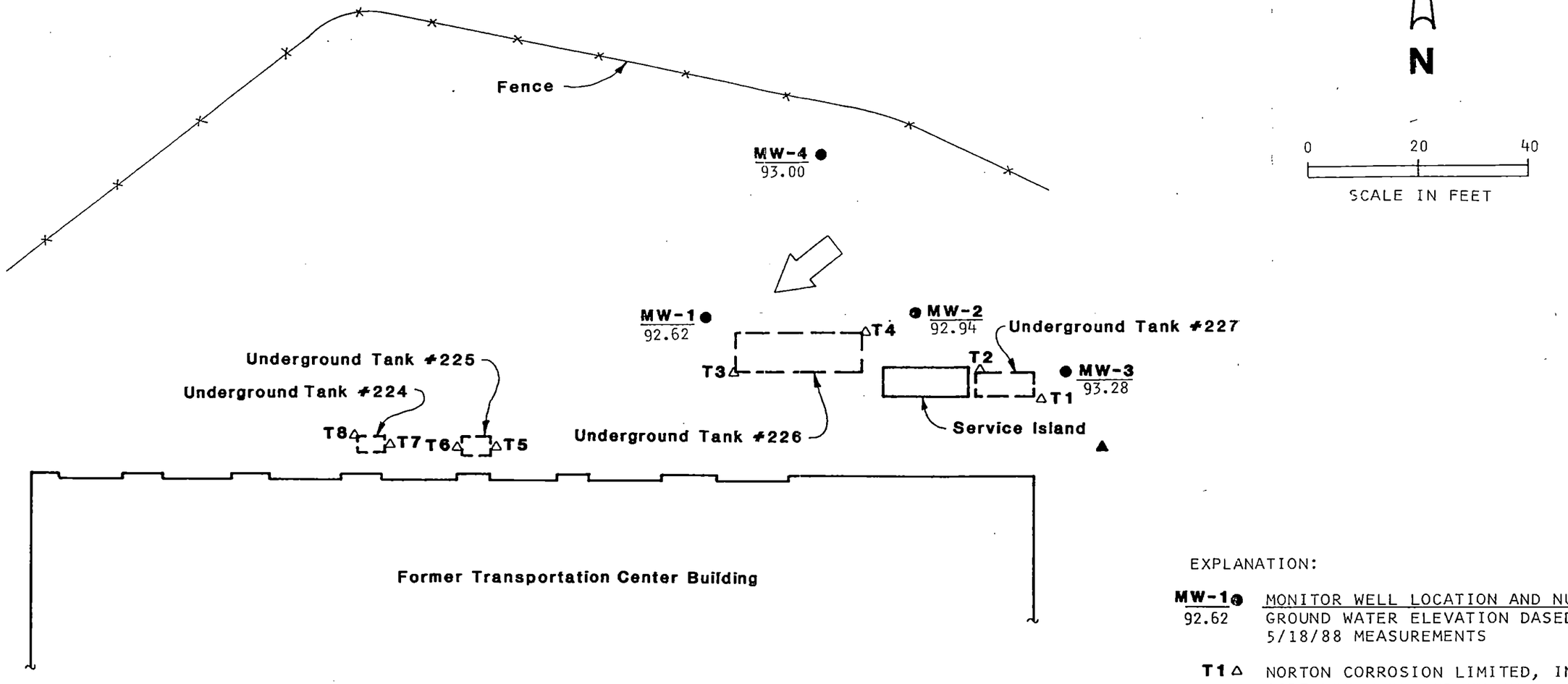


REFERENCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP "RENTON, WASH."

GeoEngineers

VICINITY MAP

FIGURE 1



EXPLANATION:

MW-1 / 92.62 — MONITOR WELL LOCATION AND NUMBER GROUND WATER ELEVATION DASED ON 5/18/88 MEASUREMENTS

T1 △ — NORTON CORROSION LIMITED, INC. CORE LOCATION AND NUMBER

APPROXIMATE DIRECTION OF GROUND WATER FLOW

▲ BENCHMARK AT CENTER OF MANHOLE. ASSUMED ELEVATION AT 100.00 FEET.

REFERENCE: UNTITLED, UNDATED MAP PROVIDED BY PUGET POWER AND SITE MEASUREMENTS MADE BY GEOENGINEERS ON 5/18/88.

GeoEngineers

SITE PLAN

FIGURE 2

APPENDIX A

FIELD EXPLORATIONS

APPENDIX A

FIELD EXPLORATIONS

DRILLING AND SOIL SAMPLING PROGRAM

Subsurface conditions at the former Renton Transportation Center were explored by drilling four borings at the locations indicated in Figure 2. The borings were drilled on May 13, 1988 to depths of 15 to 15.5 feet using truck-mounted, hollow-stem auger drilling equipment owned and operated by R & R Drilling. The drilling and soil sampling equipment was cleaned with a hot-water pressure washer between each boring, and between each sample attempt, respectively.

A geologist from our staff determined the boring locations, examined and classified the soils encountered, and prepared a detailed log of each boring. Soils encountered were classified visually in general accordance with ASTM D-2488-83, which is described in Figure A-1. An explanation of the boring log symbols is presented in Figure A-2. The boring logs are given in Figures A-3 through A-6.

Relatively undisturbed samples were obtained from Borings MW-1 through MW-3 using a Dames & Moore split-barrel sampler (2.4-inch ID). The sampler was driven 18 inches by a 300-pound weight falling a vertical distance of approximately 30 inches.

Three soil samples were selected for chemical analysis of fuel hydrocarbons and volatile aromatic hydrocarbons. The soil samples tested are denoted in our boring logs with a "CA."

MONITOR WELL CONSTRUCTION

Two-inch-diameter, Schedule 40 PVC pipe was installed in each boring at the completion of drilling. The lower portion of the PVC pipe is machine slotted (0.02-inch slot width) to allow entry of water, floating hydrocarbons and hydrocarbon vapors into the well casings. Coarse sand

was placed in the borehole annulus surrounding the slotted portion of the wells. The well casings are protected within flush-grade surface monuments. Monitor well construction is indicated in Figures A-3 through A-6.

The monitor wells were developed by removing water from the wells with a stainless steel bailer. We determined the elevations of the well casings to the nearest 0.01 foot with an engineer's level on May 13, 1988. An elevation datum of 100.00 feet was assumed at the center of a manhole cover located north of MW-3 (Figure 2). Elevations referenced to this datum are included on the monitor well logs.

GROUND WATER SAMPLING PROGRAM

Ground water samples were collected from the monitor wells by GeoEngineers on May 18, 1988. The water samples were collected with a teflon bailer after a minimum of three well volumes of water was removed from each well casing. The water samples were transferred to septum vials and liter bottles in the field and kept cool during transport to the testing laboratory. The water samples obtained for total petroleum hydrocarbon analysis were preserved with hydrochloric acid.

The bailer was cleaned prior to each sampling attempt with a fresh water rinse, trisodium phosphate wash, and a distilled water rinse.

GROUND WATER ELEVATIONS

The depth to the ground water table relative to the monitor well casing rims was measured on May 18, 1988. The site measurements were made using a weighted fiberglass tape and water-finding paste. The tape was cleaned prior to use at each well with a trisodium phosphate wash and a distilled water rinse. Ground water elevations were calculated by subtracting the water table depth from the casing rim elevations. Water table positions measured on May 18, 1988 are shown on the monitor well logs and in Figure 2.

HYDROCARBON VAPOR CONCENTRATIONS

Hydrocarbon vapor concentrations were measured in each monitor well on May 18, 1988 using our TLV Sniffer, which is calibrated to hexane. The lower threshold of significance for the TLV Sniffer in this application is 400 ppm (4 percent of the Lower Explosive Limit of hexane).

CHEMICAL ANALYTICAL PROGRAM

Three soil samples and four ground water samples were analyzed by Analytical Technologies Inc. The soil samples were analyzed for fuel hydrocarbons and aromatic volatile hydrocarbons using gas chromatography (Modified EPA Method 8015 and EPA Method 8020, respectively). Gas chromatography was also used to quantify specific aromatic hydrocarbons in the water samples (EPA Method 602). Infrared spectrophotometry methods were used to analyze for petroleum hydrocarbons in the ground water (EPA Method 418.1). The laboratory reports are presented in Appendix B.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-83.
2. Soil classification using laboratory tests is based on ASTM D2487-83.
3. Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry – Absence of moisture, dusty, dry to the touch

Moist – Damp, but no visible water

Wet – Visible free water or saturated, usually soil is obtained from below water table

GeoEngineers Incorporated

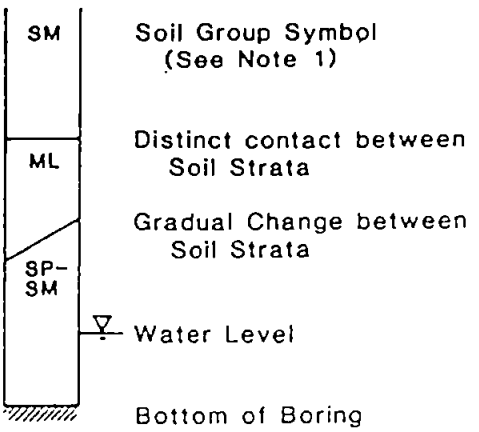
SOIL CLASSIFICATION SYSTEM

FIGURE A-1

LABORATORY TESTS:

AL	Atterberg limits
CP	Compaction
CS	Consolidation
DS	Direct shear
GS	Grain-size analysis
HA	Hydrometer analysis
K	Permeability
M	Moisture content
MD	Moisture and density
SP	Swelling pressure
TX	Triaxial compression
UC	Unconfined compression
CA	Chemical Analysis

SOIL GRAPH:



BLOW-COUNT/SAMPLE DATA:

Blows required to drive Dames & Moore sampler 12 inches or other indicated distances using 300 pound hammer falling 30 inches.

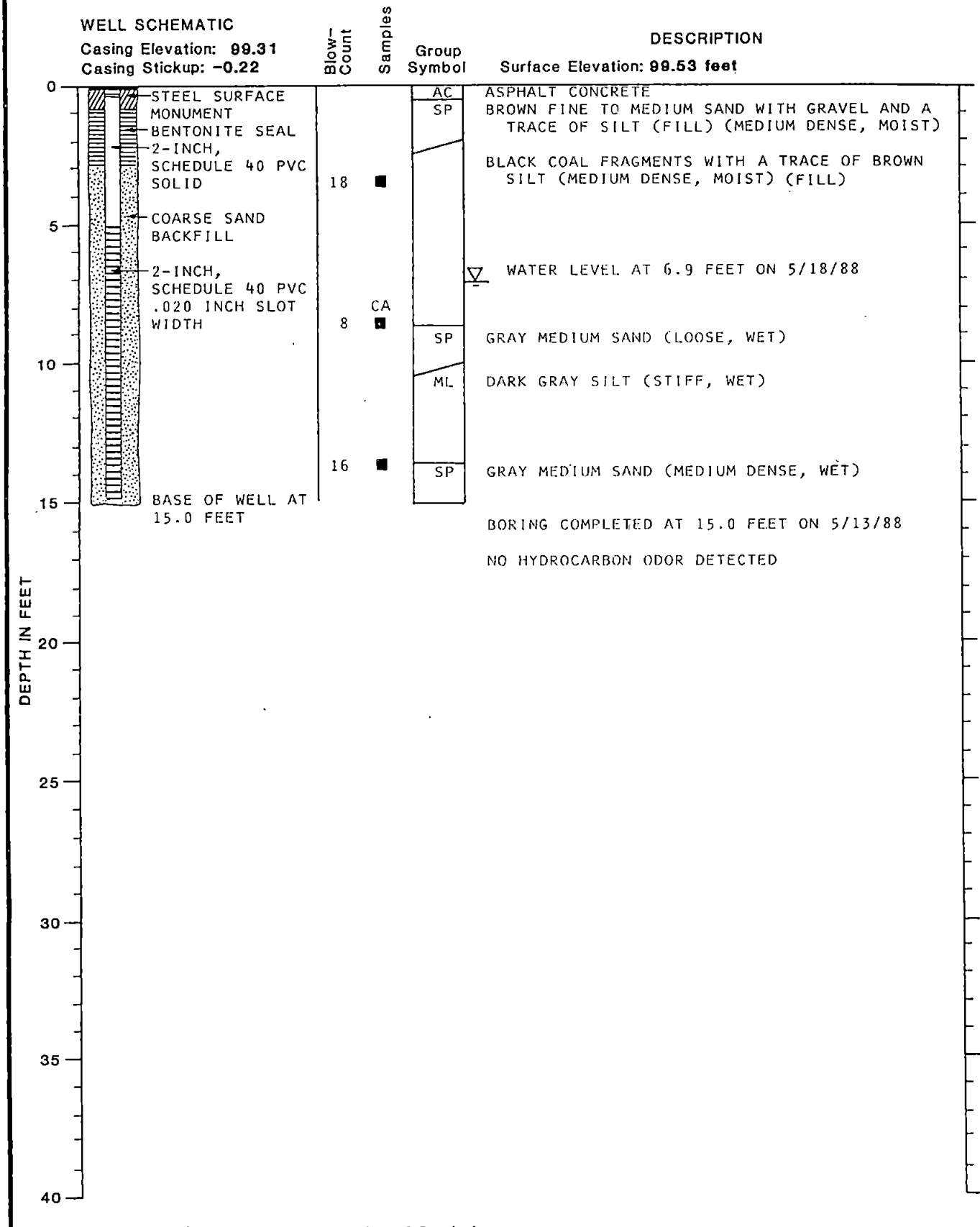
"P" indicates sampler pushed with weight of hammer or hydraulics of drill rig.

22 ■	Location of relatively undisturbed sample
12 ⊠	Location of disturbed sample
P □	Location of sampling attempt with no recovery
10 ◪	Location of sample attempt using Standard Penetration Test procedures
40 ▬	Location of relatively undisturbed sample using 140 pound hammer falling 30 inches.

NOTES:

1. Soil classification system is summarized in Figure A-1.
2. The reader must refer to the discussion in the report text as well as the exploration logs for a proper understanding of subsurface conditions.

MONITOR WELL NO. MW-1



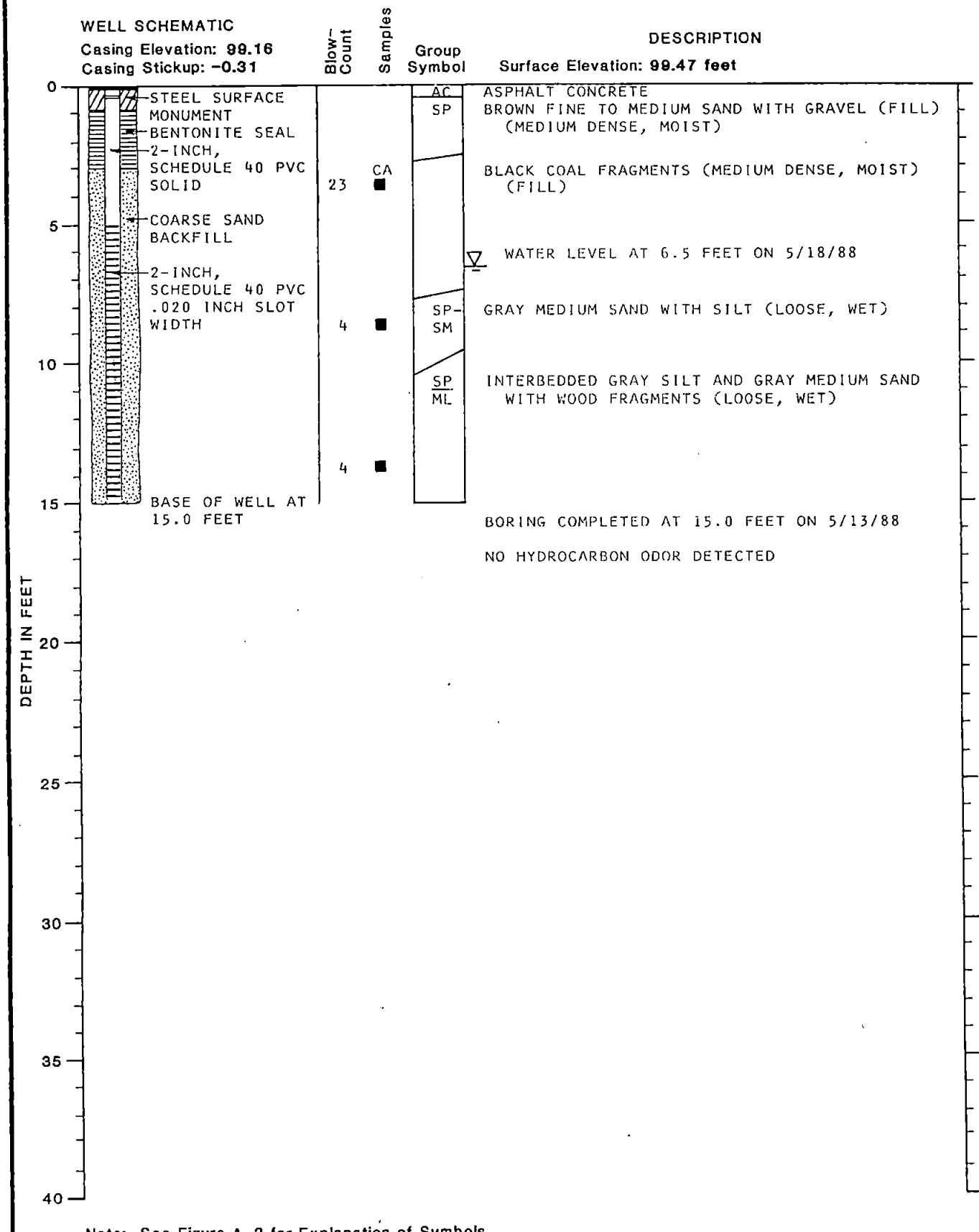
Note: See Figure A-2 for Explanation of Symbols

GeoEngineers

LOG OF MONITOR WELL

FIGURE A-3

MONITOR WELL NO. MW-2



Note: See Figure A-2 for Explanation of Symbols

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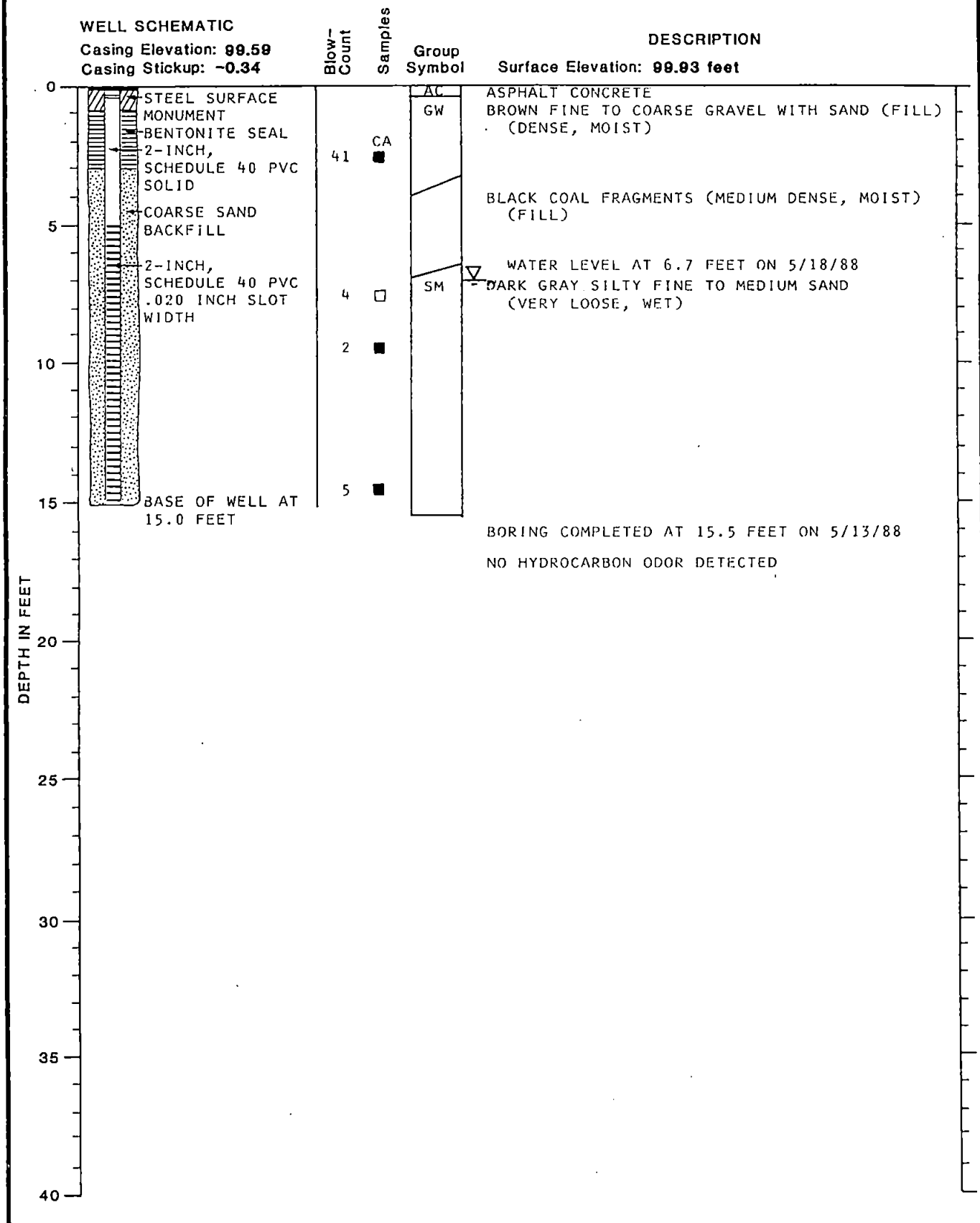
LOG OF MONITOR WELL

FIGURE A-4

MONITOR WELL NO. MW-3



Note: See Figure A-2 for Explanation of Symbols

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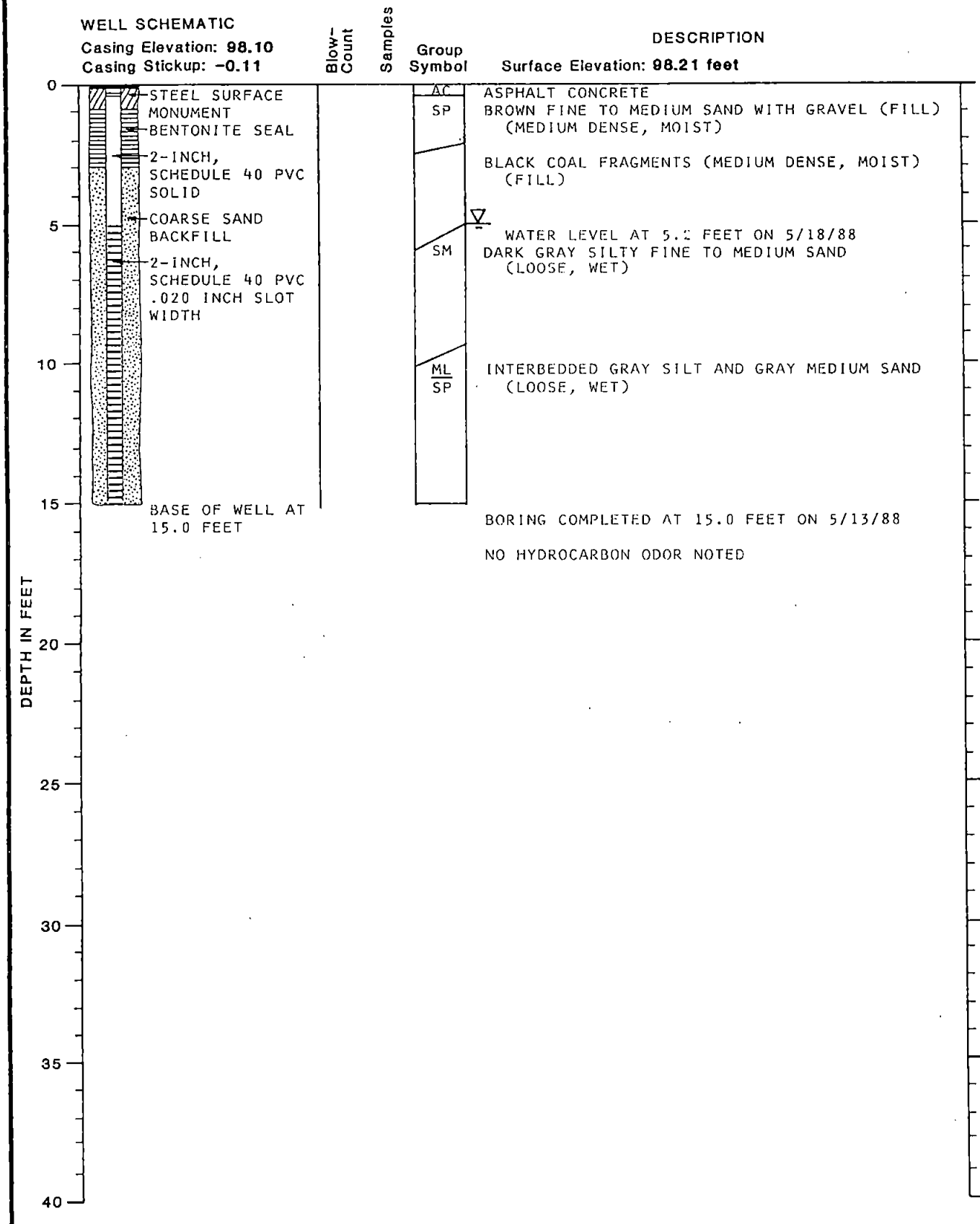
LOG OF MONITOR WELL

FIGURE A-5

MONITOR WELL NO. MW-4



Note: See Figure A-2 for Explanation of Symbols

GeoEngineers

LOG OF MONITOR WELL

FIGURE A-6

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. #8805-039

June 9, 1988

Geoengineers, Inc.
Steve Perrigo
2405 140th Ave. N.E.
Bellevue, WA 98005

Attention: Steve Perrigo

Project Name: Puget Power

Project Number: 0186-78-4

On May 19, 1988 Analytical Technologies, Inc. received four water samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Karen Y. Mixon
Karen Mixon
GC Chemist

Karen Y. Mixon for FWG
Frederick W. Grothkopp
Technical Manager

FWB/hbb

Analytical Technologies, Inc.

ATI I.D. #8805-039

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-78-4
PROJECT NAME : PUGET POWER

DATE RECEIVED : 05/19/88
REPORT DATE : 06/09/88

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
8805-039-1	MW-1	WATER	05/18/88
8805-039-2	MW-2	WATER	05/18/88
8805-039-3	MW-3	WATER	05/18/88
8805-039-4	MW-4	WATER	05/18/88

----- TOTALS -----

MATRIX	# SAMPLES
WATER	4

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

APPENDIX B

ANALYTICAL TESTING DATA

ATI I.D. #8805-039

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC. PROJECT #: 0186-78-4
PROJECT : PUGET POWER

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE AROMATICS	GC/PID	EPA 602
PETROLEUM HYDROCARBONS	IR	EPA 418.1

AnalyticalTechnologies, Inc.

ATI I.D. #8805-039

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-78-4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 05/31/88
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 602	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
CHLOROBENZENE	<0.5
ETHYLBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
META XYLENE	<0.5
ORTHO & PARA XYLENE	<0.5

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	104

ATI I.D. #8805-039-1

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/18/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/19/88
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1	DATE ANALYZED	: 05/31/88
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 602	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
CHLOROBENZENE	<0.5
ETHYLBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
META XYLENE	<0.5
ORTHO & PARA XYLENE	<0.5

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	95

Analytical Technologies, Inc.

ATI I.D. #8805-039-2

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/18/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/19/88
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 05/31/88
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 602	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
CHLOROBENZENE	<0.5
ETHYLBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
META XYLENE	<0.5
ORTHO & PARA XYLENE	<0.5

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	97

ATI I.D. #8805-039-3

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/18/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/19/88
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3	DATE ANALYZED	: 05/31/88
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 602	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
CHLOROBENZENE	<0.5
ETHYLBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
META XYLENE	<0.5
ORTHO & PARA XYLENE	<0.5

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	95

ATI I.D. #8805-039-4

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/18/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/19/88
PROJECT NAME	: PUGET POWER	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4	DATE ANALYZED	: 05/31/88
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 602	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.5
TOLUENE	<0.5
CHLOROBENZENE	<0.5
ETHYLBENZENE	<0.5
1,3-DICHLOROBENZENE	<0.5
1,2 & 1,4-DICHLOROBENZENE	<0.5
META XYLENE	<0.5
ORTHO & PARA XYLENE	<0.5

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	96

ATI I.D. #8805-039

QUALITY CONTROL DATA
MATRIX SPIKE/MATRIX SPIKE DUPLICATES

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-78-4
SAMPLE I.D. : 88050-38-3

SAMPLE MATRIX : WATER
UNITS : ug/L
EPA METHOD : 602

COMPONENT	SAMPLE RESULT	SPIKED ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	<0.5	8.0	7.5	94	7.7	96	3
TOLUENE	.88	8.0	7.7	96	8.0	100	4
META-XYLENE	<0.5	22.8	22.4	98	22.3	98	0
ETHYLBENZENE	<0.5	8.0	7.8	98	7.9	99	1

Analytical Technologies, Inc.

ATI I.D. #8805-039

GENERAL CHEMISTRY RESULTS

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-78-4
PROJECT NAME : PUGET POWER
MATRIX : WATER

DATE RECEIVED : 05/19/88
REPORT DATE : 06/09/88

PARAMETER	UNITS	01	02	03	04
PETROLEUM HYDROCARBONS	mg/L	0.67	0.53	0.40	2.9

ATI I.D. #8805-039

GENERAL CHEMISTRY QUALITY CONTROL

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-76-4
PROJECT NAME : PUGET POWER
MATRIX : WATER

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP RSLT.	RPD	SPIKED RESULT	SPIKE CONC.	% REC
PETROLEUM HYDROCARBONS	mg/L	8805-039-3	0.40	5.1	171*			
PETROLEUM HYDROCARBONS	mg/L	8805-034-13				12.67	10	127

* High RPD due to sampling inconsistency.

Analytical Technologies, Inc.

San Diego ● Phoenix ● Seattle

Chain of Custody

DATE 5/19 PAGE 1 OF 1

PROJ. MGR. Steve Perrigo
COMPANY GeoEngineers Inc
ADDRESS 2405 - 140th Ave NE Suite 1
Bellevue Wa

SAMPLERS (SIGNATURE) W. Stephen Lewis 5/19 (PHONE NO.) 746-5200

ANALYSIS REQUEST

SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.	BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418			PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLC/STLC	EP TOX METALS (8)	SWDA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE				NUMBER OF CONTAINERS
mw-1	5/18	1431	H_2O	-1							X			X										X	4
mw-2	5/18	1502		-2							X			X										X	4
mw-3	5/18	1550		-3							X			X										X	4
mw-4	5/18	1633	↓	-4							X			X										X	4

B - 12

PROJECT INFORMATION

PROJECT: Puget Power
PO NO. 0186-78-4
SHIPPING ID. NO.
VIA:

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	16
CHAIN OF CUSTODY SEALS	✓
REC'D GOOD CONDITION/COLD	✓
CONFORMS TO RECORD	✓

LAB NO. 8805-039

SPECIAL INSTRUCTIONS/COMMENTS:
4 bottles per sample

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
W. Stephen Lewis 0826 (Signature) (Time)	(Signature) (Time)	(Signature) (Time)
W. Stephen Lewis (Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
GeoEngineers 5/19 (Company)	(Company)	(Company)
RECEIVED BY 1.	**RECEIVED BY 2.**	**RECEIVED BY (LABORATORY) 3.**
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name)
(Company)	(Company)	ANALYTICAL TECHNOLOGIES, INC.

ATI LABORATORIES: SAN DIEGO (619) 458-9141 PHOENIX (602) 438-1530

DISTRIBUTION: WHITE, CANARY - ANALYTICAL TECHNOLOGIES, INC. ● PINK - ORIGINATOR

Analytical Technologies, Inc.
560 Naches Avenue, S.W., Suite 101, Renton, WA 98055 (206) 228-8335

GeoEngineers

JUN 17 1988

Routing

File

ATI I.D. #8805-029

June 16, 1988

Geoengineers, Inc.
2405 140th Ave. N.E.
Bellevue, WA 98005

Attention: Steve Perrigo

Project Name: Puget Power-Renton

Project Number: 0186-78-4

On May 13, 1988 Analytical Technologies, Inc. received three soil samples for analyses. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Karen Mixon
GC Chemist

Frederick W. Grothkopp
Technical Manager

FWG/hbb

Analytical Technologies, Inc.

ATI I.D. #8805-029

SAMPLE CROSS REFERENCE SHEET

CLIENT : GEOENGINEERS, INC.
PROJECT # : 0186-78-4
PROJECT NAME : PUGET POWER-RENTON

DATE RECEIVED : 05/13/88
REPORT DATE : 06/16/88

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
8805-029-1	B-1-#2 @ 8 1/2'	SOIL	05/13/88
8805-029-2	B-2 #1 @ 3 1/2'	SOIL	05/13/88
8805-029-3	B-3 #1 @ 2 1/2'	SOIL	05/13/88

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	3

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ATI I.D. #8805-029

ANALYTICAL SCHEDULE

CLIENT : GEOENGINEERS, INC
PROJECT # : 0186-78-4
PROJECT : PUGET POWER-RENTON

ANALYSIS	TECHNIQUE	REFERENCE/METHOD
PURGEABLE AROMATICS	GC/PID	EPA 8020
FUEL HYDROCARBONS	GC/FID	EPA 8015 (modified)

ATI I.D. #:8805-029

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-78-4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/19/88
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 05/23/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
CHLOROBENZENE	<0.025
ETHYLBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,2 & 1,4-DICHLOROBENZENE	<0.025
META XYLENE	<0.025
ORTHO & PARA XYLENE	<0.025
SURROGATE PERCENT RECOVERIES	
TRIFLUOROTOLUENE (%)	92

ATI I.D. #:8805-029-1

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/13/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/13/88
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/19/88
CLIENT I.D.	: B-1-#2 @ 8 1/2	DATE ANALYZED	: 05/24/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020	DILUTION FACTOR	: 1

RESULTS BASED ON % DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	0.093
TOLUENE	0.41
CHLOROBENZENE	<0.025
ETHYLBENZENE	0.14
1,3-DICHLOROBENZENE	<0.025
1,2 & 1,4-DICHLOROBENZENE	<0.025
META XYLENE	0.36
ORTHO & PARA XYLENE	0.46

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	98
% MOISTURE	21.2

Analytical Technologies, Inc.

ATI I.D. #: 8805-029-2

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/13/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/13/88
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/19/88
CLIENT I.D.	: B-2 #1 @ 3 1/2'	DATE ANALYZED	: 05/24/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020	DILUTION FACTOR	: 1

RESULTS BASED ON % DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
CHLOROBENZENE	<0.025
ETHYLBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,2 & 1,4-DICHLOROBENZENE	<0.025
META XYLENE	0.089
ORTHO & PARA XYLENE	0.060

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	113
% MOISTURE	13.4

ATI I.D. #:8805-029-3

PURGEABLE AROMATICS ANALYSIS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/13/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/13/88
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/19/88
CLIENT I.D.	: B-3 #1 @ 2 1/2'	DATE ANALYZED	: 05/24/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8020	DILUTION FACTOR	: 1

RESULTS BASED ON % DRY WEIGHT

COMPOUNDS	RESULTS
BENZENE	<0.025
TOLUENE	<0.025
CHLOROBENZENE	<0.025
ETHYLBENZENE	<0.025
1,3-DICHLOROBENZENE	<0.025
1,2 & 1,4-DICHLOROBENZENE	<0.025
META XYLENE	<0.025
ORTHO & PARA XYLENE	<0.025

SURROGATE PERCENT RECOVERIES

TRIFLUOROTOLUENE (%)	90
% MOISTURE	5.45

ATI I.D. #8805-029

QUALITY CONTROL DATA
MATRIX SPIKE/MATRIX SPIKE DUPLICATES

CLIENT : GEOENGINEERS, INC.
PROJECT : PUGET POWER-RENTON
SAMPLE I.D. : 8805-029-1

SAMPLE MATRIX : SOIL
UNITS : mg/Kg
EPA METHOD : 8020

COMPONENT	SAMPLE RESULT	SPIKED ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
BENZENE	0.073	0.6	0.53	76	0.54	78	2
TOLUENE	0.32	0.6	0.6	47	0.59	46	5
CHLOROBENZENE	<0.025	0.6	0.46	77	0.44	73	4
META-XYLENE	0.28	1.1	0.98	89	0.92	84	6

ATI I.D. #8805-029

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: N/A
PROJECT #	: 0186-78-4	DATE RECEIVED	: N/A
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/12/88
CLIENT I.D.	: BLANK	DATE ANALYZED	: 05/13/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED (GC/FID)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	-

ATI I.D. #8805-029-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/13/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/13/88
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/13/88
CLIENT I.D.	: B-1-#2 @ 8 1/2'	DATE ANALYZED	: 05/13/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED (GC/FID)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	-

Analytical Technologies, Inc.

ATI I.D. #8805-029-2

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/13/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/13/88
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/13/88
CLIENT I.D.	: B-2 #1 @ 3 1/2'	DATE ANALYZED	: 05/13/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED (GC/FID)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	34
HYDROCARBON RANGE	C12 - C24+
HYDROCARBONS QUANTITATED USING	DIESEL

BEST ESTIMATE OF FUEL TYPE - 1 PART GAS : 6 PARTS DIESEL

Analytical Technologies, Inc.

ATI I.D. #8805-029-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: GEOENGINEERS, INC.	DATE SAMPLED	: 05/13/88
PROJECT #	: 0186-78-4	DATE RECEIVED	: 05/13/88
PROJECT NAME	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/13/88
CLIENT I.D.	: B-3 #1 @ 2 1/2'	DATE ANALYZED	: 05/13/88
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8015 MODIFIED (GC/FID)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<5
HYDROCARBON RANGE	-
HYDROCARBONS QUANTITATED USING	GASOLINE
FUEL HYDROCARBONS	19
HYDROCARBON RANGE	C14 - C24
HYDROCARBONS QUANTITATED USING	DIESEL

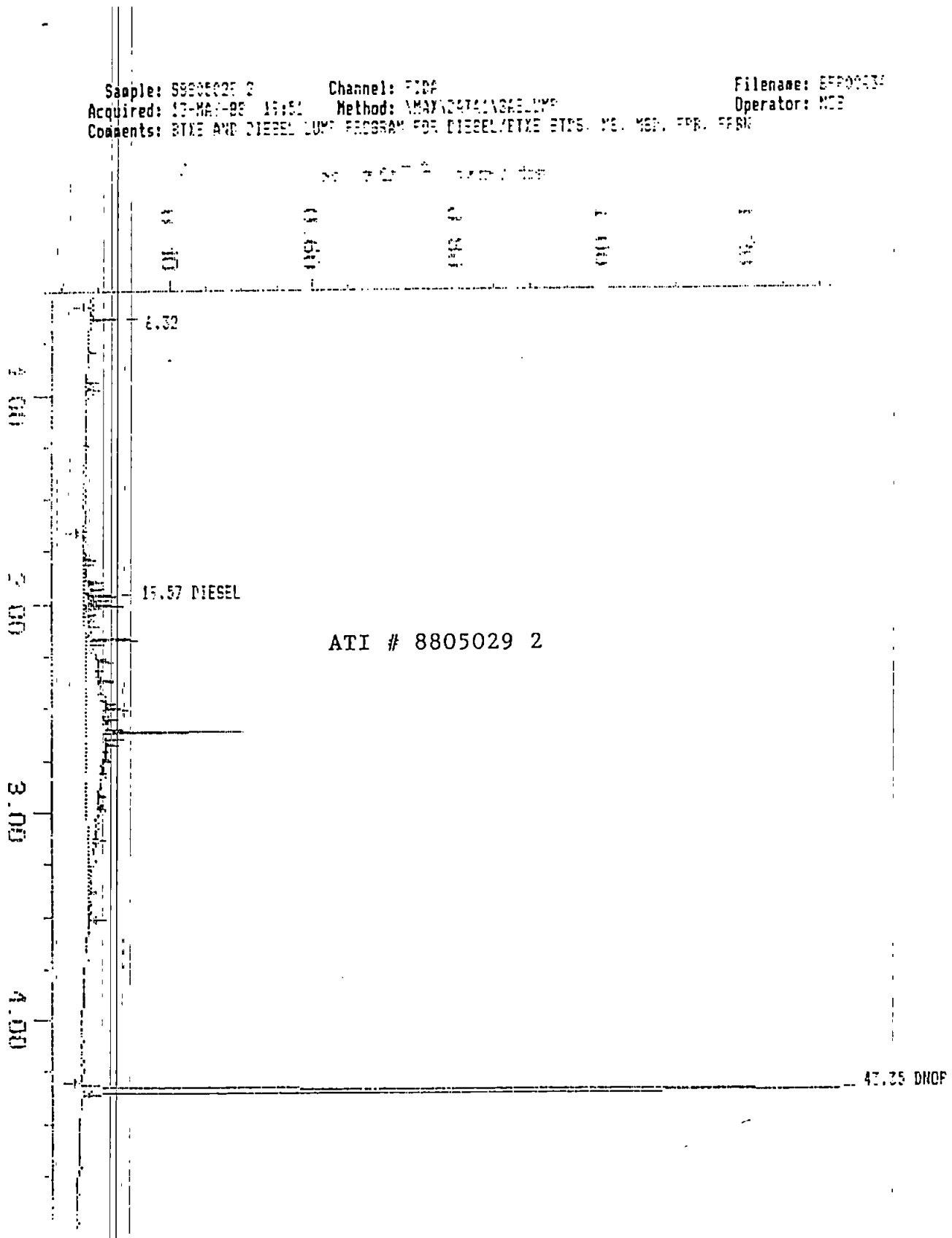
BEST ESTIMATE OF FUEL TYPE - 1 PART GAS : 4 PARTS DIESEL

ATI I.D. #8805-029

QUALITY CONTROL DATA
MATRIX SPIKE/MATRIX SPIKE DUPLICATES

CLIENT	: GEOENGINEERS, INC.	SAMPLE MATRIX	: SOIL
PROJECT	: PUGET POWER-RENTON	DATE EXTRACTED	: 05/12/88
SAMPLE I.D.	: SAND 5/12	DATE ANALYZED	: 05/13/88
EPA METHOD	: MODIFIED 8015	UNITS	: mg/Kg

COMPONENT	SAMPLE RESULT	SPIKED ADDED	SPIKED SAMPLE	% REC	DUP SPIKED SAMPLE	DUP % REC	RPD
GASOLINE		500	426	85	425	85	0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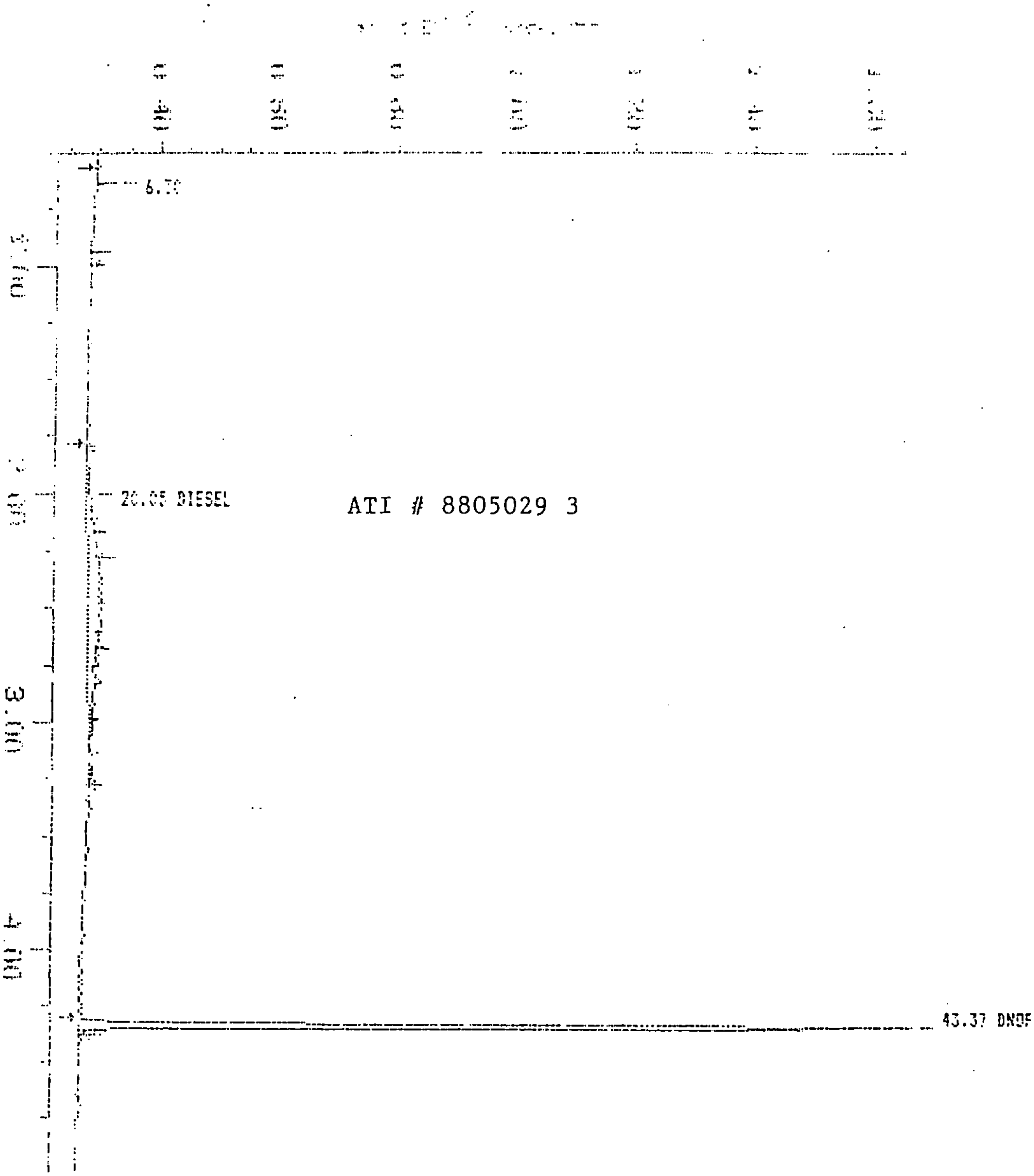
Acquired: 13-MAY-88
Comments: BTXE AND DIESEL LUMP PROGRAM FOR DIESEL/BTXE ETPS. MS. MSP. FPR. FPSK
Channel: FIDF
Method:
Filename:
Operator: MCE
6.32
15.57 DIESEL
ATI # 8805029 2
47.35 DNOP

Sample: [illegible] Channel: [illegible] Filename: [illegible]
Acquired: [illegible] Method: [illegible] Operator: [illegible]
Comments: [illegible]



ATI # 8805029 3

Analytical**Technologies,** Inc.
San Diego ● Phoenix ● Seattle

Chain of Custody

DATE 5/13 PAGE 1 OF 1

PROJ. MGR. Steve Pettigrew
COMPANY GeoEngineers Inc.
ADDRESS 2405 - 140th Ave NE, Suite 105
Bellevue Wa 98005

SAMPLERS (SIGNATURE) Deborah Y Khuty
(PHONE NO.) 746-5200

SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.	BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418	Fuel Hydrocarbons 8015		PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLC/STLC	EP TOX METALS (8)	SWDA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE				NUMBER OF CONTAINERS
B-1 - #2 @ 8½'	5/13	8:45	Soil	-1							X				X										1
B-2 #1 @ 3½'	5/13	10:35	"	-2							X				X										1
B-3 #1 @ 2½'	5/13	12:30	"	-3							X				X										1

PROJECT INFORMATION	SAMPLE RECEIPT		RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
PROJECT: Puget Power - Renton	TOTAL NO. OF CONTAINERS	3	Deborah Khuty 16:09		
PO NO. 0186-78-4	CHAIN OF CUSTODY SEALS	✓	(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
SHIPPING ID. NO.	REC'D GOOD CONDITION/COLD	✓	Deborah J Kuty 5/13		
VIA: Hand delivered	CONFORMS TO RECORD	✓	(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
	LAB NO.	8805-029	GeoEngineers Inc.		
			(Company)	(Company)	(Company)
SPECIAL INSTRUCTIONS/COMMENTS:			RECEIVED BY 1.	RECEIVED BY 2.	RECEIVED BY (LABORATORY) 3.
					Michelle Cooley
			(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
			(Printed Name) (Date)	(Printed Name) (Date)	MICHELLE COOLEY (Printed Name)
			(Company)	(Company)	ANALYTICAL TECHNOLOGIES, INC

ATL LABORATORIES: SAN DIEGO (619) 458-9141 PHOENIX (602) 438-1530

DISTRIBUTION: WHITE, CANARY - ANALYTICAL TECHNOLOGIES, INC ● PINK - ORIGINATO

B - 28

FARR, FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James K. Farr, Ph.D.
Andrew John Friedman
James E. Bruya, Ph.D.

JUL 19 1988

Routing JKF pf

File

3008 B - 16th West
Seattle, WA 98119
(206) 285-8282

July 15, 1988

Steve Perrigo, Project Manager
GeoEngineers, Inc.
2405-140th Avenue N.E., Suite 105
Bellevue, WA 98005

Dear Steve:

Enclosed are the results of the analyses of samples submitted on July 13, 1988 from Project 0186-78-4.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

James K. Farr, Ph.D.

JKF/cag

Enclosures

Date of Report: July 15, 1988
Date Submitted: July 13, 1988
Project: 0186-78-4

RESULTS OF ANALYSES OF ENVIROMENTAL SAMPLES FOR METHANE BY GC/FID

Sample #	Methane (ppm)
MW-4A gas	109,000[a]
Quality Assurance	
Method Blank	<100
MW-4B (Duplicate)	46,000[a]

a - Value reported exceeded the calibration range established for the sample.

Date of Report: July 15, 1988
Date Submitted: July 13, 1988
Project: 0186-78-4

RESULTS OF ANALYSES OF ENVIRONMENTAL SAMPLES FOR TOTAL VOLATILE HYDROCARBONS AS N-HEXANE

Sample #	Total Volatile Hydrocarbons (ppm)
MW-4A gas	<10
Quality Assurance	
Method Blank	<10
MW-4B (Duplicate)	<10

APPENDIX C

ECOLOGY'S SOIL CLEANUP GUIDELINES

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4350-150th Ave. N.E. • Redmond, Washington 98052-5301 • (206) 867-7000

SOIL SAMPLING FOR UNDERGROUND STORAGE TANKS
(Petroleum Products)

Below is a list of testing parameters and clean-up levels for common petroleum contaminants. Different tests are used for each contaminant. These are quidelines used in the Seattle metropolitan area by the Northwest Region of the Department of Ecology (Ecology).

Excavate until no odor or visual signs of product are detected. Then take a representative sample of the excavation pit walls and bottom to determine if clean-up levels have been achieved. Take another representative sample(s) of the excavated material to characterize it for treatment or disposal. If clean-up levels in the pit walls and bottom have not been reached, remove additional material and resample. Excavated material which has concentrations higher than the clean-up levels must be treated or disposed off-site.

CONTAMINANT	PARAMETER	SOIL CLEAN-UP LEVELS (parts per million-ppm parts per billion-ppb)
Gasoline	Benzene	66 ppb
	Toluene	143 ppm
	Ethyl benzene	-
	Xylene	-
Diesel	Total Petroleum Hydrocarbons (TPH)	200 ppm

Waste oil tank issues are more complex and may involve testing for petroleum, metals, solvents and PCB contamination.

If there is a potential threat to groundwater (e.g. soil contamination and a shallow groundwater table), monitoring wells and groundwater sampling may be required.

These values are guidelines and may vary according to specific situations (e.g. drinking water well or other sensitive receptor impacts?). If you have additional questions, contact the Northwest Region of Ecology at 867-7000.

3/8/88