

Report
Supplemental Site Characterization
and Site Closure Report
Grady Way Complex Property
Renton, Washington

December 21, 1999

*PSE Grady Way Renton
Complex VCP*

*aka LUST # 511315
Renton Sheffield*

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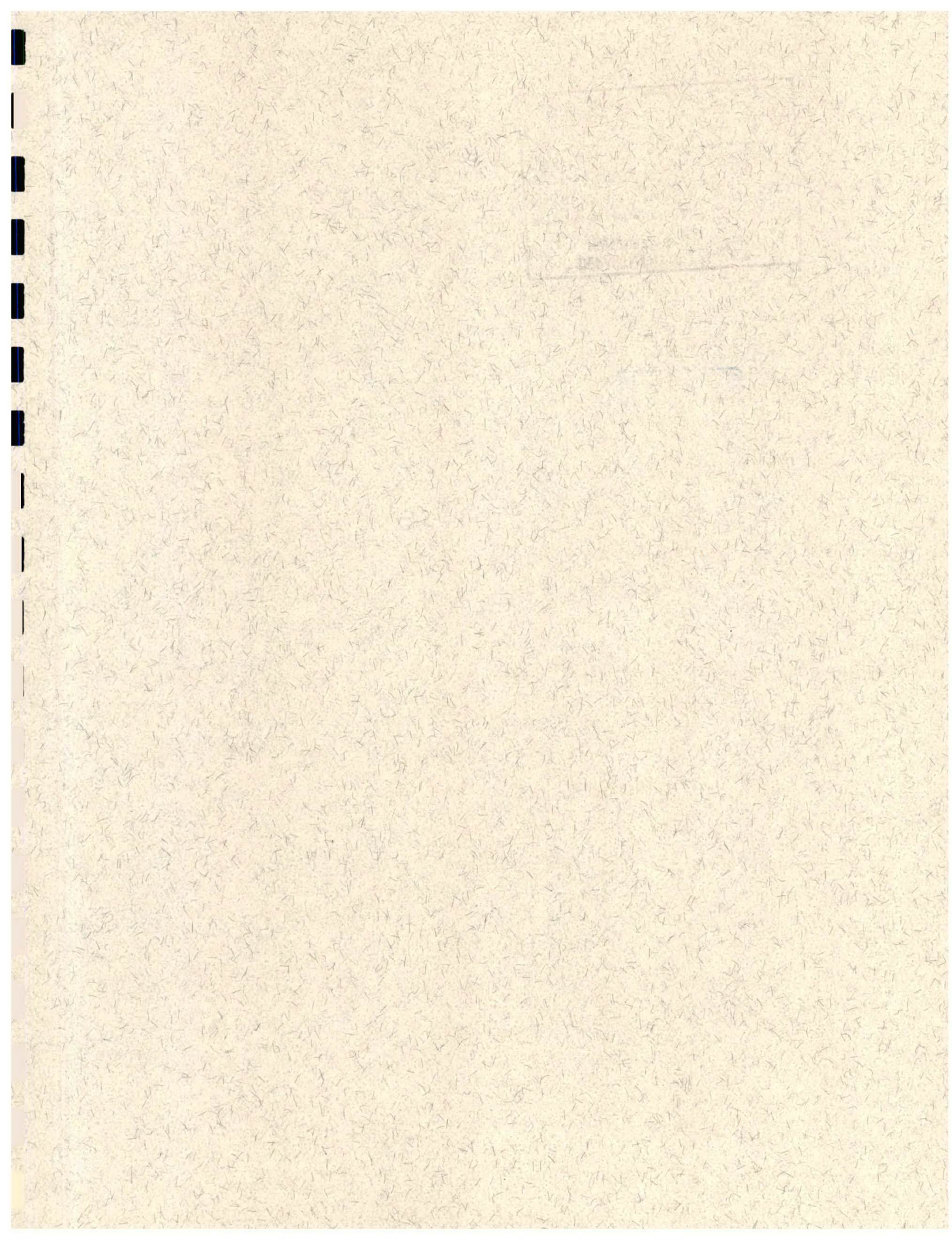
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For
Puget Sound Energy

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DEPARTMENT OF ECOLOGY NWRO/TCP TANKS UNIT	
INTERIM CLEANUP REPORT	<input type="checkbox"/>
SITE CHARACTERIZATION	<input type="checkbox"/>
FINAL CLEANUP REPORT	<input type="checkbox"/>
OTHER <i>XXXX</i>	<input type="checkbox"/>
AFFECTED MEDIA: SOIL	<input checked="" type="checkbox"/>
OTHER GW	<input checked="" type="checkbox"/>
INSPECTOR (INIT.) <i>AB</i>	DATE <i>6/30/00</i>



December 21, 1999

**Consulting Engineers
and Geoscientists**
Offices in Washington,
Oregon, and Alaska

Puget Western, Inc.
19515 North Creek Parkway, Suite 310
Bothell, Washington 98011

Attention: Bob Boyd

We are pleased to submit four copies of our report entitled "Supplemental Site Characterization and Site Closure Report" for Puget Sound Energy's (PSE) former Grady Way Complex property in Renton, Washington. Our study was authorized by Bob Boyd of Puget Western and was completed in general accordance with the scope of services described in our fee estimate dated December 1, 1999, and the conditions of our general agreement with Puget Sound Energy (Contract No. 9600000888).

We appreciate the opportunity to assist Puget Western and PSE on this project. Please contact us if you have questions regarding this report.

Yours very truly,

GeoEngineers, Inc.



Kurt R. Fraese
Principal

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cc:	Nnamdi Madakor (1 copy) Washington State Dept. of Ecology Northwest Regional Office 3190-160th Avenue Southeast Bellevue, Washington 98008-5452	Steve Secrist (1 copy) Puget Sound Energy Environmental Services P.O. Box 90868 MER-04S Bellevue, Washington 98009-0868
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EXECUTIVE SUMMARY

GeoEngineers monitored supplemental site characterization activities at Puget Sound Energy's (PSE's) Grady Way Complex property located at 915 Grady Way South in Renton, Washington. The location of the site is shown in Figure 1. These activities were completed on December 2, 1999. The purpose of this study was to further evaluate the potential presence of soil contamination related to petroleum hydrocarbons in Parcel 2 and polychlorinated biphenyls (PCBs) in Parcel 3. Additional information also was obtained relative to the extent of PCBs in ground water beneath Parcel 3.

GeoEngineers monitored the completion of one soil boring in Parcel 2 and 13 soil borings in Parcel 3 using direct-push drilling equipment. A total of 18 soil samples and eight ground water samples were obtained from the borings and submitted for chemical analysis of diesel- and lube oil-range hydrocarbons using Washington State Department of Ecology (Ecology) Method NWTPH-D extended, or PCBs using EPA Method 8082. One ground water sample also was obtained from existing monitoring well GMW-4a and submitted for analysis of PCBs.

Diesel- and lube oil-range hydrocarbons were not detected in the soil sample obtained from Parcel 2. This sample was obtained from boring SB-1, located immediately upgradient of existing monitoring well GMW-14.

PCBs either were not detected or were detected at concentrations less than the MTCA Method A cleanup level in the soil samples obtained from borings SB-2 through SB-14 (Parcel 3). These borings were completed at locations upgradient (SB-4, SB-8, SB-9, SB-10, SB-12 and SB-13) and cross-gradient (SB-2 and SB-14) of existing monitoring well GMW-4a. PCBs were detected at a concentration [0.70 micrograms per liter ($\mu\text{g/l}$)] exceeding the MTCA Method A cleanup level (0.1 $\mu\text{g/l}$) in the ground water sample obtained from GMW-4a. This analytical result is generally consistent with past quarterly sampling events in GMW-4a. PCBs were not detected in the ground water samples obtained from the direct-push borings. Based on these analytical data, it is our opinion that the residual PCB ground water contamination detected in GMW-4a is limited in lateral extent. Additionally, analytical results from a total of 34 soil samples obtained during this study and our 1998 remedial activities suggest that the source of the PCB ground water contamination detected in GMW-4a was removed from the site or, if present, is likely limited to the immediate vicinity of GMW-4a.

**SUPPLEMENTAL SITE CHARACTERIZATION
AND SITE CLOSURE REPORT
GRADY WAY COMPLEX PROPERTY
RENTON, WASHINGTON
FOR
PUGET SOUND ENERGY**

1.0 INTRODUCTION

This report summarizes the supplemental site characterization activities completed at Puget Sound Energy's (PSE) former Grady Way Complex property located at 915 Grady Way South in Renton, Washington. The activities described in this report were completed on December 2, 1999. The location of the site relative to surrounding physical features is shown in Figure 1. The site is comprised of four parcels (Parcels 1 through 4) as shown in Figure 2. The northern-most portion of the original Grady Way Complex site has been sold, as shown in Figure 2.

PSE completed several phases of subsurface characterization and remediation activities to prepare the site for sale. The results of this work have been presented to the Washington State Department of Ecology (Ecology) in numerous written reports and meetings. The work summarized in this report is intended to provide Ecology with the final information it requires to issue separate letters documenting "No Further Action" (NFA) determinations for Parcels 1 through 3. The scope of services for this study is based on our meeting with Ecology (Nnamdi Madakor) on November 29, 1999.

2.0 BACKGROUND AND PURPOSE

During our recent meeting with Ecology, PSE requested that separate NFAs be issued for Parcels 1 through 3. Mr. Madakor indicated that Ecology is prepared to issue NFAs for Parcels 1 and 3 based on the existing subsurface information. However, Ecology will require that additional subsurface information be obtained prior to issuing an NFA for Parcel 2, as described below. The NFAs for Parcels 1 through 3 will require restrictive covenants that address residual ground water contamination beneath the site.

Mr. Madakor requested that PSE evaluate the potential presence of petroleum-contaminated soil beneath Parcel 2 prior to issuing an NFA for this portion of the site. This was requested because (1) petroleum-related ground water contamination has been detected beneath Parcel 2 (along the road frontage) during past monitoring events, and (2) extensive soil analytical data does not exist for Parcel 2. Ground water conditions beneath Parcel 2 and other portions of the site are described in our report entitled "1998 Site Cleanup Activities, Grady Way Complex Property, Renton, Washington (Volume I of II)," dated December 23, 1998. In our opinion, the ground water contamination detected beneath Parcel 2 is migrating onto the site from beneath Talbot Road, as summarized in our December 1998 report.

Four monitoring wells (GMW-8, GMW-9, GMW-13 and GMW-14) were installed on Parcel 2, as summarized in our December 1998 report. Field screening results suggested the potential presence of petroleum-related soil contamination in one of these wells (GMW-14). Soil

samples obtained from depths ranging between about 8 and 14 feet below ground surface (bgs) in GMW-14 exhibited a moderate sheen; soil samples from this boring were not submitted for analysis at the time GMW-14 was installed. Other soil samples obtained from the soil borings completed in Parcel 2 did not exhibit sheens. Based on this information, representatives of Ecology and PSE agreed that a soil boring should be completed immediately adjacent to GMW-14 to further evaluate the potential presence of petroleum-related soil contamination beneath Parcel 2.

During our recent meeting with Ecology, we also discussed issues related to the presence of polychlorinated biphenyls (PCBs) in ground water in GMW-4a, in the southern portion of the site (Parcel 3). PCB-contaminated soil was removed from this location during 1998 remedial activities; however, PCB (aroclor 1242) concentrations in ground water samples obtained from GMW-4a do not appear to have significantly declined during recent monitoring events. PSE decided to conduct additional exploration in the vicinity of GMW-4a to evaluate whether PCB-contaminated soil remains in this area. This work was completed as a conservative measure by PSE to facilitate property sale and redevelopment. Ecology did not require this as a condition for granting an NFA for Parcel 3.

Additional subsurface explorations were completed at the site on December 2, 1999 to further evaluate the potential presence of (1) petroleum-contaminated soil beneath Parcel 2, and (2) PCB-contaminated soil beneath Parcel 3. The results of these activities are described in this report.

3.0 SCOPE OF SERVICES

1. Monitor the completion of 14 soil borings using direct-push drilling equipment. One soil boring (SB-1) was completed in Parcel 2, adjacent to existing monitoring well GMW-14; 13 soil borings (SB-2 through SB-14) were completed in Parcel 3, in the vicinity of existing monitoring well GMW-4a.
2. Obtain soil samples from the borings for field screening and chemical analysis of diesel- and heavy oil-range hydrocarbons using Ecology Method NWTPH-D extended, or PCBs using EPA Method 8082.
3. Obtain ground water samples from GMW-4a and selected soil borings for chemical analysis of PCBs using EPA Method 8082.
4. Evaluate the soil chemical analytical results relative to applicable MTCA cleanup levels. The ground water chemical analytical results were evaluated relative to the concentration of PCBs detected in prior ground water samples obtained from GMW-4a.

4.0 SUPPLEMENTAL SITE CHARACTERIZATION

4.1 GENERAL

A total of 14 soil borings were completed at the site on December 2, 1999 using direct-push drilling equipment operated by Transglobal Environmental Geosciences Northwest (TEG) of Lacey, Washington. Soil and ground water samples obtained from the borings and existing monitoring well GMW-4a were submitted to TEG's mobile or fixed laboratory for chemical

analysis. The approximate locations of the soil borings are shown in Figures 2 and 3. Soil boring logs are shown in Appendix A.

Soil boring SB-1 was completed immediately upgradient (west) of monitoring well GMW-14, in Parcel 2 (Figure 2). Soil boring SB-1 was completed to a depth of approximately 15 feet bgs because soil that exhibited a moderate sheen was encountered at depths ranging between about 8 and 14 feet bgs in boring GMW-14.

The remaining soil borings were completed in Parcel 3 (Figure 3) at locations upgradient (southeast; SB-4, SB-8, SB-9, SB-10, SB-12 and SB-13) from monitoring well GMW-4a, or cross-gradient (SB-2 and SB-14) from GMW-4a. These borings were completed to depths ranging between approximately 6 and 7 feet bgs. The depth of each boring was (1) at least 2 feet below ground water, and (2) below the deepest occurrence of PCBs in the remedial excavation previously completed in this area (see details concerning "excavation E-6" in our December 23, 1998 report). PCBs previously were detected at concentrations exceeding the MTCA Method A cleanup level in soil samples obtained from depths of 3.0 feet bgs or shallower in excavation E-6. This soil was removed from the site during 1998 remedial excavation activities.

4.2 SUBSURFACE CONDITIONS

4.2.1 Soil

Soil encountered in the borings generally consisted of sand with varying amounts of silt, silt with varying amounts of sand and coal debris. This soil appears to be fill material based on the presence of the coal debris, and occasional brick and wood debris. The types of soil encountered in borings SB-1 through SB-14 were generally similar to those observed at the site during past studies.

4.2.2 Ground Water

Ground water was encountered at depths ranging between about 0.5 and 5.5 feet bgs in the direct-push borings and monitoring well GMW-4a. The direction of shallow ground water flow has been relatively consistent during past monitoring events. Shallow ground water generally flows in a northwesterly direction beneath the majority of the site, including near GMW-4a; however, a localized easterly ground water flow direction appears to be present beneath the western corner of the site, near GMW-14. The general ground water flow direction in these areas is shown in Figures 2 and 3, respectively. Details concerning the depths and flow direction of shallow ground water beneath the site are presented in our past quarterly ground water monitoring reports.

4.3 ENVIRONMENTAL CONDITIONS

4.3.1 Field Screening Results

Field screening procedures were used to evaluate the potential presence of petroleum-related contamination in soil samples obtained from the borings. Field screening techniques are described in Appendix A. Based on our observations of fill soil at the site during this and previous studies, field screening results often falsely indicate the potential presence of petroleum-

related contamination. Soil containing coal material often exhibits moderate to heavy petroleum-like sheens, but upon analytical testing is discovered to contain no petroleum hydrocarbons. In our opinion, sheen screening produces "false positives" in fill soil at the site because of the presence of degraded coal material. Based on our experience, field screening is effective in identifying the petroleum-related contamination in soil when actually present (i.e., "false negative" field screening results are not common).

A moderate sheen was observed in soil samples SB-3-4, SB-3-5 and SB-9-5. Other soil samples obtained from the borings exhibited slight sheens or no sheens. The field screening results are presented in the boring logs (Appendix A).

4.3.2 Soil Chemical Analytical Results

A total of 18 soil samples obtained from the direct-push borings were submitted for chemical analysis. The boring locations are shown in Figures 2 and 3. The soil chemical analytical results are presented in Table 1. The laboratory reports are presented in Appendix B.

One soil sample (SB-1-8.0) was obtained from Parcel 2 and submitted for chemical analysis of diesel- and heavy oil-range hydrocarbons using Ecology Method NWTPH-D extended. This sample was obtained from the depth at which soil exhibited a moderate sheen in the boring drilled to install GMW-14. Diesel- and heavy oil-range hydrocarbons were not detected in sample SB-1-8.0.

A total of 17 soil samples were obtained from borings completed in Parcel 3, in the vicinity of GMW-4a (Figure 3). These samples were submitted for chemical analysis of PCBs using EPA Method 8082. These soil samples were obtained from depths ranging between about 2 and 6 feet bgs. The sampling depths were selected based on a combination of the following criteria: (1) field screening results, (2) sample depth relative to ground water, (3) the depth of former PCB-contaminated soil in remedial excavation E-6, and (4) the need for analytical data from a variety of depths. PCBs (arochlor 1260) were detected at concentrations of 0.31 milligrams per kilogram (mg/kg) and 0.10 mg/kg in soil samples SB-3-4.0 and SB-3-5.0, respectively. These concentrations are less than the MTCA Method A cleanup level for PCBs (1.0 mg/kg). PCBs were not detected in the other soil samples tested.

A total of 20 soil samples were obtained from former remedial excavation E-6 during 1998 remedial activities and submitted for analysis of PCBs. The locations of these soil samples are shown in Figure 4. Figure 4 also shows the locations of four soil samples obtained during this study from three direct-push borings (SB-6, SB-13 and SB-14) completed within the outline of former excavation E-6. The soil samples obtained from borings SB-6, SB-13 and SB-14 were collected from depths below the excavation backfill (placed in 1998). These soil samples produce a collective database of 24 soil samples in the immediate vicinity of monitoring well GMW-4a. PCBs (aroclor 1242, 1248 and 1260) were detected at concentrations exceeding the MTCA Method A cleanup level in only three (E6-5-3.0, E6-8-0.5 and E6-12-0.5) of the 24 soil samples obtained from excavation E-6. Soil characterized by these three samples was overexcavated and subsequent samples were obtained. PCBs either were not detected or were

detected at concentrations less than the MTCA Method A cleanup level the soil samples (a total of 21 samples) obtained from the final limits of excavation E-6 during the 1998 remedial activities and this study. Details concerning our 1998 soil sampling and analysis activities are presented in our December 23, 1998 report.

4.3.3 Ground Water Chemical Analytical Results

Ground water samples were obtained from monitoring well GMW-4a and eight of the direct-push borings. The ground water samples were submitted to TEG's mobile laboratory for chemical analysis of PCBs using EPA Method 8082. The mobile laboratory equipment used by TEG to perform PCB analyses provides detection limits for individual aroclors that are greater than the MTCA Method A cleanup level. This was deemed suitable for this study because the ground water analyses were performed in an attempt to follow the ground water plume to an upgradient contamination source, if present. To accomplish this, it was only necessary to be able to detect PCB aroclor 1242 at concentrations exceeding 0.506 micrograms per liter ($\mu\text{g/l}$); this was the lowest detected concentration of PCBs in GMW-4a, and the only aroclor detected in ground water. TEG's laboratory equipment provided a detection limit for aroclor 1242 of 0.5 $\mu\text{g/l}$. The detection limits for the various aroclors are presented in the laboratory reports (Appendix B). The ground water chemical analytical results are presented in Table 2.

PCBs (aroclor 1242) were detected at a concentration (0.70 $\mu\text{g/l}$) exceeding the MTCA Method A cleanup level (0.1 $\mu\text{g/l}$) in the ground water sample obtained from GMW-4a. This analytical result is generally consistent with past quarterly sampling events in GMW-4a. PCBs were not detected in the ground water samples obtained from the direct-push borings completed during this study.

5.0 CONCLUSIONS

The sampling and analysis activities completed during this study did not identify the presence of petroleum-related soil contamination in Parcel 2 or PCB-related soil contamination in Parcel 3 at concentrations exceeding MTCA cleanup levels. Additionally, PCBs were not detected in six ground water samples obtained from direct-push borings located upgradient (SB-4, SB-8, SB-9, SB-10, SB-12 and SB-13) of GMW-4a, and two ground water samples obtained from borings located cross-gradient (SB-2 and SB-14) from GMW-4a.

Based on the relatively extensive ground water and soil analytical data obtained from the vicinity of GMW-4a during this study and 1998 remedial activities, it is our opinion that the source of the PCB ground water contamination detected in GMW-4a was removed from the site during 1998 remedial activities, or, if present, is likely limited to the immediate vicinity of GMW-4a. Additionally, it appears that the residual PCB contamination in ground water at this location is limited in extent.

6.0 LIMITATIONS

We have prepared this report for use by Puget Western and Puget Sound Energy, their authorized agents and regulatory agencies. This report is not intended for use by others, and the information contained herein is not applicable to other sites. If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgment that the scope of services provided, and the general conditions under which the services were rendered are understood and accepted by them. This is to provide our firm with reasonable protection against open-end litigation by third parties with whom there otherwise would be no contractual limits to their actions.

No environmental site assessment (ESA) or remedial action can wholly eliminate the potential for contamination to remain at the property at concentrations exceeding applicable cleanup levels. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for remaining contamination in connection with a property. Our conclusions are based on chemical analytical results from soil and ground water samples obtained during our site studies. There always is a potential that areas with contamination that were not identified during our prior ESA or this study exist in portions of the site that were not sampled or tested. Further evaluation of such potential would require additional research, subsurface exploration, sampling and testing.

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state, or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards of all appropriate inquiry or regulatory definitions of hazardous substances change, or if you are required to meet more stringent standards in the future.


GeoEngineers has performed site characterization, facilities removal and remedial action monitoring at the Puget Sound Energy property at 915 Grady Way South in Renton, Washington within the limitations of scope, schedule and budget. Our services have been executed in accordance with our general agreement with Puget Sound Energy (Contract No. 9600000888) and generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

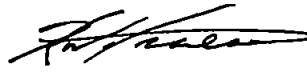


We appreciate the opportunity to assist Puget Western and Puget Sound Energy on this project. Please call if you have questions regarding this report.

Yours very truly,

GeoEngineers, Inc.


Stephen C. Woodward
Project Geologist


Kurt R. Fraese
Principal

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Attachments

Four copies submitted

TABLE 1
SUMMARY OF SOIL CHEMICAL ANALYTICAL DATA
 Puget Sound Energy Grady Way Site
 Renton, Washington

Sample Number ¹	Boring Number ²	Sample Depth (feet)	Field Screening Results (sheen) ³	Polychlorinated Biphenyls ⁴ (mg/kg)
SB-1-8.0	SB-1	8.0	SS	-- ⁵
SB-2-3.0	SB-2	3.0	NS	<0.80
SB-3-4.0	SB-3	4.0	MS	0.31
SB-3-5.0	SB-3	5.0	MS	0.10
SB-4-2.0	SB-4	2.0	SS	<0.80
SB-4-5.0	SB-4	5.0	SS	<0.80
SB-5-3.0	SB-5	3.0	SS	<0.80
SB-6-5.0	SB-6	5.0	SS	<0.80
SB-6-6.0	SB-6	6.0	SS	<0.80
SB-8-3.0	SB-8	3.0	SS	<0.80
SB-8-5.0	SB-8	5.0	SS	<0.80
SB-9-3.0	SB-9	3.0	SS	<0.80
SB-9-5.0	SB-9	5.0	MS	<0.80
SB-10-2.0	SB-10	2.0	SS	<0.80
SB-11-3.0	SB-11	3.0	SS	<0.80
SB-12-3.0	SB-12	3.0	SS	<0.80
SB-13-5.5	SB-13	5.5	SS	<0.80
SB-14-6.0	SB-14	6.0	NS	<0.80
MTCA Method A Cleanup Level				1.0

Notes:

¹ Soil samples were obtained from subsurface explorations that were completed using direct-push drilling equipment on 12/2/99. Soil samples were analyzed by Transglobal Environmental Geosciences Northwest's (TEG) mobile or fixed laboratory. The laboratory reports are presented in Appendix B.

² Approximate exploration locations are shown in Figures 2 and 3.

³ See Appendix A for a description of field screening methods.

⁴ Analyzed using EPA Method 8082.

⁵ This sample was submitted for analysis of diesel- and heavy oil-range hydrocarbons using Ecology Method NWTPH-D extended. Diesel- and heavy oil-range hydrocarbons were not detected in the soil sample.

-- = not tested

mg/kg = milligrams per kilogram

MTCA = Model Toxics Control Act

NS = no sheen

SS = slight sheen

MS = moderate sheen

TABLE 2
SUMMARY OF GROUND WATER CHEMICAL ANALYTICAL DATA
 Puget Sound Energy Grady Way Site
 Renton, Washington

Sample Number ¹	Polychlorinated Biphenyls ² (µg/l)
GMW-4a	0.70
SB-2	ND
SB-4	ND
SB-8	ND
SB-9	ND
SB-10	ND
SB-12	ND
SB-13	ND
SB-14	ND
MTCA Method A Cleanup level	0.1

NOTES:

¹Ground water sample GMW-4a was obtained from monitoring well GMW-4a on 12/2/99. Samples SB-2 through SB-14 were obtained on 12/2/99 from temporary sampling points installed using direct-push drilling equipment. The ground water samples were analyzed by Transglobal Environmental Geosciences Northwest's (TEG) mobile laboratory.

The approximate sampling locations are shown in Figures 2 and 3. The laboratory reports are presented in Appendix B.

²Analyzed using EPA Method 8082. The detection limits for the individual PCB aroclors exceed the MTCA Method A cleanup level. The significance of the elevated detection limits is discussed in the report text. See the laboratory reports for the detection limits.

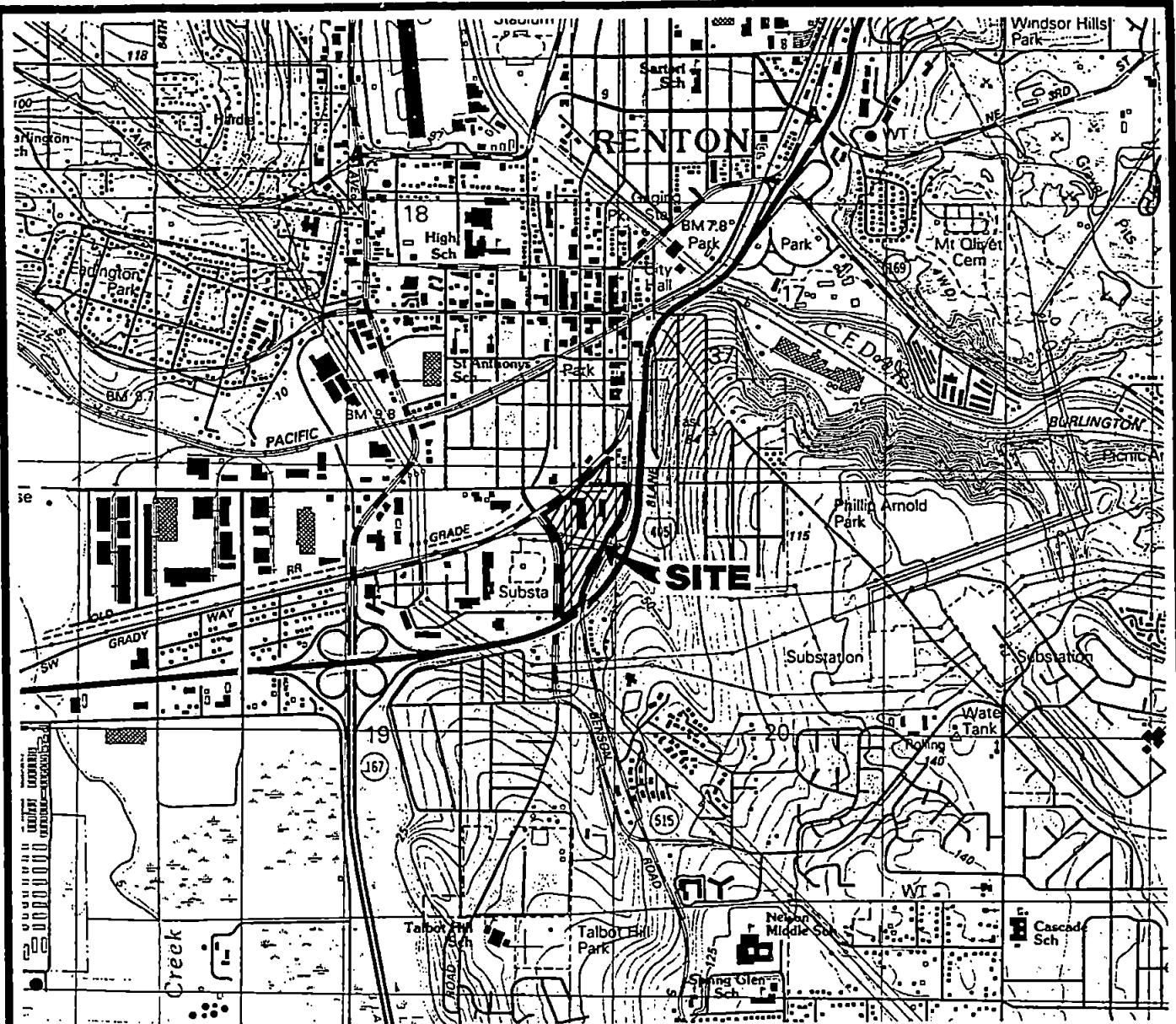
ND = not detected

µg/l = micrograms per liter

MTCA = Model Toxics Control Act

10/18/95
- 0186-346-RB5 LCM-BDH 9/1/95

TNO:HLA 0186-407-85 10/29/97



Reference: USGS 7.5' X 15' topographic-bathymetric quadrangle map "Renton, Wash.," dated 1983.



VICINITY MAP

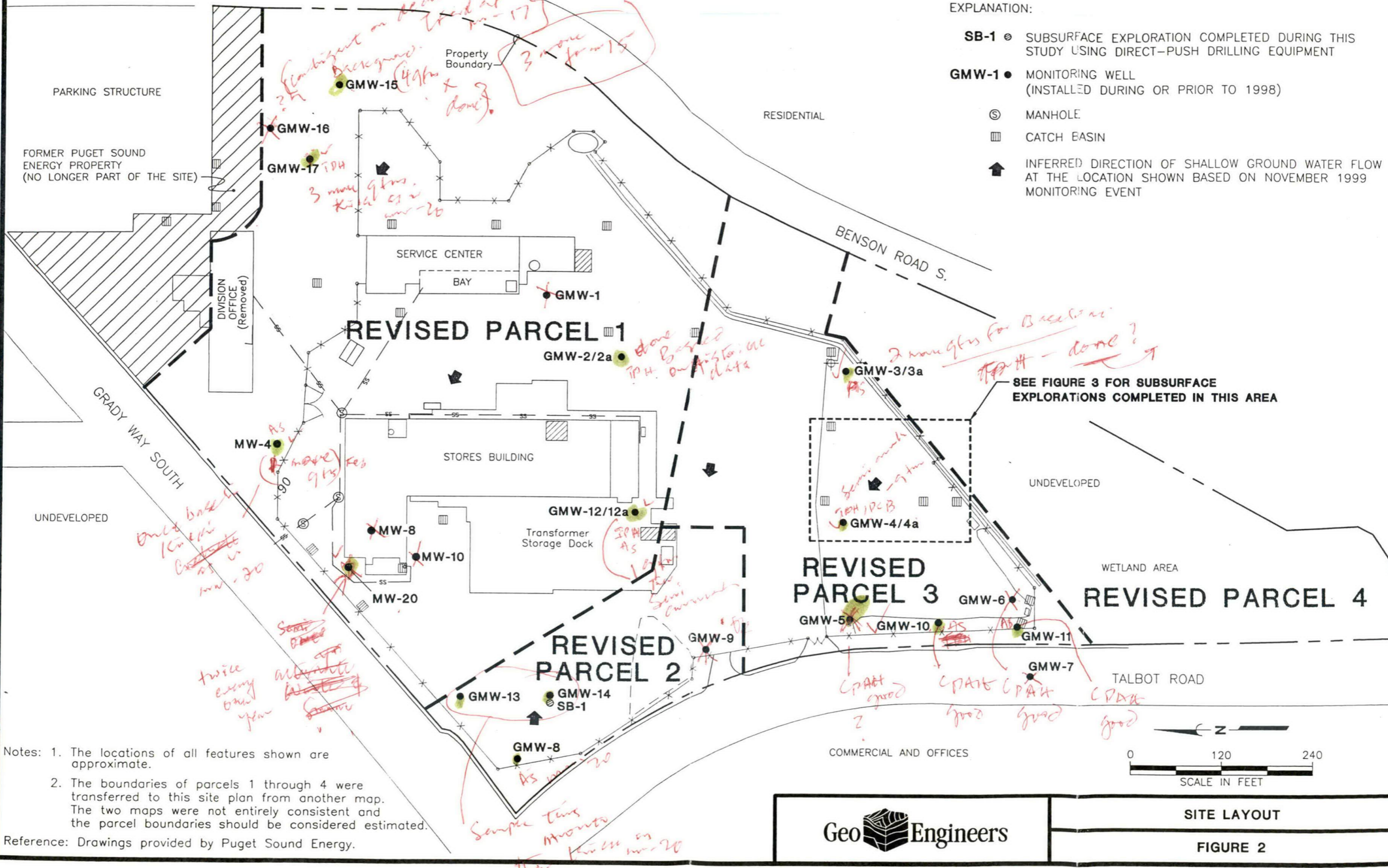
FIGURE 1

MAIN AVENUE S.

I-405

EXPLANATION:

- SB-1 ● SUBSURFACE EXPLORATION COMPLETED DURING THIS STUDY USING DIRECT-PUSH DRILLING EQUIPMENT
- GMW-1 ● MONITORING WELL (INSTALLED DURING OR PRIOR TO 1998)
- ⊙ MANHOLE
- ▤ CATCH BASIN
- ↑ INFERRED DIRECTION OF SHALLOW GROUND WATER FLOW AT THE LOCATION SHOWN BASED ON NOVEMBER 1999 MONITORING EVENT



12/15/99

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SCW:HLA

Notes: 1. The locations of all features shown are approximate.

2. The boundaries of parcels 1 through 4 were transferred to this site plan from another map. The two maps were not entirely consistent and the parcel boundaries should be considered estimated.

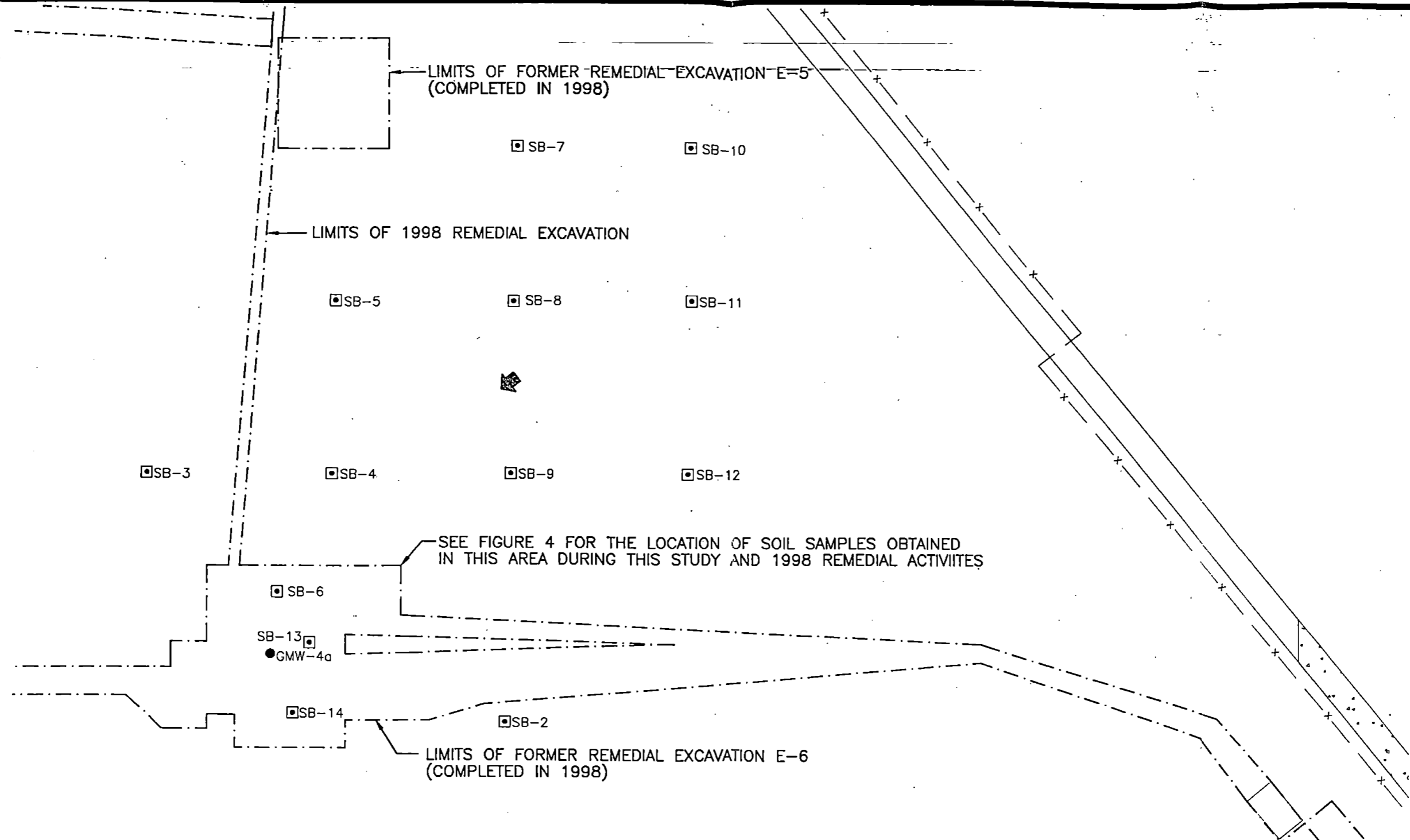
Reference: Drawings provided by Puget Sound Energy.



SITE LAYOUT

FIGURE 2

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EXPLANATION:

- SB-9 □ SUBSURFACE EXPLORATION COMPLETED DURING THIS STUDY USING DIRECT-PUSH DRILLING EQUIPMENT. SOIL AND/OR GROUND WATER SAMPLES WERE OBTAINED FROM THESE EXPLORATIONS.
- GMW-4a ● MONITORING WELL
- INFERRED DIRECTION OF SHALLOW GROUND WATER FLOW BASED ON NOVEMBER 1999 MONITORING EVENT

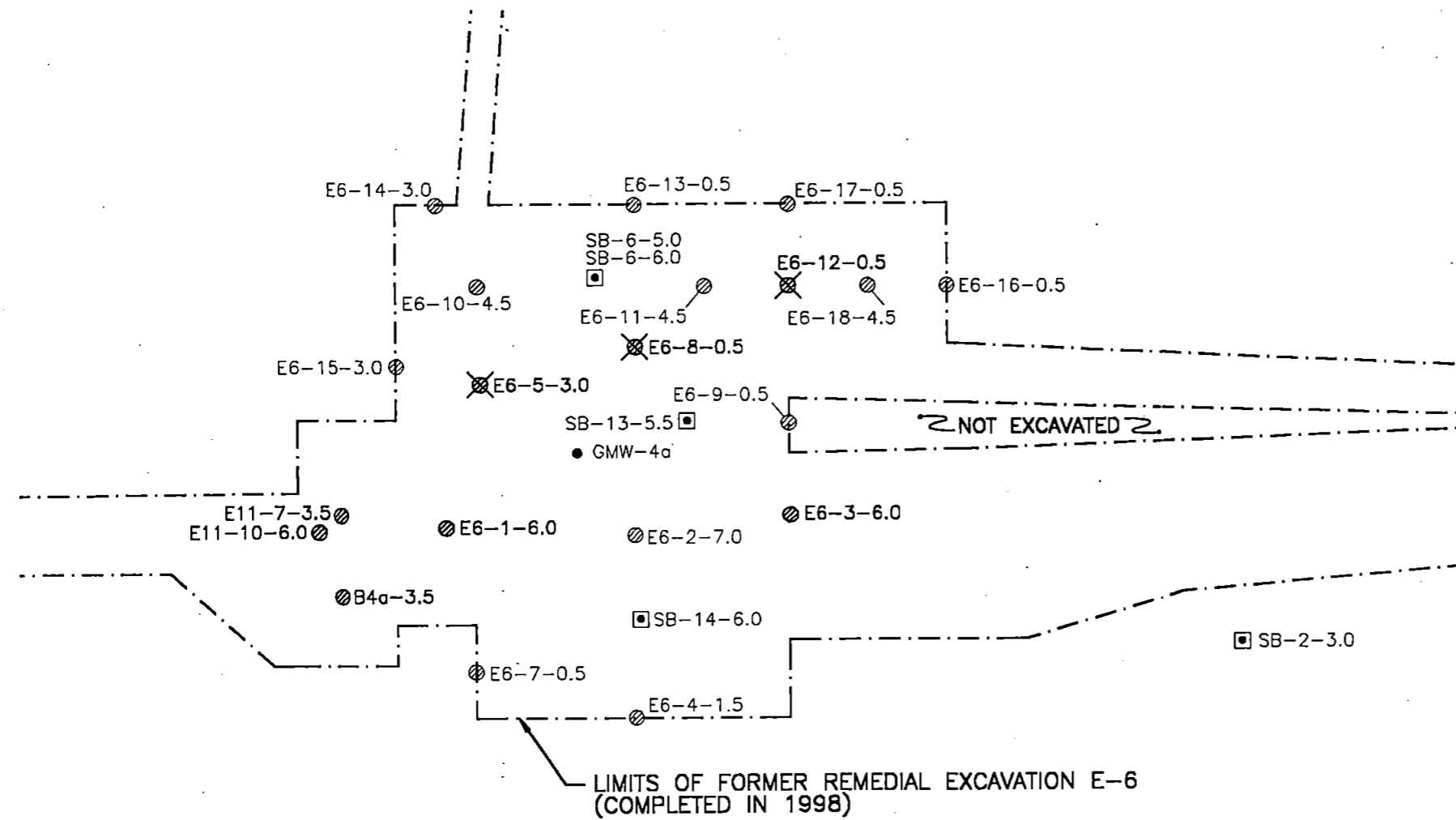
- Notes: 1. The locations of all features shown are approximate.
2. See GeoEngineers' report entitled "1998 Site Cleanup Activities, Grady Way Complex Property, Renton, Washington," dated December 23, 1998 for details concerning former remedial excavation activities and the locations of utilities in this portion of the site.

Reference: Original site plan provided by Puget Sound Energy.



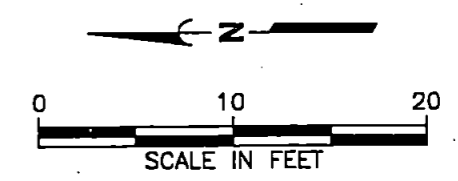
SUBSURFACE EXPLORATION LOCATIONS

FIGURE 3



EXPLANATION:

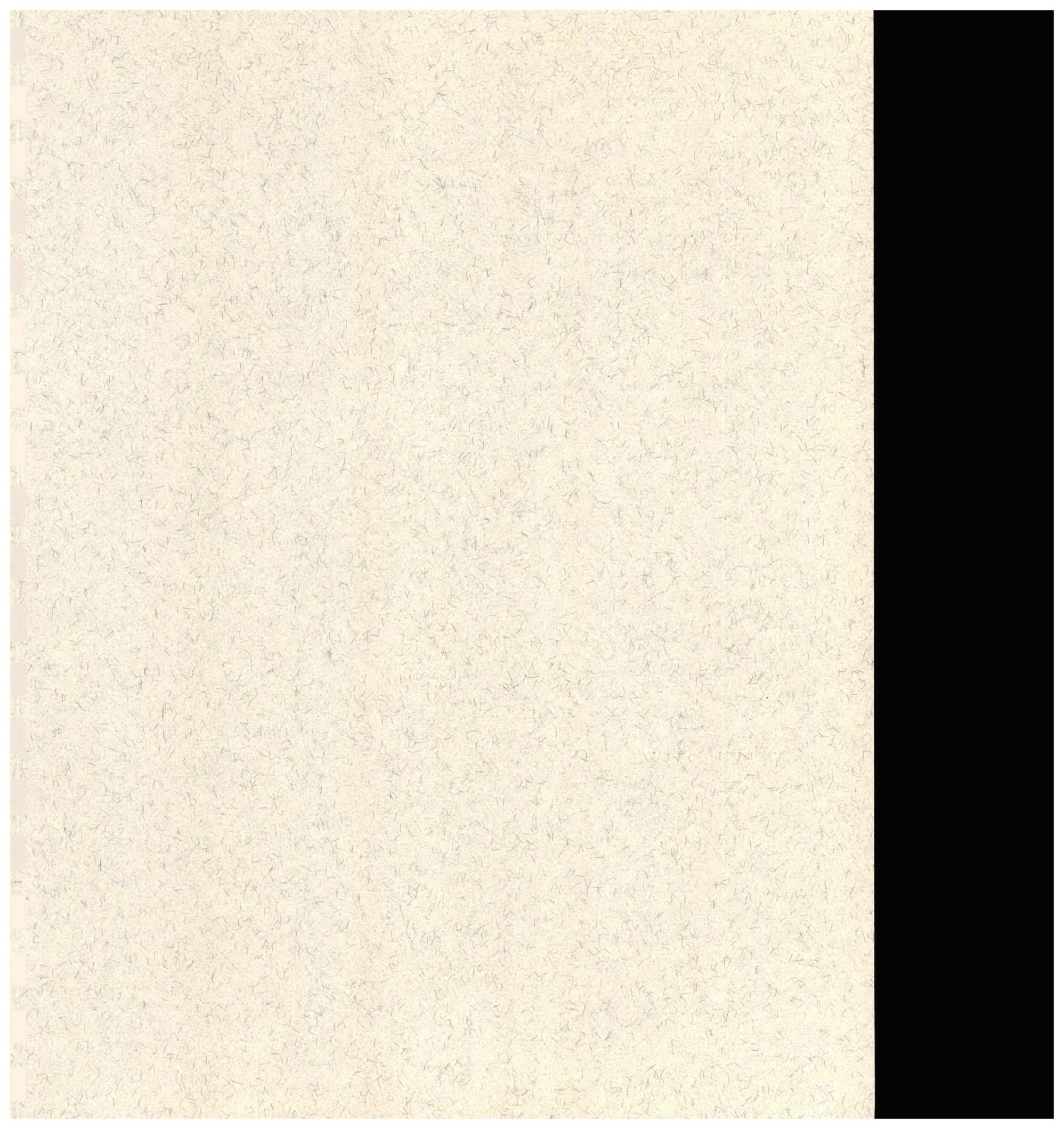
- ⎓ OUTLINE OF REMEDIAL EXCAVATION COMPLETED IN 1998
- SB-13-5.5 ◻ SOIL SAMPLE OBTAINED DURING THIS STUDY USING DIRECT-PUSH DRILLING EQUIPMENT
- GMW-4a ● GROUND WATER MONITORING WELL INSTALLED DURING 1998 REMEDIAL ACTIVITIES
- E6-14-3.0 ⊙ SOIL SAMPLE OBTAINED FROM LIMITS OF 1998 REMEDIAL EXCAVATION IN WHICH PCBs EITHER WERE NOT DETECTED OR WERE DETECTED AT A CONCENTRATION LESS THAN MTCA METHOD A CLEANUP LEVEL
- E6-8-0.5 ⊗ SOIL SAMPLE OBTAINED FROM LIMITS OF 1998 REMEDIAL EXCAVATION IN WHICH THE PCB CONCENTRATIONS EXCEEDED THE MTCA METHOD A CLEANUP LEVEL. SOIL CHARACTERIZED BY THIS SAMPLE WAS OVEREXCAVATED AND SAMPLING WAS REPEATED.
- PCB POLYCHLORINATED BIPHENYLS



Notes: 1. The locations of all features shown are approximate.
 2. See GeoEngineers' report entitled "1998 Site Cleanup Activities Grady Way Complex Property, Renton, Washington," dated December 23, 1998 for details concerning soil sampling activities and the locations of utilities in former remedial excavation E-6.
 Reference: Original site plan provided by Puget Sound Energy.

	SOIL SAMPLE LOCATIONS
	FIGURE 4

APPENDIX A
FIELD PROCEDURES



APPENDIX A

FIELD PROCEDURES SITE CHARACTERIZATION SAMPLING PROCEDURES

Subsurface conditions at the site were further evaluated by drilling 14 direct-push soil borings using equipment operated by Transglobal Environmental Geosciences Northwest (TEG) of Lacey, Washington. A representative from our staff selected the boring locations, and observed and classified the soil encountered. Soil in the borings was visually classified in general accordance with ASTM D-2488-94, which is described in Figure A-1. A detailed log was prepared for each boring. The boring logs are presented in Figures A-3 through A-16.

The direct-push borings were completed to depths ranging between 6 and 15 feet bgs. Continuous soil cores were obtained from the direct-push borings using a 1.5-inch-diameter split-barrel sampler driven with a pneumatic hammer. The sampling equipment was decontaminated before each sampling attempt with a Liquinox solution wash, and two distilled water rinses.

Ground water samples were obtained from selected soil borings using temporary well screen, a peristaltic pump and new polyethylene tubing. The ground water samples were placed directly in laboratory-prepared containers. One ground water sample also was obtained from existing monitoring well GMW-4a. A minimum of three well volumes of water was purged from GMW-4a prior to obtaining the sample. After purging the well, the ground water sample was obtained using a disposable polyethylene bailer and transferred to laboratory-prepared bottles in the field. All sample containers (soil and ground water) were immediately delivered to TEG's on-site mobile laboratory for analysis. Decontamination water generated during drilling activities and purge water were placed in labeled and secured 55-gallon drums.

FIELD SCREENING OF SOIL SAMPLES

Soil samples obtained from the site were evaluated for the potential presence of contamination using field screening techniques. Field screening results can be used as a general guideline to delineate areas of potential petroleum-related contamination in soils. In addition, screening results are often used as a basis for selecting soil samples for chemical analysis. The screening methods employed included: (1) visual examination and (2) water sheen testing. Headspace vapor testing was not used during this study because the contaminants of concern in the exploration areas do not typically contain significant volatile fractions.

Visual screening consists of inspecting the soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Sheen screening is a more sensitive screening method that can be effective in detecting petroleum based products in concentrations lower than regulatory cleanup guidelines.

Water sheen testing involves placing soil in water and observing the water surface for signs of sheen. The results of water sheen testing on soil samples from the borings are presented on the test pit logs. Sheens are classified as follows:

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No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly.
Moderate Sheen (MS)	Light to heavy sheen, may have some color/iridescence; spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Field screening results are site-specific and vary with soil type, soil moisture content, temperature and type of contaminant.

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		
			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 D2488-90.
2. Soil classification using laboratory tests is based on ASTM D2487-90.
3. Descriptions of soil density or consistency are based on interpretation of blow count 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 |

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LABORATORY TESTS

CA Chemical Analysis

FIELD SCREENING TESTS:

Headspace vapor concentration data given in parts per million

Sheen classification system:

- NS No Visible Sheen
- SS Slight Sheen
- MS Moderate Sheen
- HS Heavy Sheen
- NT Not Tested

BLOW COUNT/SAMPLE DATA:

Blows required to drive a 2.4-inch I.D. split-barrel sampler 12 inches or other indicated distances using a 300-pound hammer falling 30 inches.

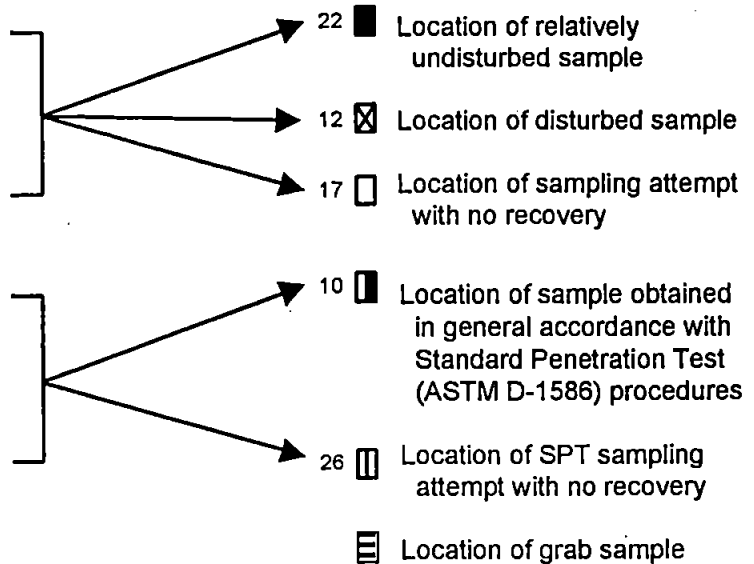
Blows required to drive a 1.5-inch I.D. (SPT) split-barrel sampler 12 inches or other indicated distances using a 140-pound hammer falling 30 inches.

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

SOIL GRAPH:



- SM Soil Group Symbol (See Note 2)
- Distinct Contact Between Soil Strata
- Gradual or Approximate Location of Change Between Soil Strata
- Water Level
- Bottom of Boring



NOTES:

1. The reader must refer to the discussion in the report text, the Key to Boring Log Symbols and the exploration logs for a proper understanding of subsurface conditions.
2. Soil classification system is summarized in Figure A-1.

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 15		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							AC	3 inch asphalt concrete				0
							SW COAL	Brown fine to coarse sand with occasional fine gravel and silt (loose, moist) (fill)				
							SP-SM COAL	Brown fine sand with silt (loose, moist) (fill)				
							COAL	Black coal fragments (loose, moist) (fill)				
5	100	1		☒				Becomes wet	▽		(SS, --)	5
	100	2		☒							(SS, --), CA	
10	100	3		☒							(SS, --)	10
	100	4		☒							(SS, --)	
	100	5		☒							(SS, --)	
15	100	6		☒				Boring completed at depth of 15.0 feet on 12/2/99 Ground water encountered at 5.5 feet during drilling			(SS, --)	15
20												20
25												25
30												30
35												35

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-1

FIGURE A-3

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0	83	1		☒		GW	Brown fine to coarse gravel with fine to coarse sand and trace silt (loose, moist) (fill)			(NS, -)	0
	83	2		☒		ML	Black silt with brick and coal fragments and occasional fine gravel (soft, moist) (fill)			(SS, -)	
		3		☒			Becomes wet			(NS, -), CA	
5		4		☒						(NS, -)	5
		5		☒						(NS, -)	
							Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 4.0 feet during drilling				

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-2

FIGURE A-4

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0		1		☒			GW ML	Brown fine gravel with fine to coarse sand and trace silt (loose, moist) (fill)			(NS, -)	0
		2		☒				Black silt with coal fragments and fine gravel (stiff, moist) (fill)			(NS, -)	
		3		☒				Becomes wet	▽		(SS, -)	
		4		☒				Wood fragments			(MS, -), CA	
5		5		☒							(MS, -), CA	5
		6		☒							(SS, -)	
								Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 3.0 feet during drilling				

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186-407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-3

FIGURE A-5

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined Y-coordinate: Not Determined	
Total Depth (ft) 7		Elevation (ft) Not Measured		Datum: Not Determined System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET	
0							GW	Brown fine to coarse gravel (fill)			(SS, -)	0	
100	1			☒			ML	Black silt with coal, brick and gravel fragments (stiff, moist) (fill)			(SS, -), CA		
100	2			☒				Becomes wet	∇		(SS, -)		
100	3			☒									
5	100	4		☒				Coal and wood fragments			(SS, -), CA	5	
100	5			☒							(NS, -)		
								Boring completed at depth of 7.0 feet on 12/2/99 Ground water encountered at 2.5 feet during drilling					
10												10	
15												15	
20												20	
25												25	
30												30	
35												35	

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-4

FIGURE A-6

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW-GM	Fine to coarse gravel with silt (loose, moist) (fill)			(NS, -)	0
100		1		<input checked="" type="checkbox"/>			ML	Black silt with coal and brick fragments (stiff, moist) (fill)			(NS, -)	
100		2		<input checked="" type="checkbox"/>								
100		3		<input checked="" type="checkbox"/>				Becomes wet	▽		(SS, -), CA	
5		4		<input checked="" type="checkbox"/>				Wood fragments			(NS, -)	5
100		5		<input checked="" type="checkbox"/>				Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 3.0 feet during drilling			(NS, -)	
10												10
15												15
20												20
25												25
30												30
35												35

Note: See Figure A-2 for explanation of symbols




GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-5

FIGURE A-7

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined System: Not Determined	

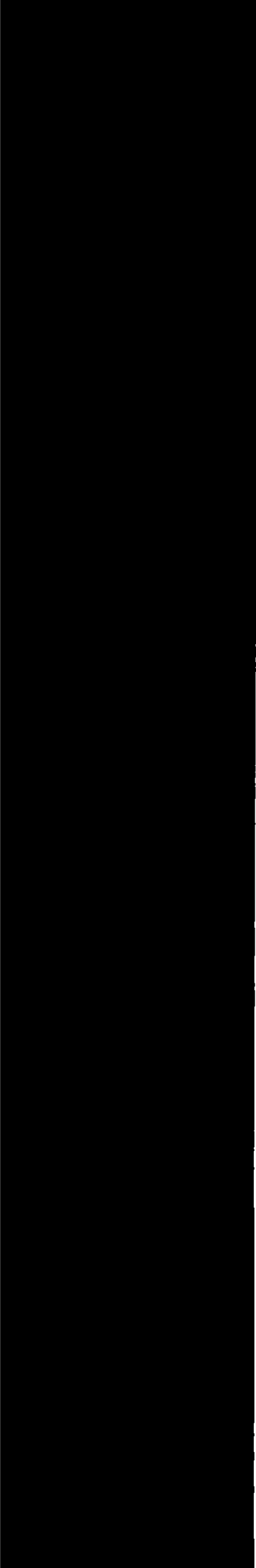
DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW	Fine to coarse gravel (loose, wet) (fill)				0
5	50	1		<input checked="" type="checkbox"/>			ML	Black silt with coal fragments and wood debris (stiff, wet) (fill)			(SS, -), CA	5
5	50	2		<input checked="" type="checkbox"/>			ML	Boring completed at depth of 6.0 feet on 12/2/99 Recovery not sufficient to determine ground water depth			(SS, -), CA	5
10												10
15												15
20												20
25												25
30												30
35												35

Note: See Figure A-2 for explanation of symbols




LOG OF BORING SB-6

FIGURE A-8



Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW	Fine to coarse gravel (very poor recovery) (fill)				0
5												5
10												10
15												15
20												20
25												25
30												30
35												35

Boring completed at depth of 6.0 feet on 12/2/99
Recovery not sufficient to determine ground water depth

Note: See Figure A-2 for explanation of symbols

GELGENERAL BORING 0186407B.GPJ GEL_CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-7

FIGURE A-9

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET	
0							GW-GM	Brown fine to coarse gravel with fine to coarse sand and silt (loose, moist) (fill)			(SS, -)	0	
50	1			☒			ML				(NS, -)		
50	2			☒				Black silt with coal and brick fragments (stiff, moist) (fill)				(SS, -), CA	
100	3			☒								(SS, -), CA	
5	100	4		☒				Becomes wet Wood fragments				(SS, -), CA	5
100	5			☒				Coal fragment content increases				(NS, -)	
								Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 4.0 feet during drilling					

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/2/99 0186-407-00



LOG OF BORING SB-8

FIGURE A-10

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW					0
100		1		☒			ML	Brown fine to coarse gravel with fine to coarse sand and trace silt (loose, moist) (fill)			(SS, -)	
100		2		☒				Black silt with coal, brick and wood fragments (still, moist) (fill)			(SS, -)	
100		3		☒				Becomes wet	∇		(SS, -), CA	
5		4		☒							(MS, -), CA	5
100		5		☒							(NS, -)	
								Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 3.0 feet during drilling				
10												10
15												15
20												20
25												25
30												30
35												35

Note: See Figure A-2 for explanation of symbols



LOG OF BORING SB-9

FIGURE A-11

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW	Brown fine to coarse gravel with fine to coarse sand and trace silt (loose, wet) (fill)			(NS, -)	0
67		1		☒			ML	Black fine gravelly silt with fine to coarse sand and occasional brick and coal fragments (stiff, wet) (fill)			(SS, -), CA	
67		2		☒							(SS, -)	
67		3		☒								
5	100	4		☒			COAL	Wood fragments			(NS, -)	5
100	100	5		☒				Black coal fragments with silt (loose, moist) (fill)			(NS, -)	
Boring completed at depth of 6.0 feet on 12/2/99												
Ground water encountered at 0.5 feet during drilling												

Note: See Figure A-2 for explanation of symbols






GEL GENERAL BORING 0186-407-B.GPJ_GEL CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-10

FIGURE A-12

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET	
0	100	1		☒			GW	Brown fine to coarse gravel with fine to coarse sand and trace silt (loose, moist) (fill)			(SS, -)	0	
100	100	2		☒			ML	Black silt with coal and brick fragments (stiff, moist) (fill)			(SS, -)	1	
200	100	3		☒			ML	Becomes wet			(SS, -), CA	2	
300	100	4		☒			ML	Wood fragments			(SS, -)	3	
400	100	5		☒			ML				(NS, -)	4	
								Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 3.7 feet during drilling					

Note: See Figure A-2 for explanation of symbols



LOG OF BORING SB-11

FIGURE A-13

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Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0	67	1		☒			GW	Brown line to coarse gravel with fine to coarse sand and trace silt (loose, moist) (fill)			(SS, -)	0
	67	2		☒			SW	Brown line to coarse sand with trace silt and occasional fine gravel (loose, moist) (fill)			(SS, -)	
	67	3		☒			ML	Black silt with coal, wood and brick fragments (stiff, moist) (fill)			(SS, -), CA	
	5	100	4	☒				Becomes wet			(SS, -)	5
	100	5	100	☒				Coal fragment content increases			(NS, -)	
								Boring completed at depth of 6.0 feet on 12/2/99				
								Ground water encountered at 4.0 feet during drilling				

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-12

FIGURE A-14

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 6		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW	Fine to coarse gravel (loose, moist) (fill)				0
5	75 75	1 2					ML	Black silt with fine to coarse sand and coal fragments (stiff, moist) (fill) Boring completed at depth of 6.0 feet on 12/2/99 Ground water encountered at 2.0 feet during drilling (measured with interface probe)			(SS, -), CA (NS, -)	5
10												10
15												15
20												20
25												25
30												30
35												35

Note: See Figure A-2 for explanation of symbols

GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/2/99 0186-407-00



LOG OF BORING SB-13

FIGURE A-15

Project Puget Sound Energy		Job Number 0186-407-00		Location Renton, WA	
Date Drilled 12/2/99		Logged By BPP		Contractor TEG Northwest	
Drill Method Direct Push		Equipment Strataprobe		Drill Bit	
Sample Method SPT		Hammer Data		X-coordinate: Not Determined	
				Y-coordinate: Not Determined	
Total Depth (ft) 7		Elevation (ft) Not Measured		Datum: Not Determined	
				System: Not Determined	

DEPTH IN FEET	% Recovery	Sample No.	Blows per foot	Sample	Frost	Graphic Log	USCS Group Symbol	Material Description	Moisture Content (%)	Dry Unit Weight (pcf)	Other Tests And Notes	DEPTH IN FEET
0							GW	Brown fine to coarse gravel with trace silt (loose, wet) (fill) Becomes wet	▽			0
5		1		☒			ML	Black silt with coal and wood fragments (stiff, wet) (fill)			(NS, -), CA	5
7		2		☒				Boring completed at depth of 7.0 feet on 12/2/99 Ground water encountered at 1.5 feet during drilling			(NS, -)	7

Note: See Figure A-2 for explanation of symbols

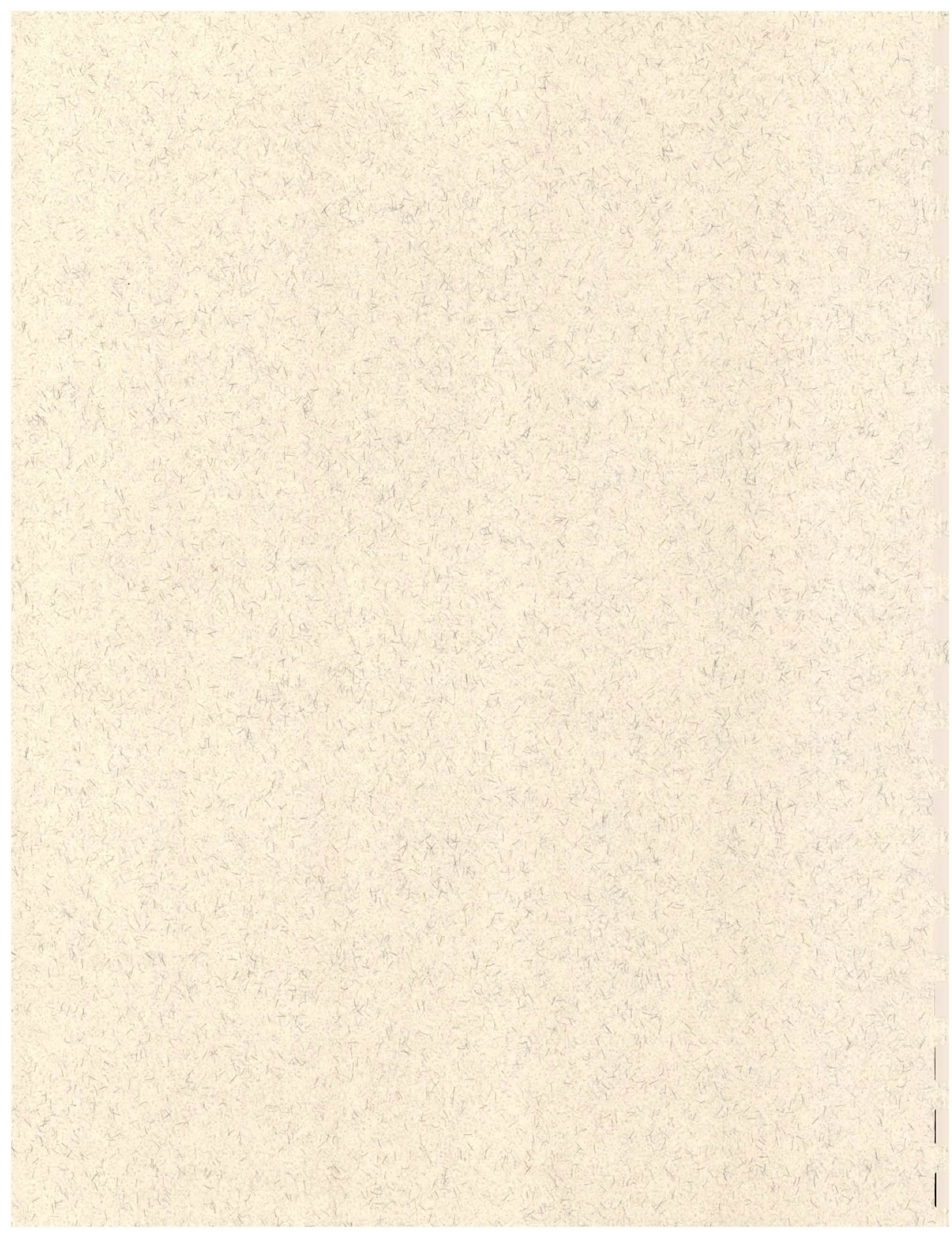
GEI GENERAL BORING 0186407B.GPJ GEI CORP.GDT 12/20/99 0186-407-00



LOG OF BORING SB-14

FIGURE A-16

APPENDIX B
CHEMICAL ANALYTICAL PROGRAM



APPENDIX B

CHEMICAL ANALYTICAL PROGRAM

ANALYTICAL METHODS

Soil and ground water samples obtained from the site were submitted to Transglobal Environmental Geosciences Northwest's (TEG) on-site or fixed laboratory. Chain-of-custody procedures were observed during the transfer of soil and ground water samples from GeoEngineers' field personnel to the laboratory personnel. The samples were held in cold storage pending extraction and/or analysis. The analytical results, analytical methods reference and laboratory quality assurance/quality control (QA/QC) records are included in this appendix. The analytical results are also summarized in the text and tables of this report.

ANALYTICAL DATA REVIEW

The laboratories maintain an internal quality assurance program as documented in their laboratory quality assurance manuals. The laboratories use a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the validity of the analytical results. The laboratories also use data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals are included in the laboratory reports. The laboratories compared each group of samples with the existing data quality goals and noted any exceptions in the laboratory reports. Data quality exceptions documented by the laboratories in the laboratory reports are reviewed by GeoEngineers using the applicable data validation guidelines from the following documents: "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" dated October 1999 (EPA-540/R-99-008) and "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" dated February 1994 (EPA-540/R-94-013).

ANALYTICAL DATA REVIEW SUMMARY

Based on our data quality review, it is our opinion that the analytical data are of acceptable quality for their intended use in this report.

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

800 Sleater-Kinney SE, PMB #262
Lacey, Washington 98503-1127

Mobile Environmental Laboratories
Environmental Sampling Services

Telephone: 360-459-4670
Fax: 360-459-3432

December 7, 1999

Steve Woodward
GeoEngineers, Inc.
Plaza 600 Bldg.
600 Stewart St., Ste. 1215
Seattle, WA 98101

Dear Mr. Woodward:

Please find enclosed the analytical data report for the PSE – Grady Way Project in Renton, Washington. StrataProbe and Mobile Laboratory services were conducted on December 2, 1999. Soil and water samples were analyzed for PCB's by Method 8082. Soil samples were analyzed off-site for Diesel and Oil by NWTPH-Dx/Dx Extended on December 3, 1999.

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

TEG Northwest appreciates the opportunity to have provided analytical services to GeoEngineers for this project. It was a pleasure working with you, and we are looking forward to the next opportunity to work together.

Sincerely,



Michael A. Korosec
President

QA/QC FOR ANALYTICAL METHODS

GENERAL

The TEG Northwest Laboratory quality assurance and quality control (QA/QC) procedures are conducted following the guidelines and objectives which meet or exceed certification/-accreditation requirements of California DOHS, Washington DOE, and Oregon DEQ. The Quality Control Program is a consistent set of procedures which assures data quality through the use of appropriate blanks, replicate analyses, surrogate spikes, and matrix spikes, and with the use of reference standards that meet or exceed EPA standards.

When analyses are taking place on-site with the mobile lab, the need for Field Blanks or Travel/Trip Blanks is eliminated. If there is going to be a delay before sample preparation for analysis, the sample is stored at 4° C.

ANALYTICAL METHODS

TEG Northwest Labs use analytical methodologies which are in conformity with U. S. Environmental Protection Agency (EPA), Washington DOE, and Oregon DEQ methodologies. When necessary and appropriate due to the nature or composition of the sample, TEG may use variations of the methods which are consistent with recognized standards or variations used by the industry and government laboratories.

TPH-Gasoline, TPH-Diesel

(Gasoline and/or Diesel, Modified EPA 8015, NWTPH-Gx and NWTPH-Dx)

A check standard is run at the beginning of the day. 1) A close standard is run at the end of the day. 2) Both open and close standards must be within 15% of the continuing calibration curve value. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135% unless high sample concentrations interfere with the determination of the recovery percentage. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

**PCBs, Polychlorinated Biphenyls
(EPA 8082)**

A method blank and a calibration standard are run at the beginning of the day. The standard must be within 15% of the continuing calibration curve value. The check standard may be run at the end of the day. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135%. Samples which measure above the linear range of the calibration curve must be diluted to fall into the upper half of the linear range. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
 Renton, Washington
 GeoEngineers

PCB Analyses of Water (EPA Method 8082)

Sample Description	Method	SB 4 H2O	SB 8 H2O	SB 9 H2O	SB 10 H2	SB 12 H2O
	Blank					
Date Sampled	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
Date Analyzed	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
	MDL					
	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
PCB-1016	2.0	nd	nd	nd	nd	nd
PCB-1221	2.0	nd	nd	nd	nd	nd
PCB-1232	2.0	nd	nd	nd	nd	nd
PCB-1242	0.5	nd	nd	nd	nd	nd
PCB-1248	0.5	nd	nd	nd	nd	nd
PCB-1254	0.5	nd	nd	nd	nd	nd
PCB-1260	0.5	nd	nd	nd	nd	nd
Total	0.5	nd	nd	nd	nd	nd
Surrogate Recovery (TCMX) (%)	125	124	85	124	126	124
Surrogate Recovery (DCBP) (%)	116	125	74	125	120	123

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

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX) AND (DCBP): 65% - 135%

ANALYSES PERFORMED BY: Sherry L. Chilcutt
 DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
 Renton, Washington
 GeoEngineers

PCB Analyses of Water (EPA Method 8082)

Sample Description	GMW-4a	GMW-4a Dup	SB2 H2O	SB13 H2O	SB14 H2O
Date Sampled	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
Date Analyzed	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
	MDL (ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
PCB-1016	2.0	nd	nd	nd	nd
PCB-1221	2.0	nd	nd	nd	nd
PCB-1232	2.0	nd	nd	nd	nd
PCB-1242	0.5	0.70	0.77	nd	nd
PCB-1248	0.5	nd	nd	nd	nd
PCB-1254	0.5	nd	nd	nd	nd
PCB-1260	0.5	nd	nd	nd	nd
Total	0.5	0.70	0.77	nd	nd
Surrogate Recovery (TCMX) (%)	126	125	123	100	108
Surrogate Recovery (DCBP) (%)	124	125	121	96	98

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX) AND (DCBP): 65% - 135%

ANALYSES PERFORMED BY: Sherry L. Chilcutt

DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
Renton, Washington
GeoEngineers

QA/QC Data - PCB Analyses - Water

Sample Description:							
Matrix Spike			Matrix Spike Duplicate			RPD	
Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)	Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)	RPD (%)	
PCB 1260	15	15.1	101	15	12.7	85	17.3
TCMX		96			125		
DCBP		97			123		

Laboratory Control Sample			
Spiked Conc. (ug/l)	Measured Conc. (ug/l)	Spike Recovery (%)	
PCB 1260	15	16.9	113
TCMX		123	
DCBP		125	

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 80%-120%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Sherry L. Chilcutt
DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
 Renton, Washington
 GeoEngineers

PCB Analyses of Soil (EPA Method 8082)

Sample Description	Method Blank	SB 4 @2'	SB 5 @3'	SB 5 @3' Dup	SB8 @3'	SB9 @5'
Date Sampled	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
Date Analyzed	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
	MDL (mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
PCB-1016	0.20	nd	nd	nd	nd	nd
PCB-1221	0.20	nd	nd	nd	nd	nd
PCB-1232	0.20	nd	nd	nd	nd	nd
PCB-1242	0.05	nd	nd	nd	nd	nd
PCB-1248	0.05	nd	nd	nd	nd	nd
PCB-1254	0.05	nd	nd	nd	nd	nd
PCB-1260	0.05	nd	nd	nd	nd	nd
Total	0.05	nd	nd	nd	nd	nd
Surrogate Recovery (TCMX) (%)	72	100	108	91	97	98
Surrogate Recovery (DCBP) (%)	67	77	90	107	113	113

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX) AND (DCBP): 65% - 135%

ANALYSES PERFORMED BY: Sherry L. Chilcutt
 DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
Renton, Washington
GeoEngineers

PCB Analyses of Soil (EPA Method 8082)

Sample Description	SB10 @2'	SB11 @3'	SB 12 @3'	SB4 @5'	SB8@5'
Date Sampled	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
Date Analyzed	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
	MDL				
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
PCB-1016	0.20	nd	nd	nd	nd
PCB-1221	0.20	nd	nd	nd	nd
PCB-1232	0.20	nd	nd	nd	nd
PCB-1242	0.05	nd	nd	nd	nd
PCB-1248	0.05	nd	nd	nd	nd
PCB-1254	0.05	nd	nd	nd	nd
PCB-1260	0.05	nd	nd	nd	nd
Total	0.05	nd	nd	nd	nd
Surrogate Recovery (TCMX) (%)	106	108	106	92	102
Surrogate Recovery (DCBP) (%)	89	98	121	104	82

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX) AND (DCBP): 65% - 135%

ANALYSES PERFORMED BY: Sherry L. Chilcutt
DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
 Renton, Washington
 GeoEngineers

PCB Analyses of Soil (EPA Method 8082)

Sample Description	SB9 @3'	SB2 @3'	SB3 @4'	SB6 @5'	SB13 @5.5'	SB6 @6'
Date Sampled	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
Date Analyzed	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99	12/2/99
	MDL					
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
PCB-1016	0.20	nd	nd	nd	nd	nd
PCB-1221	0.20	nd	nd	nd	nd	nd
PCB-1232	0.20	nd	nd	nd	nd	nd
PCB-1242	0.05	nd	nd	nd	nd	nd
PCB-1248	0.05	nd	nd	nd	nd	nd
PCB-1254	0.05	nd	nd	nd	nd	nd
PCB-1260	0.05	nd	nd	0.31	nd	nd
Total	0.05	nd	nd	0.31	nd	nd
Surrogate Recovery (TCMX) (%)	122	113	112	101	100	120
Surrogate Recovery (DCBP) (%)	120	82	113	80	81	119

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX) AND (DCBP): 65% - 135%

ANALYSES PERFORMED BY: Sherry L. Chilcutt

DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
 Renton, Washington
 GeoEngineers

PCB Analyses of Soil (EPA Method 8082)

Sample Description	SB3 @5'	SB14 @6'
Date Sampled	12/2/99	12/2/99
Date Analyzed	12/2/99	12/2/99
	MDL (mg/kg)	(mg/kg)
PCB-1016	0.20	nd
PCB-1221	0.20	nd
PCB-1232	0.20	nd
PCB-1242	0.05	nd
PCB-1248	0.05	nd
PCB-1254	0.05	nd
PCB-1260	0.05	0.10
Total	0.05	0.10
Surrogate Recovery (TCMX) (%)	113	82
Surrogate Recovery (DCBP) (%)	118	106

"nd" Indicates not detected at listed detection limit.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (TCMX) AND (DCBP): 65% - 135%

ANALYSES PERFORMED BY: Sherry L. Chilcutt
 DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
 Renton, Washington
 GeoEngineers

QA/QC Data - PCB Analyses - Soils

Sample Description: SB11 @3'							
Matrix Spike			Matrix Spike Duplicate			RPD	
Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	RPD (%)	
PCB 1260	1.00	1.09	109	1.00	0.95	95	13.7
TCMX		111			90		
DCBP		120			117		

Laboratory Control Sample			
Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	
PCB 1260	1.00	0.94	94
TCMX		108	
DCBP		102	

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 80%-120%
 ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Sherry L. Chilcutt
 DATA REVIEWED BY: Michael Korosec

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

PSE PROJECT
Renton, Washington
GeoEngineers, Inc.
Client Project #0186-407-00

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

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (mg/kg)	Oil (mg/kg)
Method Blank	12/3/99	104	nd	nd
SB1@8'	12/3/99	98	nd	nd
Method Detection Limits			20	40

"nd" Indicates not detected at the listed detection limits.

"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Chantel Kamm

DATA REVIEWED BY: Sherry Chilcutt

