Report
Subsurface Exploration
Maersk Pacific Ltd Site
1675 Lincoln Avenue
Tacoma, Washington

April 3, 2001

For
Port of Tacoma

GeoEngineers

April 3, 2001

Port of Tacoma
P.O. Box 1837
Tacoma, Washington 98402

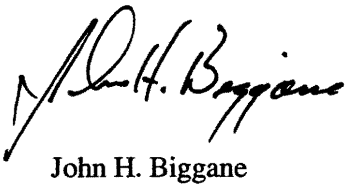
Attention: Suzanne Dudziak

We are pleased to submit our report "Subsurface Exploration, Maersk Pacific Ltd. Site, 1675 Lincoln Avenue, Tacoma, Washington," prepared for the Port of Tacoma. Our services have been completed in general accordance with our proposal dated November 10, 2001 and have been provided under Port of Tacoma Professional Services Agreement 997210 dated November 21, 2001.

We appreciate the opportunity to work with you on this project. Please contact us if you have questions or require additional information.

Respectfully submitted,

GeoEngineers, Inc.



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TRM:SLF:JHB:tw
Document ID: 045406600R.Doc

File No: 0454-066-00

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1675 LINCOLN AVENUE
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FOR
PORT OF TACOMA

INTRODUCTION

This report presents the results of our subsurface explorations completed in the vicinity of Building 600 at the property occupied by Maersk Pacific LTD. in Tacoma, Washington. The Maersk property is owned by the Port of Tacoma and is located as shown on the Vicinity Map, Figure 1.

Previous environmental site assessments (ESAs) in the vicinity of Building 600 identified the presence of petroleum hydrocarbons in soil and ground water beneath the site. Free petroleum product has been observed floating on ground water in monitoring wells at the site.

Our scope of environmental services for this project was developed in conjunction with the Port of Tacoma and is based on the results of previous ESAs completed in the vicinity of Building 600.

SCOPE OF SERVICES

The purpose of our services was to further evaluate subsurface conditions with respect to the presence of petroleum hydrocarbons in soil and ground water. Our specific scope of services included the following:

1. Reviewing existing environmental and geotechnical reports, memoranda, aerial photos and other information regarding the site as provided by the Port.
2. Compiling previous site exploration data onto a scaled site plan or aerial photograph. Chemical analytical, geologic and hydrogeologic data was summarized as part of our effort.
3. Preparing a Health and Safety Plan used by GeoEngineers personnel during the site investigation.
4. Subcontracting APS Inc. of Issaquah, Washington to identify subsurface utilities in the vicinity of the proposed boring locations.
5. Completing nine borings at the site using hollow-stem auger drilling equipment to explore subsurface soil conditions and collect soil samples for field screening and chemical analysis.
6. Submitting soil samples collected from each boring to Sound Analytical for chemical analysis for diesel and heavy-oil range petroleum hydrocarbons using Washington Department of Ecology (Ecology) Method WTPH-D extended. Three soil samples were also submitted for chemical analyses of EPH, VPH, PAH, and BETX.
7. Installing ground water monitoring wells in eight of the completed borings.

8. Collecting ground water samples from the monitoring wells for chemical analysis of diesel- and heavy oil-range petroleum hydrocarbons using Ecology Method WTPH-D extended.
9. Preparing a report presenting the compiled historic site data and the results of this investigation.

SITE CONDITIONS

GENERAL

The site is located at 1675 Lincoln Avenue in Tacoma, Washington. The study area was limited to the vicinity of Building 600 and is generally bounded on the south by Lincoln Avenue, on the north by East 11th Street, and on the west by the Puyallup River. Currently a vacant property (known as the former UP site) bounds the study area to the east. Building 600 is situated approximately 200 feet south of East 11th Street. The site is currently asphalt-paved outside of the building footprint.

The surface of the site is generally flat. The elevation of the site is approximately 18 feet Mean Lower Low Water (MLLW) based on our survey of well casing elevations.

PREVIOUS INVESTIGATIONS

Previous work at the site and adjacent railyard site was reviewed and compiled to provide a basis for planning our subsurface exploration. Previous work reviewed included studies by Creative Technologies, Inc., Geotech Consultants Inc., Hart Crowser, Inc., and AGI. The specific documents we reviewed included:

1. Map – Milwaukee railroads fuel and oil barge unloading facility at Tacoma, Washington.
2. Map – Site Features Map, UPRR/Port of Tacoma, Tacoma, Washington.
3. Map – Contamination Distribution, UPRR/Former Milwaukee Railroad, Tacoma, Washington.
4. Hart Crowser & Associates, Inc. Subsurface Exploration and Geotechnical Engineering Study – Marine Yard and CFS Area, Port of Tacoma, Washington, November 4, 1983.
5. Applied Geotechnology Inc. – Environmental Assessment Former Milwaukee Railyard, Tacoma, Washington, June 29, 1990.
6. Creative Environmental Technologies, Inc. (CETI) – Underground Storage Tank Site Assessment/Site Characterization, Sea-Land Container Terminal, November 5, 1999.
7. Geotech Consultants, Inc. (GCI) – Phase 2 Environmental Site Assessment, Maersk Pacific Limited, Building 600, Tacoma, Washington, March 30, 2000.

The compiled information includes the locations of borings, test pits, piezometers, wells, underground and above ground storage tanks (UST and AST) and known fuel/oil pipelines. The information provided by the compilation generally indicates:

- Soil beneath the study area generally consists of fill overlying silt and silty sand.
- The ground water table is generally at about elevation +8 feet MLLW or approximately 10 feet below ground surface (bgs).

- Ground water measurements made during this study indicate that the ground water flow direction varies depending on the tide level. GCI reported a north-northeast ground water flow direction. However, flow direction analysis by GCI was limited to three wells (GCI-MW1, GCI-MW-2, and GCI-MW3).
- Free petroleum product exists on ground water beneath the site.
- Petroleum hydrocarbons are present in soil and ground water beneath the site.

Based on the compiled information, potential sources of petroleum hydrocarbons include a former 1.25-million gallon diesel AST, a former 3,000-gallon waste oil UST, an abandoned 10-inch oil pipeline located north-northeast of Building 600, an abandoned lube oil pipeline located north of Building 600 and two existing USTs (1,000-gallon gasoline and 20,000-gallon diesel) located about 100 feet east of Building 600. The locations of previous explorations and potential sources of petroleum hydrocarbons in the immediate vicinity of Building 600 are shown on Figure 2. The CETI and GCI reports are summarized below.

Underground Storage Tank Site Assessment/Site Characterization, Sea-Land Terminal, prepared by Creative Environmental Technologies, Inc. [CETI], dated November 5, 1999

A UST for waste oil was removed from the south side of Building 600 in December 1998. Petroleum-contaminated soil and ground water were observed in the UST excavation at the time of removal, as described in the CETI report. The waste oil tank was reportedly in good condition.

Phase II Environmental Site Assessment, Maersk Pacific Limited, Building 600, Tacoma, Washington, prepared by Geotech Consultants, Incorporated [GCI], dated March 30, 2000

GCI completed a Phase 2 ESA in the vicinity of Building 600 to investigate soil and ground water conditions in March 2000. Their study included completing nine borings (B-1 through B-9) at the site and installing three ground water monitoring wells (MW-1 through MW-3) to collect soil and ground water samples for chemical analyses. The chemical analytical data indicate that diesel- and motor oil-range petroleum hydrocarbons and naphthalene were present in soil and ground water beneath the site as follows:

- Diesel-range petroleum hydrocarbons were detected in soil samples collected at the site at concentrations ranging from 950 to 31,000 mg/kg.
- Heavy oil-range petroleum hydrocarbons were detected in soil samples collected at the site at concentrations ranging from 60 to 12,000 mg/kg.
- Napthalene was detected in soil samples collected at the site at concentrations ranging from 2.2 to 16 mg/kg.
- Diesel-range petroleum hydrocarbons were detected in ground water samples collected at the site at concentrations ranging from 3.1 to 850,000 mg/l.

- Heavy oil-range petroleum hydrocarbons were detected in ground water samples collected at the site at concentrations ranging from 0.66 to 14,000 mg/l.
- Measurable free product was detected in monitoring wells MW-1 and MW-3 at apparent thicknesses of 0.2 and 0.92 feet.

SUBSURFACE EXPLORATIONS

Nine borings were completed at the site by GeoEngineers between January 3 and January 5, 2001 at the locations shown on Figure 3 using hollow-stem auger drilling equipment owned and operated by Holt Drilling of Puyallup, Washington. Eight of the nine borings (MW-1 through MW-6, MW-8, and MW-9) were completed as ground water monitoring wells. The borings extended to approximately 15 feet bgs.

The borings were monitored by a representative of GeoEngineers who visually classified the soil obtained during advancement of the borings and performed field-screening tests for evidence of petroleum hydrocarbons and other volatile organic compounds. Soil samples were collected at 2.5-foot intervals in each exploration using a 1.5-foot-long split-barrel sampler. Soil samples were classified in accordance with the system described in Appendix A. Field screening consisted of headspace vapor testing for combustible gases using a Microtip MP 1000, water sheen testing, and observation for staining and/or odor. The boring logs, well construction details and field screening methods are described in more detail in Appendix A.

Development of the ground water monitoring wells occurred following completion of each well. Ground water from each well was sampled on January 8, 2001 following purging. Ground water sampling procedures are described in more detail in Appendix A.

A vertical control survey was completed on January 16, 2001. Well elevations were established for the eight monitoring wells installed during this study and three monitoring wells (GCI-MW-1, GCI-MW2, and GCI-MW3) from a previous study using an existing Port of Tacoma benchmark as a reference. The well elevations (top of casing) are shown on Table 1.

The investigation-derived wastes were contained onsite in 55-gallon drums and properly labeled. The potentially contaminated soil-filled drums were transported to TPS Technologies for treatment and disposal. The liquid-filled drums were transported to Emerald Petroleum Services, Inc. for disposal at their Seattle facility. Manifests and disposal documents are provided in Appendix C.

SUBSURFACE CONDITIONS

Soil Conditions

Subsurface soil at the boring locations generally consists of a 1-foot thick layer of asphalt/gravel base overlying a one-foot thick layer of gray silt. The silt is underlain by a 6- to 8-foot thick dark gray medium to coarse sand. The medium to coarse sand is generally underlain by a dark gray fine to medium sand extending to the full depth explored. Detailed descriptions of the soil encountered in the borings are given on the boring logs presented in Appendix A.

Field Screening Results and Sample Selection

Soil samples from the borings were field screened for evidence of petroleum hydrocarbons using visual, water sheen and headspace vapor screening methods. Soil samples were selected for chemical analysis based on field screening results and/or the depth relative to the water table, particularly if field screening did not indicate the presence of petroleum hydrocarbons in the soil boring. A petroleum-like sheen was observed in one or more soil samples collected from each boring. Relatively moderate concentrations of combustible vapors (95 parts per million [ppm] to 385 ppm) were measured in the headspace of soil samples obtained from soil borings MW-1, MW-2, MW-8, and MW-9. Field screening results are identified on the boring logs in Appendix A. The field screening methods are described in Appendix A.

Ground Water and Free Product Conditions

Eight ground water monitoring wells were installed at the site between January 3 and January 5, 2001. All monitoring wells were completed to depths of about 15 feet bgs and protected with well monuments. The depths to ground water and free product were measured on January 8 and 16, and March 12, 2001. The results of the ground water and free product conditions are discussed below.

January 8 and 16, 2001

The depths to ground water and free product were measured in the 8 GEI monitoring wells and the 3 GCI monitoring wells during the ground water sampling event on January 8 and during surveying activities on January 16, 2001. Ground water elevation contours produced from these events indicated that a ground water depression exists at the site around wells GCI-MW1 and GEI-MW1. Measurable free product was observed in 3 wells (GCI-MW1, GCI-MW2, and GCI-MW3) with a trace (less than 0.01 feet) of free product also observed in monitoring well GEI-MW1 on January 8 and 16, 2001. Free product thickness ranged from 0.03 feet in monitoring well GCI-MW2 to 0.82 feet in monitoring well GCI-MW1. The approximate limits of the free product plume are shown on Figure 4.

March 12, 2001

The ground water and free product depths were measured again on March 12, 2001 to evaluate tidal influences on the ground water table. The measurements were conducted during high tide conditions at about 7:15 AM and low tide conditions at about 1:25 PM. The change in ground water elevation from high to low tide ranged from +0.12 feet in well GEI-MW1 to -1.4 feet in well GEI-MW9. The smallest change in ground water elevation from high to low tide occurred in wells GEI-MW1 and GCI-MW1 at +0.12 feet and -0.06 feet, respectively. Wells GEI-MW1 and GCI-MW1 are located in the area of ground water depression as measured during January 2001. The relatively small change in ground water elevation at wells GEI-MW1 and GCI-MW1 indicates that these wells are less influenced by tidal fluctuations than the surrounding wells. Depths to ground water and free product measurements are shown in Table 1. No

measurements were collected from well GCI-MW3 during this event as bentonite was observed in the well. Monitoring well GCI-MW3 was most likely damaged as a result of the Nisqually Earthquake on February 28, 2001.

The ground water beneath the site appears to be tidally influenced based on the March 2001 measurements. Ground water elevation contours indicate that ground water flowed concentrically inward towards monitoring wells GEI-MW1 and GCI-MW1 during the high tide period as shown on Figure 5. A ground water divide that trends east-west appeared to exist between wells GEI-MW1, GEI-MW5, GEI-MW6, and GCI-MW1 during the low tide time period. Ground water elevation contours indicate that ground water flowed to the northwest and southeast towards the Puyallup River during the low tide condition as shown on Figure 6. We reviewed as-built utility plans for the Maersk site to evaluate the possibility that subsurface utility lines were influencing ground water flow. No utility lines were identified in the Building 600 area at depths that would influence ground water flow.

Measurable free product was observed on March 12, 2001 in monitoring wells GCI-MW1 and GCI-MW2 with a trace of free product also observed in monitoring well GEI-MW1. Free product thickness ranged from 0.99 to 0.04 feet in wells GCI-MW1 and GCI-MW2, respectively, during the high tide period. Free product thickness ranged from 1.02 to 0.06 feet in wells GCI-MW1 and GCI-MW2, respectively, during the low tide period.

CHEMICAL ANALYTICAL PROGRAM

GENERAL

The soil and ground water samples were submitted to Sound Analytical, Inc. of Tacoma, Washington for chemical analysis. The soil samples were selected for chemical analysis based on field screening results and/or the depth to ground water. The laboratory reports including analytical results, analytical methods and laboratory quality assurance/quality control (QA/QC) records are attached as Appendix B. Chain-of-custody procedures were followed during the transfer of field samples to the analytical laboratory. The samples were held in cold storage pending extraction and/or analysis. The chemical analytical program generally consisted of the following:

- Submitted as many as three soil samples from each boring for chemical analysis of diesel- and heavy oil-range petroleum hydrocarbons using Ecology Method WTPH-D extended. A total of thirteen soil samples were analyzed.
- Submitted three soil samples for chemical analyses of EPH, VPH, PAH, and BETX.
- Submitted eight ground water samples for chemical analysis of petroleum hydrocarbons, using WTPH-HCID, WTPH-G and WTPH-D extended, as appropriate.

ANALYTICAL DATA REVIEW

The laboratory maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses 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 laboratory also uses 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 laboratory compared each group of samples with the existing data quality goals and noted any exceptions in the laboratory report.

It is our opinion that the analytical data are of acceptable quality for their intended use based on our data quality review.

CHEMICAL ANALYTICAL RESULTS

GENERAL

Chemical analyses of the soil and ground water samples were performed by Sound Analytical. The laboratory reports are attached as Appendix B. Summaries of the chemical analytical data are presented in Tables 2, 3, and 4. The boring/well locations and associated petroleum hydrocarbon concentrations detected for soil and ground water from all site investigations are shown on Figures 7 and 8. It should be noted that chemical analysis of soil and ground water samples in the site area has been ongoing since the early 1990s. Analytical methods have changed over time and the results presented for the various studies on Figures 7 and 8 may not be directly comparable.

SOIL SAMPLES

Thirteen soil samples were analyzed during this study for diesel- and heavy oil-range petroleum hydrocarbons using WTPH-D extended (WTPH-Dx). The WTPH-Dx data is shown on Table 2. Three of the soil samples (MW-1 [8.5 ft], MW-8 [3.5 ft], and MW-9 [11 ft]) were also analyzed for EPH, VPH, PAHs, and BETX as shown on Table 3. The chemical analytical results are discussed in more detail below.

Petroleum Hydrocarbons

One to three soil samples from each of the nine borings were analyzed for diesel- and heavy-range petroleum hydrocarbons. Petroleum hydrocarbons were detected as follows:

- Diesel-range petroleum hydrocarbons were detected in soil samples collected from MW-1, MW-5, MW-8, and MW-9 at concentrations ranging from 15 to 27,000 mg/kg as shown on Table 2. Diesel range petroleum hydrocarbons were not detected in soil samples collected from MW-2, MW-3, MW-4, MW-6, B-7, and one of two samples collected from MW-8.
- Heavy oil-range petroleum hydrocarbons were detected in soil samples collected from MW-1, MW-5, MW-8, and MW-9 at concentrations ranging from 30 to 1,900 mg/kg as shown on Table 2. Heavy-oil range petroleum hydrocarbons were not detected in soil samples collected from MW-2, MW-3, MW-4, MW-6, MW-7, one of two samples collected from MW-8 and one of two samples collected from MW-9.

The concentrations of diesel- and heavy oil-range hydrocarbons detected in the soil samples are shown on Figure 7.

Extractable Petroleum Hydrocarbons (EPH)

Soil samples collected from MW-1, MW-8 and MW-9 at depths of 8.5, 3.5 and 11 feet bgs (respectively) were analyzed for EPHs. EPHs were detected in the soil samples as follows:

- >nC8-nC10 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 45 to 420 mg/kg.
- >nC10-nC12 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 170 to 1900 mg/kg.
- >nC12-nC16 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 660 to 7900 mg/kg.
- >nC16-nC21 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 450 to 5000 mg/kg.
- >nC21-nC34 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 42 to 1100 mg/kg.
- >nC10-nC12 Aromatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 21 to 660 mg/kg.
- >nC12-nC16 Aromatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 200 to 3400 mg/kg.
- >nC16-nC21 Aromatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 270 to 4200 mg/kg.
- >nC21-nC34 Aromatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 30 to 1100 mg/kg.

Volatile Petroleum Hydrocarbons (VPH)

Soil samples collected from MW-1, MW-8 and MW-9 at depths of 8.5, 3.5 and 11 feet bgs (respectively) were analyzed for VPHs. VPHs were detected in the soil samples as follows:

- Total EC >8-10 Aromatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 9.8 to 170 mg/kg.
- Total EC 5-6 Aliphatics were detected in MW-1 at a concentration of 1.9 mg/kg. Total EC 5-6 Aliphatics were not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Total EC >6-8 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.91 to 9 mg/kg.
- Total EC >8-10 Aliphatics were detected in MW-1, MW-8 and MW-9 at concentrations ranging from 9.1 to 110 mg/kg.

Polynuclear Aromatic Hydrocarbons (PAHs)

Soil samples collected from MW-1, MW-8 and MW-9 at depths of 8.5, 3.5 and 11 feet bgs (respectively) were analyzed for PAHs. PAHs were detected in the soil samples as follows:

- Napthalene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.37 to 45 mg/kg.

- 2-Methylnapthalene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 7.4 to 230 mg/kg.
- Acenapthene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.25 to 17 mg/kg.
- Fluorene was detected in MW-1 and MW-9 at concentrations of 19 and 2.2 mg/kg, respectively. Fluorene was not detected above the reporting limit in the soil sample collected from MW-8.
- Phenanthrene was detected in MW-1 and MW-9 at concentrations of 27 and 2 mg/kg, respectively. Phenanthrene was not detected above the reporting limit in the soil sample collected from MW-8.
- Anthracene was detected in MW-1 at a concentration of 7.9 mg/kg. Anthracene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Fluoranthene was detected in MW-1 and MW-9 at concentrations of 2.6 and 0.06 mg/kg, respectively. Fluoranthene was not detected above the reporting limit in the soil sample collected from MW-8.
- Pyrene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.11 to 11 mg/kg.
- Benzo(a)anthracene was detected in MW-1 and MW-9 at concentrations of 3.4 and 0.04 mg/kg, respectively. Benzo(a)anthracene was not detected above the reporting limit in the soil sample collected from MW-8.
- Chrysene was detected in MW-1 and MW-9 at concentrations of 5.1 and 0.063 mg/kg, respectively. Chrysene was not detected above the reporting limit in the soil sample collected from MW-8.
- Benzo(b)fluoranthene was detected in MW-1 at a concentration of 2.6 mg/kg. Benzo(b)fluoranthene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Benzo(k)fluoranthene was detected in MW-1 at a concentration of 1.7 mg/kg. Benzo(k)fluoranthene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Benzo(a)pyrene was detected in MW-1 at a concentration of 2.2 mg/kg. Benzo(a)pyrene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Indeno(1,2,3-cd)pyrene was detected in MW-1 at a concentration of 1.3 mg/kg. Indeno(1,2,3-cd)pyrene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Benzo(g,h,i)perylene was detected in MW-1 at a concentration of 1.1 mg/kg. Benzo(g,h,i)perylene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.

BETX

Soil samples collected from MW-1, MW-8 and MW-9 at depths of 8.5, 3.5 and 11 feet bgs (respectively) were analyzed for BETX. BETX were detected in the soil samples as follows:

- Benzene was detected in MW-1 at a concentration of 0.094 mg/kg. Benzene was not detected above the reporting limit in the soil samples collected from MW-8 and MW-9.
- Toluene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.11 to 0.53 mg/kg.
- Ethylbenzene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.23 to 3.9 mg/kg.
- M- and p-xylenes were detected in MW-1 and MW-9 at concentrations of 3.2 and 1.3 mg/kg, respectively. M- and p-xylenes were not detected above the reporting limit in the soil sample analyzed from MW-8.
- O-xylene was detected in MW-1, MW-8 and MW-9 at concentrations ranging from 0.28 to 4.8 mg/kg.

GROUND WATER SAMPLES

Seven ground water samples (MW-2 through MW-6, MW-8 and MW-9) were analyzed during this study for petroleum hydrocarbons using WTPH-HCID, WTPH-G, and/or WTPH-Dx. The analytical results for petroleum hydrocarbons in ground water are shown on Table 4. A ground water sample was not collected from MW-1 because a heavy sheen to trace amount of product was observed during the sampling event. Petroleum hydrocarbons were detected in the ground water samples as follows:

- Gasoline-range petroleum hydrocarbons were detected in the ground water samples collected from MW-4, MW-8, and MW-9 at concentrations ranging from 0.17 to 0.58 milligrams per liter (mg/l).
- Diesel-range petroleum hydrocarbons were detected in the ground water samples collected from MW-2, MW-4, MW-5, MW-6, MW-8, and MW-9 at concentrations ranging from 0.41 to 3 mg/l.
- Heavy oil-range petroleum hydrocarbons were detected in the ground water samples collected from MW-2, MW-4, MW-5, MW-6, MW-8, and MW-9 at concentrations ranging from 0.42 to 1.1 mg/l.

The concentration of diesel-range hydrocarbons detected in the ground water samples and contours showing the apparent distribution of hydrocarbons in ground water beneath the site are shown on Figure 8.

LIMITATIONS

This report has been prepared for the use of the Port of Tacoma. This report can be provided to regulatory agencies but this report is not intended for use by others and the information contained herein is not applicable to other sites. The analytical results presented in this report are based on the agreed-upon scope of work outlined in the report. Use or misuse of this report, or

reliance upon the findings hereof by any other parties is at their own risk. Neither the Port of Tacoma nor GeoEngineers makes any representation or warranty to such other parties as to the accuracy or completeness of this report or the suitability of its use by such other parties for any purpose whatever, known or unknown. Neither the Port of Tacoma nor GeoEngineers shall have any liability to, or indemnifies or holds harmless third parties for any losses incurred by the actual or purported use or misuse of this report.

The data reported herein are based on limited soil and ground water sampling conducted on the property. The services provided by GeoEngineers satisfy the standard of care, skill and diligence ordinarily performed by professionals performing similar services at the time the services were completed. A potential always exists for areas of hydrocarbons that were not identified during this study. Further evaluation of such potential would require appropriate subsurface exploration and testing.

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 warranty, express or implied, should be understood.

We appreciate the opportunity to work with the Port of Tacoma on this project. Please call if you have questions or require additional information.

Respectfully submitted,

GeoEngineers, Inc.

Sally L. Fisher
Senior Environmental Scientist

John H. Biggane
Principal

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Attachments

TABLE 1
GROUND WATER ELEVATION AND FREE PRODUCT DATA
MAERSK PACIFIC LTD. SITE
TACOMA, WASHINGTON
MEASUREMENTS COLLECTED ON MARCH 12, 2001

Well Number	Date	Well Elevation[1] Top of Casing (ft MLLW)	Depth to Product (ft)	Product Thickness (ft)	Depth to Water (ft)	Water[2] Elevation (ft MLLW)	Difference in Ground Water Elevation from High Tide to Low Tide
High Tide							
GCIMW-1	3/12/01	18.58	9.96	0.99	10.95	8.46	
GCIMW-2	3/12/01	17.64	8.86	0.04	8.90	8.77	
GCIMW-3	3/12/01	18.46	NA	NA	NA	NA	
GEIMW-1	3/12/01	18.81	10.44	--	10.44	8.37	
GEIMW-2	3/12/01	17.64	--	--	8.82	8.82	
GEIMW-3	3/12/01	17.45	--	--	8.57	8.88	
GEIMW-4	3/12/01	18.15	--	--	9.42	8.73	
GEIMW-5	3/12/01	17.67	--	--	8.73	8.94	
GEIMW-6	3/12/01	17.95	--	--	9.28	8.67	
GEIMW-8	3/12/01	17.50	--	--	8.75	8.75	
GEIMW-9	3/12/01	18.36	--	--	9.52	8.84	
Low Tide							
GCIMW-1	3/12/01	18.58	10.01	1.02	11.03	8.40	-0.06
GCIMW-2	3/12/01	17.64	9.64	0.06	9.70	7.99	-0.78
GCIMW-3	3/12/01	18.46	NA	NA	NA	NA	NA
GEIMW-1	3/12/01	18.81	10.32	0.01	10.33	8.49	0.12
GEIMW-2	3/12/01	17.64	--	--	9.35	8.29	-0.53
GEIMW-3	3/12/01	17.45	--	--	9.21	8.24	-0.64
GEIMW-4	3/12/01	18.15	--	--	10.33	7.82	-0.91
GEIMW-5	3/12/01	17.67	--	--	9.27	8.40	-0.54
GEIMW-6	3/12/01	17.95	--	--	9.56	8.39	-0.28
GEIMW-8	3/12/01	17.50	--	--	9.23	8.27	-0.48
GEIMW-9	3/12/01	18.36	--	--	10.92	7.44	-1.4

Notes:

[1] Well elevations were established from a vertical control survey conducted on January 16, 2001and referenced to an existing Port of Tacoma benchmark.

[2] Water elevation was corrected for the specific gravity of product being 0.835 in wells with measurable product.

-- Free product not present.

NA - not accessible; well filled with bentonite (due to seismic event February 28, 2001).

MLLW = Mean Lower Low water = 0.0

TABLE 2
SUMMARY OF TPH CHEMICAL ANALYTICAL RESULTS - SOIL
MAERSK PACIFIC LTD. SITE
TACOMA, WASHINGTON

Sample Number	Sample Depth (ft)	Sample Date	WTPH-Dx (mg/kg)	
			Diesel	Heavy-Oil
GEIMW-1	6	1/4/01	1,000	70
	8.5	1/4/01	27,000	1,900
	11	1/4/01	130	35
GEIMW-2	6	1/5/01	ND	ND
GEIMW-3	3	1/3/01	ND	ND
GEIMW-4	6	1/4/01	ND	ND
GEIMW-5	6	1/4/01	15	30
GEIMW-6	6	1/3/01	ND	ND
GEIB-7	8.5	1/5/01	ND	ND
GEIMW-8	3.5	1/5/01	9,500	170
	6	1/5/01	ND	ND
GEIMW-9	8.5	1/3/01	23	ND
	11	1/3/01	3,300	64

Notes:

Laboratory analysis conducted by Sound Analytical Services, Inc. in Tacoma, Washington

"mg/kg" = milligrams per kilogram

"ND" = indicates the analyte was not detected above the laboratory reporting limit

TABLE 3 (Page 1 of 2)
SUMMARY OF EPH, VPH, PAHs, AND BETX CHEMICAL ANALYTICAL RESULTS FOR SOIL[1]
MAERSK PACIFIC LTD. SITE
TACOMA, WASHINGTON

Sample Number Sample Depth	MW-1 (8.5')	MW-8 (3.5')	MW-9 (11')
EPH (mg/kg)			
>nC8-nC10 Aliphatic	420	45	52
>nC10-nC12 Aliphatic	1900	170	210
>nC12-nC16 Aliphatic	7900	1700	660
>nC16-nC21 Aliphatic	5000	2100	450
>nC21-nC34 Aliphatic	1100	120	42
>nC10-nC12 Aromatic	660	21	47
>nC12-nC16 Aromatic	3400	200	290
>nC16-nC21 Aromatic	4200	490	270
>nC21-nC34 Aromatic	1100	45	30
VPH (mg/kg)			
MTBE	ND	ND	ND
Total EC >8-10 Aromatics	170	9.8	36
Total EC 5-6 Aliphatics	1.9	ND	ND
Total EC >6-8 Aliphatics	9	0.91	1.9
Total EC >8-10 Aliphatics	110	9.1	36
PAHs (mg/kg)			
Naphthalene	45	0.37	5.4
2-Methylnaphthalene	230	7.4	36
2-Chloronaphthalene	ND	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	17	0.25	1.3
Fluorene	19	ND	2.2
Phenanthrene	27	ND	2
Anthracene	7.9	ND	ND
Fluoranthene	2.6	ND	0.06
Pyrene	11	0.11	0.15
Benzo(a)anthracene	3.4	ND	0.04
Chrysene	5.1	ND	0.063

TABLE 3 (Page 2 of 2)

Sample Number Sample Depth	MW-1 (8.5')	MW-8 (3.5')	MW-9 (11')
Benzo(b)fluoranthene	2.6	ND	ND
Benzo(k)fluoranthene	1.7	ND	ND
Benzo(a)pyrene	2.2	ND	ND
Indeno(1,2,3-cd)pyrene	1.3	ND	ND
Dibenz(a,h)anthracene	ND	ND	ND
Benzo(g,h,I)perylene	1.1	ND	ND
BETX (mg/kg)			
Benzene	0.094	ND	ND
Toulene	0.53	0.11	0.12
Ethylbenzene	3.9	0.23	1.5
m- & p-Xylene	3.2	ND	1.3
o-Xylene	4.8	0.28	1.3
WTPH-Dx (mg/kg)			
Diesel	27000	9500	3300
Motor Oil	1900	170	64

Notes:

[1] Laboratory analysis conducted by Sound Analytical Services, Inc. in Tacoma, Washington

"mg/kg" = milligrams per kilogram

"ND" = indicates the analyte was not detected above the laboratory reporting limit

"--" = not analyzed

EPH = Extractable petroleum hydrocarbons

VPH = Volatile petroleum hydrocarbons

BETX = Benzene, ethylbenzene, toluene, xylenes

PAH = Polynuclear aromatic hydrocarbons

TABLE 4
SUMMARY OF CHEMICAL ANALYTICAL RESULTS - GROUND WATER
MAERSK PACIFIC LTD. SITE
TACOMA, WASHINGTON

Sample Number	Sample Date	WTPH-HCID (mg/l)			WTPH-G (mg/l)	WTPH-Dx (mg/l)	
		Gasoline-Range	Diesel-Range	Motor Oil-Range	Gasoline	Diesel	Motor Oil
GEIMW-2	1/8/01	--	--	--	--	1.9	0.87
GEIMW-3	1/8/01	<0.1	<0.26	<0.52	--	--	--
GEIMW-4	1/8/01	>0.11	>0.26	<0.53	0.17	0.76	0.42
GEIMW-5	1/8/01	<0.11	>0.27	<0.55	--	0.59	0.43
GEIMW-6	1/8/01	<0.11	>0.27	<0.54	--	0.41	0.52
GEIMW-8	1/8/01	>0.11	>0.27	>0.55	0.51	3	1.1
GEIMW-9	1/8/01	>0.11	>0.27	<0.54	0.58	2	0.45

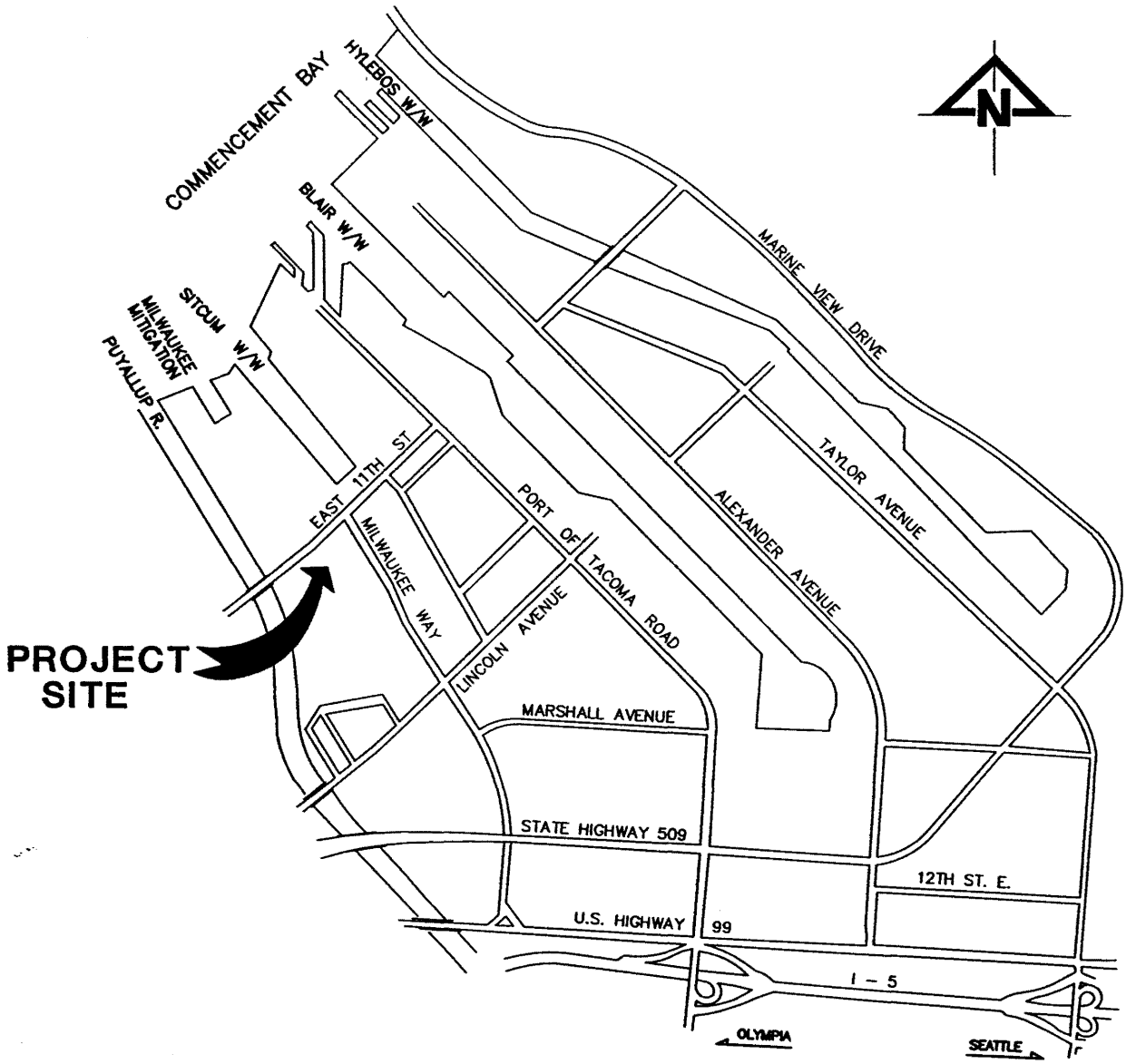
Notes:

Laboratory analysis conducted by Sound Analytical Services, Inc. in Tacoma, Washington

"mg/l" = milligrams per liter

"<0.1" = indicates the analyte was not detected above the concentration shown

P:\045406\00\CAD\VICINITY



VICINITY MAP
N.T.S.

0454-066-00 SLF:RJW 03/12/01

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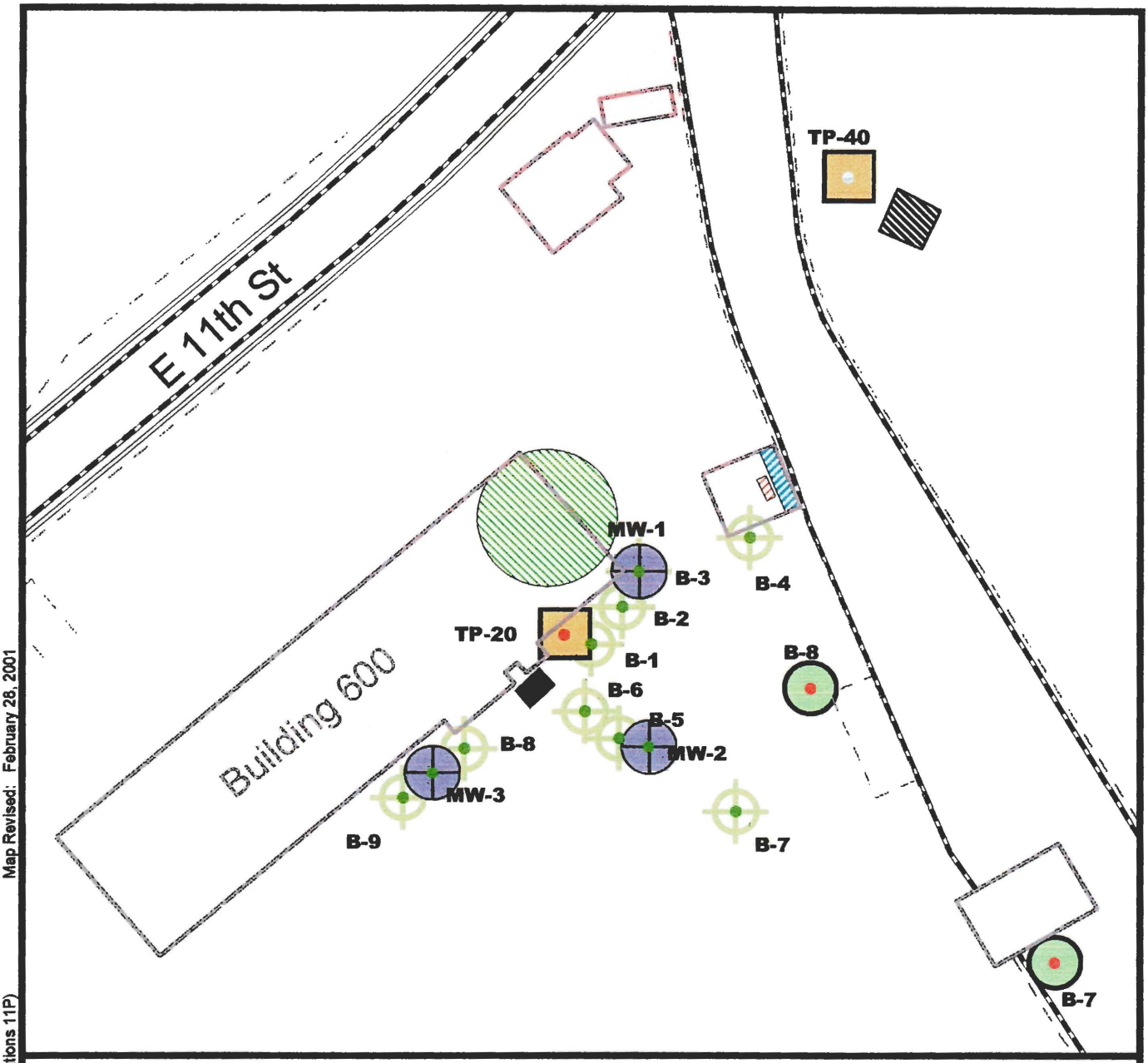
VICINITY MAP

FIGURE 1



N

0 100 Feet

Data Sources: Buildings, streets, fences from Port of Tacoma CAD drawings. Boring and Monitoring well locations from GEI.

Lambert Conformal Conic
Washington State Plane South
North American Datum 1983

This map is for information purposes. It is intended to assist in showing investigation sites. Data was compiled from multiple sources as listed on this map. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this map.

All locations are approximate.

PREVIOUS EXPLORATIONS
- Boring
- Monitor Well
- Piezometer
- Test Pit

FORMER STORAGE TANKS
- 1.25 million gal. AST Diesel
- 14,000 gal. UST Diesel
- 3,000 gal. UST Diesel

EXISTING STORAGE TANKS
- 20,000 gal. UST Diesel
- 1,000 gal. UST Gasoline

- BUILDINGS
- FENCES
- ROADS
- BRIDGES

CONSULTANT
- Applied Geotechnology
- Geotech
- Hart-Crowser

Map Revised: February 28, 2001

p:\0454066\gis\maersk.apr (previous investigations 11P)

jlm

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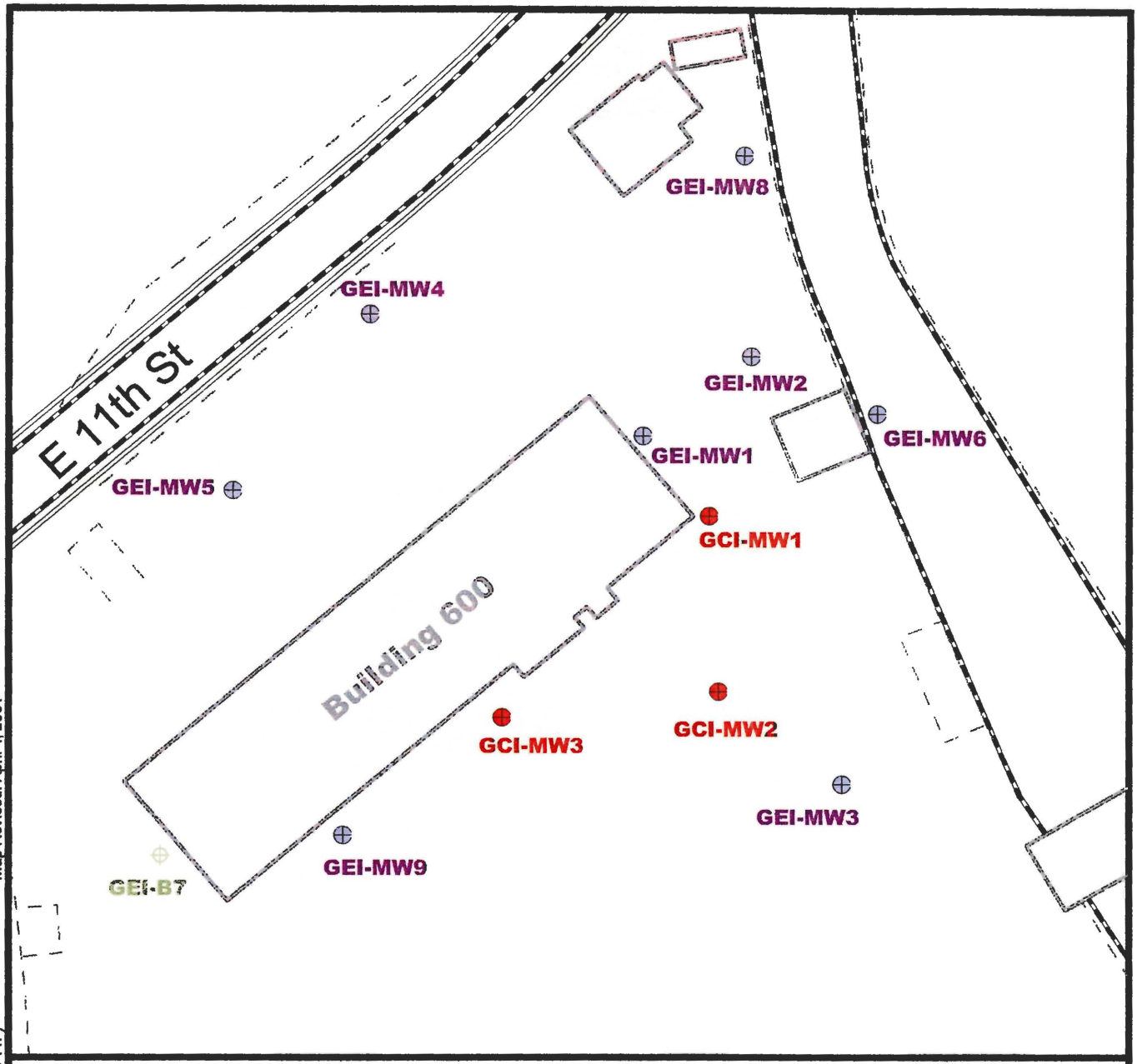
PREVIOUS INVESTIGATIONS

FIGURE 2



Map Revised: April 4, 2001

p:\0454066\gis\maersk.apr (GEI investigations 11P)

N

0 100 Feet

Data Sources: Buildings, streets, fences from Port of Tacoma CAD drawings. Boring and Monitoring well locations from GEI.

Lambert Conformal Conic
Washington State Plane South
North American Datum 1983

This map is for information purposes. It is intended to assist in showing investigation sites. Data was compiled from multiple sources as listed on this map. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this map.

All locations are approximate.

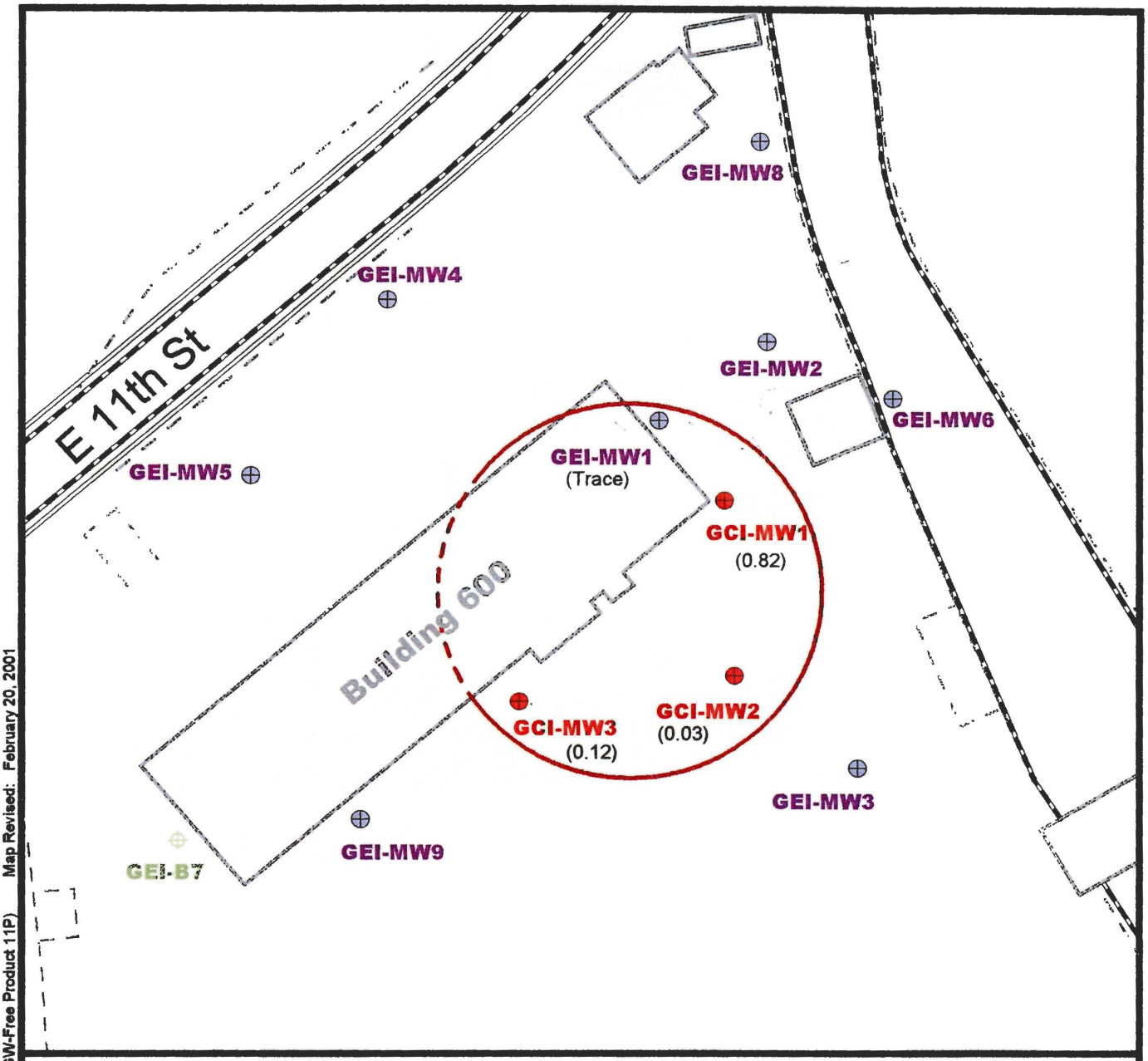
GEOENGINEERS SAMPLE SITES
- Boring
- Monitoring Wells
- PREVIOUS MONITORING WELLS
- BUILDINGS
- FENCES
- ROADS
- BRIDGES

GeoEngineers

GEI INVESTIGATIONS

FIGURE 3

rjw



N

0 100 Feet

Data Sources: Buildings, streets, fences from Port of Tacoma CAD drawings. Boring and Monitoring well locations from GEI.

Lambert Conformal Conic
Washington State Plane South
North American Datum 1983

This map is for information purposes. It is intended to assist in showing investigation sites. Data was compiled from multiple sources as listed on this map. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this map.

All locations are approximate.

GEOENGINEERS SAMPLE SITES
- Boring
- Monitoring Wells
- PREVIOUS MONITORING WELLS
- BUILDINGS
- FENCES
- ROADS
- BRIDGES

(0.03) - FREE PRODUCT THICKNESS IN FEET

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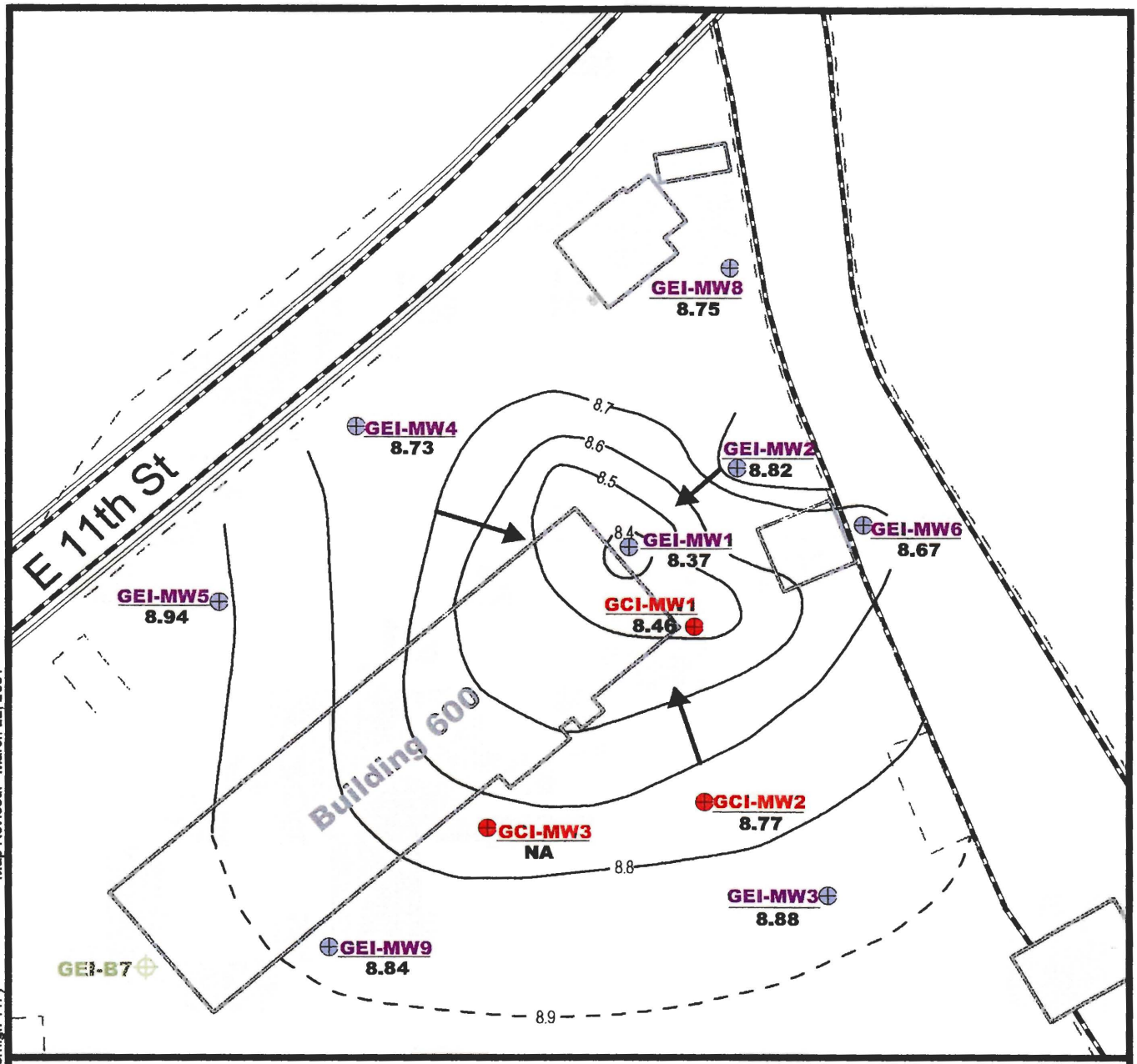
GEI INVESTIGATIONS - FREE PRODUCT PLUME AREA

FIGURE 4

p:\0454066\gis\maersk.apr (GEI investigations GW-Free Product 11P) Map Revised: February 20, 2001

jlm



Data Sources: Buildings, streets, fences from Port of Tacoma CAD drawings. Boring and monitoring well locations from GEI. Groundwater level measurements collected on March 12, 2001 at approximately 7:15 AM.

Lambert Conformal Conic
Washington State Plane South
North American Datum 1983

This map is for information purposes. It is intended to assist in showing investigation sites. Data was compiled from multiple sources as listed on this map. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this map.

All locations are approximate.

GEOENGINEERS SAMPLE SITES
- Boring
- Monitoring Wells
- Previous Monitoring Wells
- BUILDINGS
- FENCES
- ROADS
- BRIDGES
- 8.4 GROUND WATER CONTOUR INTERVAL (MLLW)
- GROUND WATER FLOW DIRECTION

N

100 0 100 Feet

Map Revised: March 22, 2001

p:\0454066\gis\maerskgw3-12.apr (groundwaterhigh 11P)

rjw

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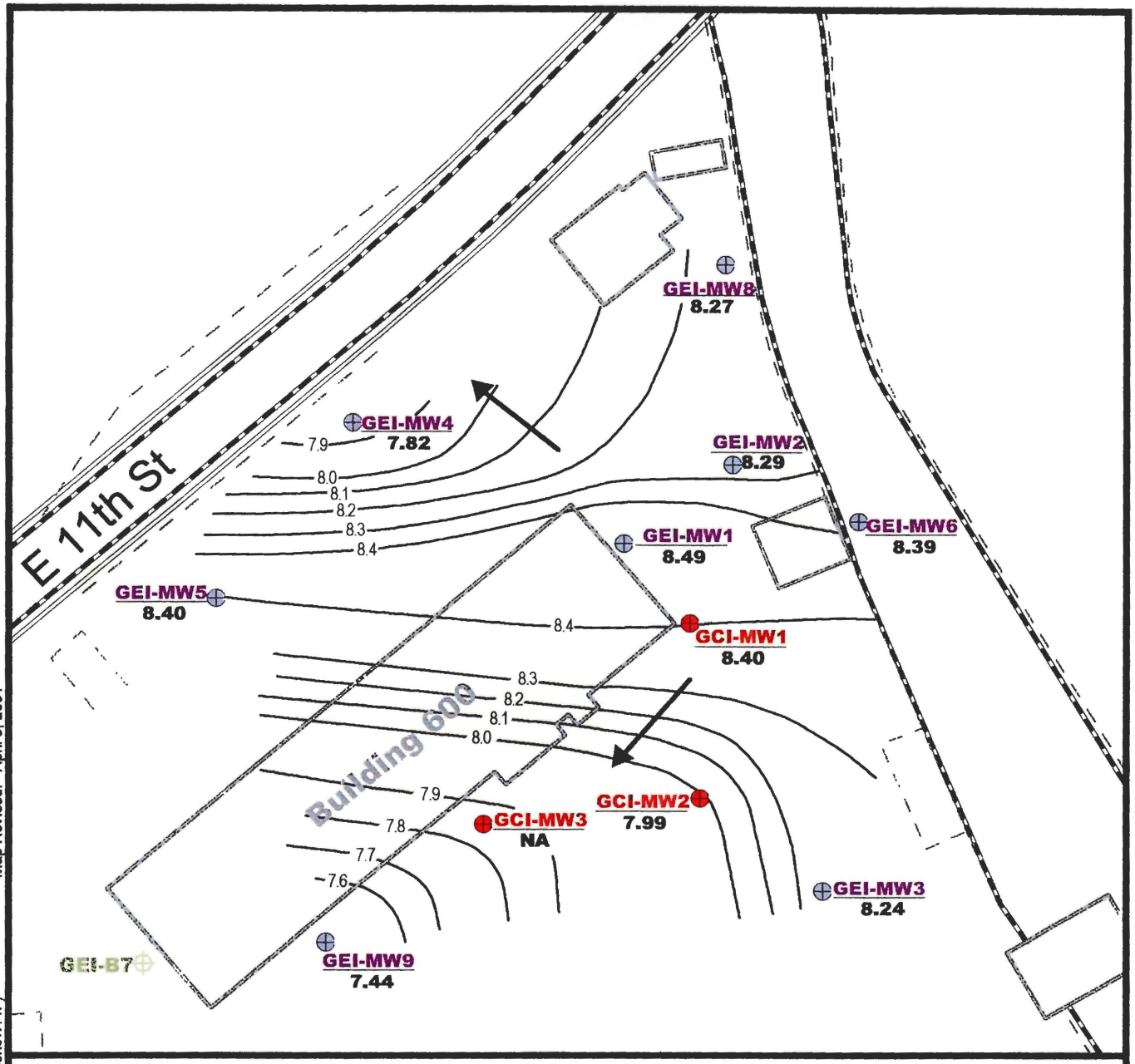
HIGH TIDE GROUND WATER ELEVATION CONTOUR MAP

FIGURE 5



Map Revised: April 3, 2001

p:\0454066\gis\maerskgw3-12.apr (groundwaterlow11P)

Data Sources: Buildings, streets, fences from Port of Tacoma CAD drawings. Boring and monitoring well locations from GEI. Groundwater level measurements collected on March 12, 2001 at approximately 1:25 PM.

Lambert Conformal Conic
Washington State Plane South
North American Datum 1983

This map is for information purposes. It is intended to assist in showing investigation sites. Data was compiled from multiple sources as listed on this map. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this map.

All locations are approximate.

GEOENGINEERS SAMPLE SITES
- Boring
- Monitoring Wells
- Previous Monitoring Wells
- BUILDINGS
- FENCES
- ROADS
- BRIDGES
- 8.4 GROUND WATER CONTOUR INTERVAL (MLLW)
- GROUND WATER FLOW DIRECTION

N

100 0 100 Feet

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LOW TIDE GROUND WATER ELEVATION CONTOUR MAP

FIGURE 6

rjw

P:\0454066\00\CAD\GW_SOIL1

GEI-MW8	Diesel	Heavy Oil	Gasoline
Soil (3.5')	9,500	170	--
Soil (6')	ND	ND	--

AGITP-39	TPH
Soil	39,000

AGITP-40	TPH
Soil	46,000

GEI-MW2	Diesel	Heavy Oil
Soil (6')	ND	ND

GEI-MW1	Diesel	Heavy Oil
Soil (6')	1,000	70
Soil (8.5')	27,000	1,900
Soil (11')	130	35

GEI-MW4	Diesel	Heavy Oil	Gasoline
Soil (6')	ND	ND	--

GEI-MW6	Diesel	Heavy Oil
Soil (6')	ND	ND

GCI-B3	Diesel	Heavy Oil
Soil	16,000	2,200

GCI-B2	Diesel	Heavy Oil
Soil	29,000	12,000

GCI-B4	Diesel	Heavy Oil
Soil	12,000	610

HCTP-20	Diesel	Heavy Oil
Soil	0.00	0.00

GEI-MW5	Diesel	Heavy Oil
Soil (6')	15	30

GCI-B1	Diesel	Heavy Oil
Soil	13,000	12,000

GCI-B5	Diesel	Heavy Oil
Soil	1,800	70.0

GCI-B6	Diesel	Heavy Oil
Soil	5,600	380

GCI-B8	Diesel	Heavy Oil
Soil	31,000	650

GCI-B7	Diesel	Heavy Oil
Soil	950	60

GCI-B9	Diesel	Heavy Oil
Soil	26,000	650

GEI-MW3	Diesel	Heavy Oil
Soil (3')	ND	ND

GEI-MW9	Diesel	Heavy Oil	Gasoline
Soil (6.5')	23	ND	--
Soil (11')	3,300	6+	--

GEI-B7	Diesel	Heavy Oil
Soil (8.5')	ND	ND

APITP-32	TPH
Soil	1,700

GCI-MW1

GCI-MW2

GCI-MW3

PAVED

OPEN STORAGE

BUILDING 600

E 11th STREET

PUYALLUP RIVER

18TH

20

N

0 120 240

SCALE IN FEET

EXPLANATION:

- **GEI-MW1** ● APPROXIMATE LOCATION OF MONITORING WELL
- **GCI-MW1** ◑ APPROXIMATE LOCATION OF MONITORING WELL BY OTHERS
- **GEI-B7** ⊕ APPROXIMATE LOCATION OF SOIL BORING
- **GCI-B5** ⊕ APPROXIMATE LOCATION OF SOIL BORING BY OTHERS
- **AGITP-40** ⧈ APPROXIMATE LOCATION OF TEST PIT BY OTHERS

NOTES:

1. See report text for information regarding studies by others.
2. The location of all features shown is approximate.
3. Concentrations are in milligrams per kilogram (mg/kg).
4. ND = Not detected at or above laboratory method detection limit.
5. -- = Not analyzed.

Reference: Base drawing from AutoCAD file "321343A.DWG", provided by Port of Tacoma.

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PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL

FIGURE 7

P:\0454066\00\CAD\G_WATER

GEI-MW8	Diesel	Heavy Oil	Gasoline
Groundwater	3	1.1	0.51

GEI-MW2	Diesel	Heavy Oil
Groundwater	1.9	0.87

GEI-MW1	Diesel	Heavy Oil
Groundwater	NS	NS

GEI-MW4	Diesel	Heavy Oil	Gasoline
Groundwater	0.76	0.42	0.17

GEI-MW6	Diesel	Heavy Oil
Groundwater	0.41	0.52

GEI-MW5	Diesel	Heavy Oil
Groundwater	0.59	0.43

GCI-MW1	Diesel	Heavy Oil
Water	850,000	14,000

GCI-MW2	Diesel	Heavy Oil
Water	3.1	0.66

GCI-MW3	Diesel	Heavy Oil
Water	22	1.6

GEI-MW3	Diesel	Heavy Oil
Groundwater	ND	ND

GEI-MW9	Diesel	Heavy Oil	Gasoline
Groundwater	2	0.45	0.58

AGITP-39

AGITP-40

APITP-32

HCTP-20

GCI-B1

GCI-B2

GCI-B3

GCI-B4

GCI-B5

GCI-B6

GCI-B7

GCI-B8

GCI-B9

GEI-B7

PAVED

OPEN STORAGE

BUILDING 600

E 11th STREET

PUYALLUP RIVER

18TH

20

1

3

20

850,000

N

0 120 240

SCALE IN FEET

EXPLANATION:

GEI-MW1 ● APPROXIMATE LOCATION OF MONITORING WELL

GCI-MW1 ◑ APPROXIMATE LOCATION OF MONITORING WELL BY OTHERS

GEI-B7 ⊕ APPROXIMATE LOCATION OF SOIL BORING

GCI-B5 ⊕ APPROXIMATE LOCATION OF SOIL BORING BY OTHERS

AGITP-40 ⧈ APPROXIMATE LOCATION OF TEST PIT BY OTHERS

1 DIESEL-RANGE PETROLEUM HYDROCARBON CONCENTRATION CONTOUR INTERVAL. CONCENTRATIONS IN MILLIGRAMS PER LITER (mg/l).

NOTES:

1. See report text for information regarding studies by others.
2. The location of all features shown is approximate.

Reference: Base drawing from AutoCAD file "321343A.DWG", provided by Port of Tacoma.

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DIESEL-RANGE PETROLEUM HYDROCARBON CONCENTRATONS IN GROUND WATER

FIGURE 8

APPENDIX A

APPENDIX A

FIELD EXPLORATION PROGRAM

GENERAL

Subsurface conditions were explored by completing nine hollow-stem auger borings (MW-1 through MW-6, B-7, MW-8, and MW-9) at the site between January 3 and January 5, 2001 to evaluate the potential presence of contaminated soil and ground water beneath the site. A 2-inch diameter PVC ground water monitoring well was constructed in eight of the borings (i.e., all borings except B-7).

A geologist from our staff selected the locations for borings, observed and classified the soils encountered, and prepared a detailed log of each boring. An explanation of the boring log symbols is presented in Figure A-2. The boring logs are presented in Figures A-3 through A-11.

SOIL SAMPLING

Soil samples were collected at 2.5-foot intervals during exploration using hollow-stem auger drilling equipment owned and operated by Holt Drilling of Puyallup, Washington. Soil samples were collected using a 1.5-foot long split barrel sampler. The sampler was driven into the soil using a 300-pound hammer connected to a 30-inch drop wire release. The sampler was opened upon retrieval and a GeoEngineers geologist logged the soils in general accordance with the Unified Soil Classification System (ASTM D-2488-90). The soil samples were collected in 8-ounce glass jars (supplied by the analytical laboratory), labeled and stored in an ice-chest pending delivery to the laboratory. The soils were classified according to the system described in Figure A-1.

FIELD SCREENING METHODS

Our representative conducted field screening on each of the soil samples obtained from the borings. Field screening results can be used as a general guideline to delineate areas of potential petroleum-hydrocarbons 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, (2) screening for organic vapors, and (3) water sheen testing.

Visual screening consists of observing the soil for stains indicative of petroleum-related hydrocarbons. Visual screening is generally more effective when heavy petroleum hydrocarbons such as motor oil are present, or when hydrocarbon concentrations are high. Sheen screening and headspace screening are more sensitive screening methods 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 boring logs. Sheens are classified as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light colorless film, spotty to globular; spread is irregular, not rapid; areas of no sheen remain; film dissipates rapidly.
Moderate Sheen (MS)	Light to heavy film, may have some color or iridescence, globular to stringy, spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy colorful film with iridescence; stringy, spread is rapid; sheen flows off the sample; most of water surface may be covered with sheen.

Headspace vapor screening involves placing a soil sample in a plastic sample bag. Air is captured in the bag and the bag is shaken to expose the soil to the air trapped in the bag. The probe of the Microtip MP 1000 is inserted in the bag, and the device measures the concentration of combustible vapors present within the sample bag headspace. The TLV measures combustible vapor concentrations in parts per million (ppm). The results of headspace vapor screening are presented on the boring logs.

GROUND WATER SAMPLING

A GeoEngineers' geologist collected ground water samples from the ground water monitoring wells. Each well was purged prior to sample collection. Ground water samples were collected from each monitoring well using a disposable polyethylene bailer with disposable tubing. Ground water samples were collected in laboratory-supplied containers and placed in an ice chest with blue ice. Ground water levels were measured using an electronic tape. Free product was measured using a water/oil interface probe.

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 D2488-90.
2. Soil classification using laboratory tests is in general accordance with 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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SOIL CLASSIFICATION SYSTEM

FIGURE A-1

File No. 0454-066-00-3150 TRM:SLF:JHB:tw

ENVIRONMENTAL LABORATORY TESTS

CA Chemical Analysis

FIELD SCREENING TESTS:

Headspace vapor concentration data given in parts per million

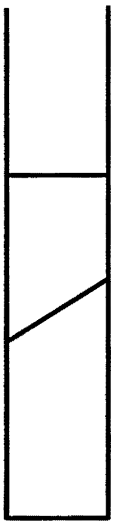
Sheen classification system:

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

GEOTECHNICAL LABORATORY DATA

GS Grain size

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

SAMPLE COLLECTION

Continuous sample collection at 4.0-foot intervals using a 1.5-inch-diameter macro-core sampler driven with a pneumatic hammer. Single-use PTFE macro core liners were used for each sampling interval.

Location of relatively undisturbed sample

Location of disturbed sample

Location of sampling attempt with no recovery

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.

File No. 0454-066-00-3150 TRM:SLF:JHB:tw

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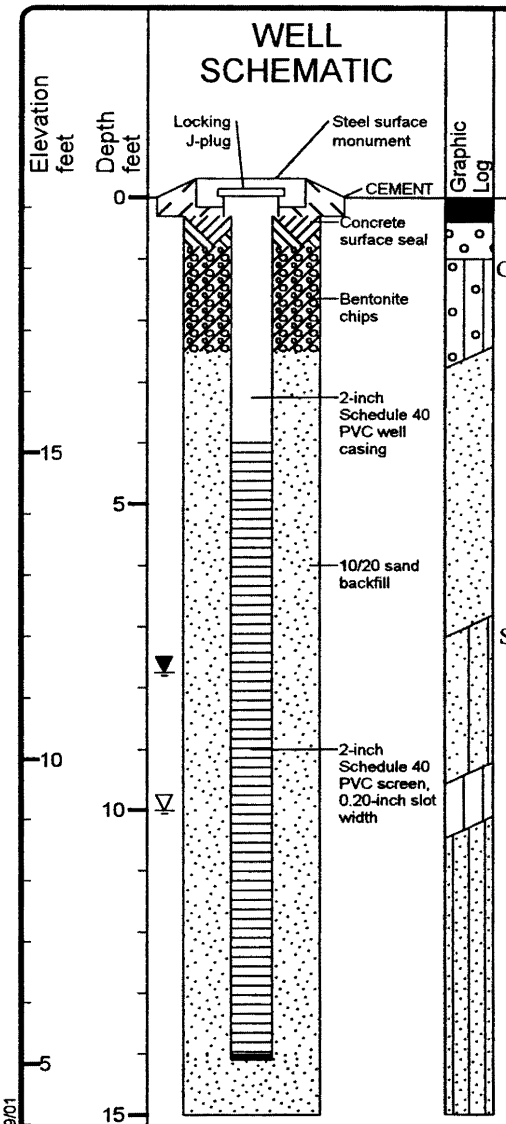
KEY TO BORING LOG SYMBOLS

FIGURE A-2

Date(s) Drilled	01/04/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/05/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	18.76	Ground Water Elevation (ft)	8.75
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164856	Northing	708865



Elevation feet	Depth feet	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sample Number	Sample	Sheen	PID Values (ppm)	Other Tests And Remarks
	0		AC	4 inches asphalt					
			GP	8 inches gravel base fill					
			GP-GM	Blue-gray medium to coarse gravel with silt and sand (dense, moist) (fill)					
15			SP	Dark brown medium sand (dense, moist)	1		MS	62	
	5				2		MS	195	CA
			SP-SM	Dark brown fine to medium sand with silt (loose, wet)	3		HS	265	
10			ML	Gray silt and occasional organic woody plant debris (soft, wet)					
	10		SM	Gray silty fine sand (very loose, wet)	4		HS	385	CA
5					5		MS	265	
	15			Boring completed at 15 feet on 01/04/01 Ground water observed at approximately 7.5 feet bgs during drilling.					
0									
	20								

Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

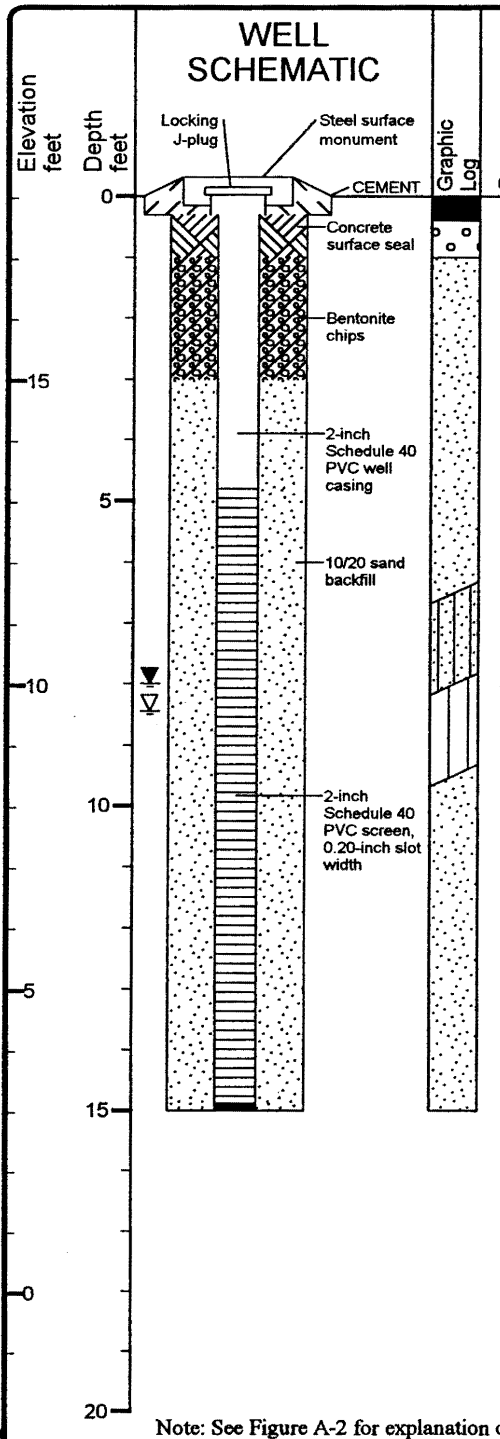
LOG OF MONITORING WELL MW-1

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-3
Sheet 1 of 1

Date(s) Drilled	01/05/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/05/2001
Well Depth (ft)	14.86	Top of Well Elevation (ft)	17.64	Ground Water Elevation (ft)	9.2
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164934	Northing	708919



Elevation feet	Depth feet	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sample Number	Sample	Sheen	PID Values (ppm)	Other Tests And Remarks
15	0		AC	4 inches asphalt					
			GP	8 inches gravel base fill					
			SP	Dark gray medium to coarse sand (medium dense, moist)	1		MS	20	
5	5				2		HS	95	CA
			SM	Dark gray silty fine to medium sand (loose, moist to wet)					
10			ML	Gray silt (soft, wet)	3		NS	<10	catcher failed
	10		SP	Dark gray medium sand (loose, wet)	4				CA
5					5		NS	<10	
	15			Boring completed at 15 feet on 01/04/01 Ground water observed at approximately 8 feet bgs during drilling.					
0									
	20								

Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

LOG OF MONITORING WELL MW-2

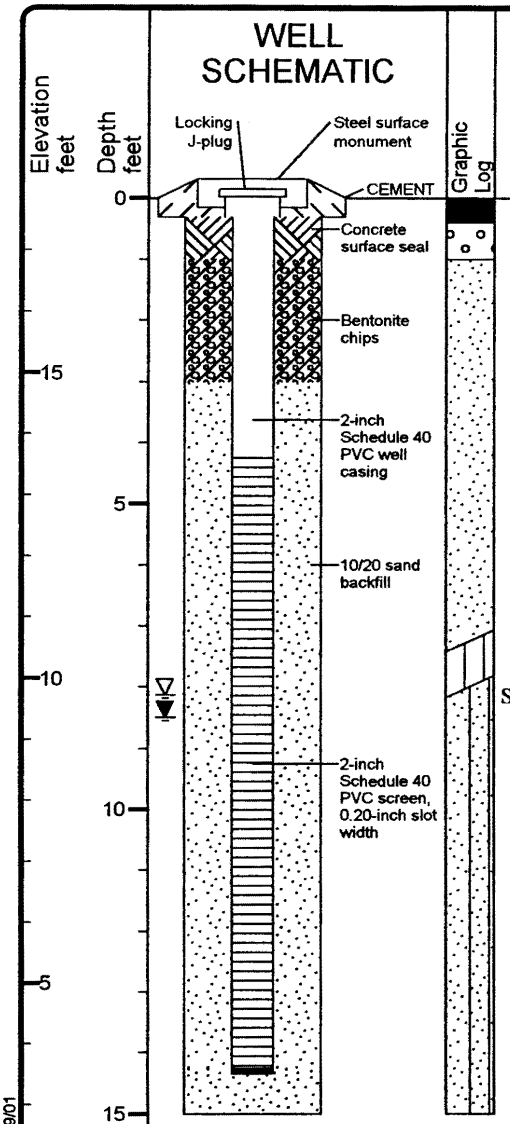
Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-4
Sheet 1 of 1

0454-066-00 GEI ENVWELL_2001 T:\PDR\0454066.GPJ GEIV1.GDT 2/9/01

Date(s) Drilled	01/03/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/08/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	17.45	Ground Water Elevation (ft)	9.32
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164991	Northing	708645



Elevation feet	Depth feet	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sample Number	Sample	Sheen	PID Values (ppm)	Other Tests And Remarks
	0		AC	4 inches asphalt					
			GP	8 inches gravel base fill					
			SP	Brown medium to coarse sand with occasional gravel (medium dense, moist)					
15					1		SS	<10	
	5				2		SS	<10	CA
10			ML	Gray silt with a trace organic matter (soft, moist to wet)					
			SP-SM	Gray fine to medium sand with silt (very loose, wet)	3		NS	<10	
	10				4		NS	<10	
5					5		NS	<10	
	15			Boring completed at 15 feet on 01/04/01 Ground water observed at approximately 8.5 feet bgs during drilling.					
0									
	20								

Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

LOG OF MONITORING WELL MW-3

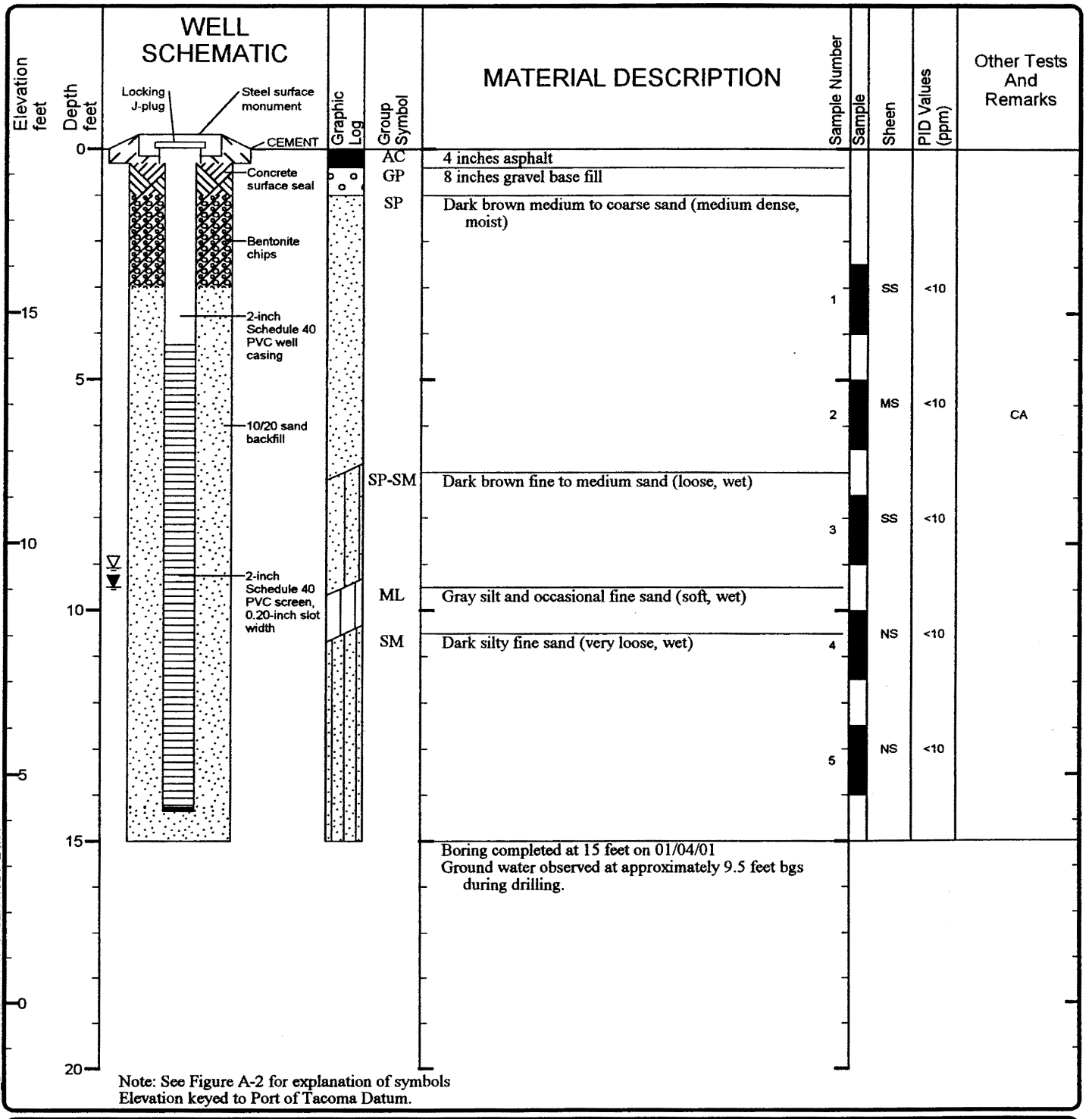
Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-5
Sheet 1 of 1

0454-066-00 GEI ENVWELL_2001 T:\PDR\0454066.GPJ GEIV1.GDT 2/9/01

Date(s) Drilled	01/04/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/05/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	18.15	Ground Water Elevation (ft)	9.06
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164696	Northing	708946



Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

0454-066-00 GEI ENVWELL_2001 T:\PDR\0454066.GPJ GEIV1.GDT 2/9/01

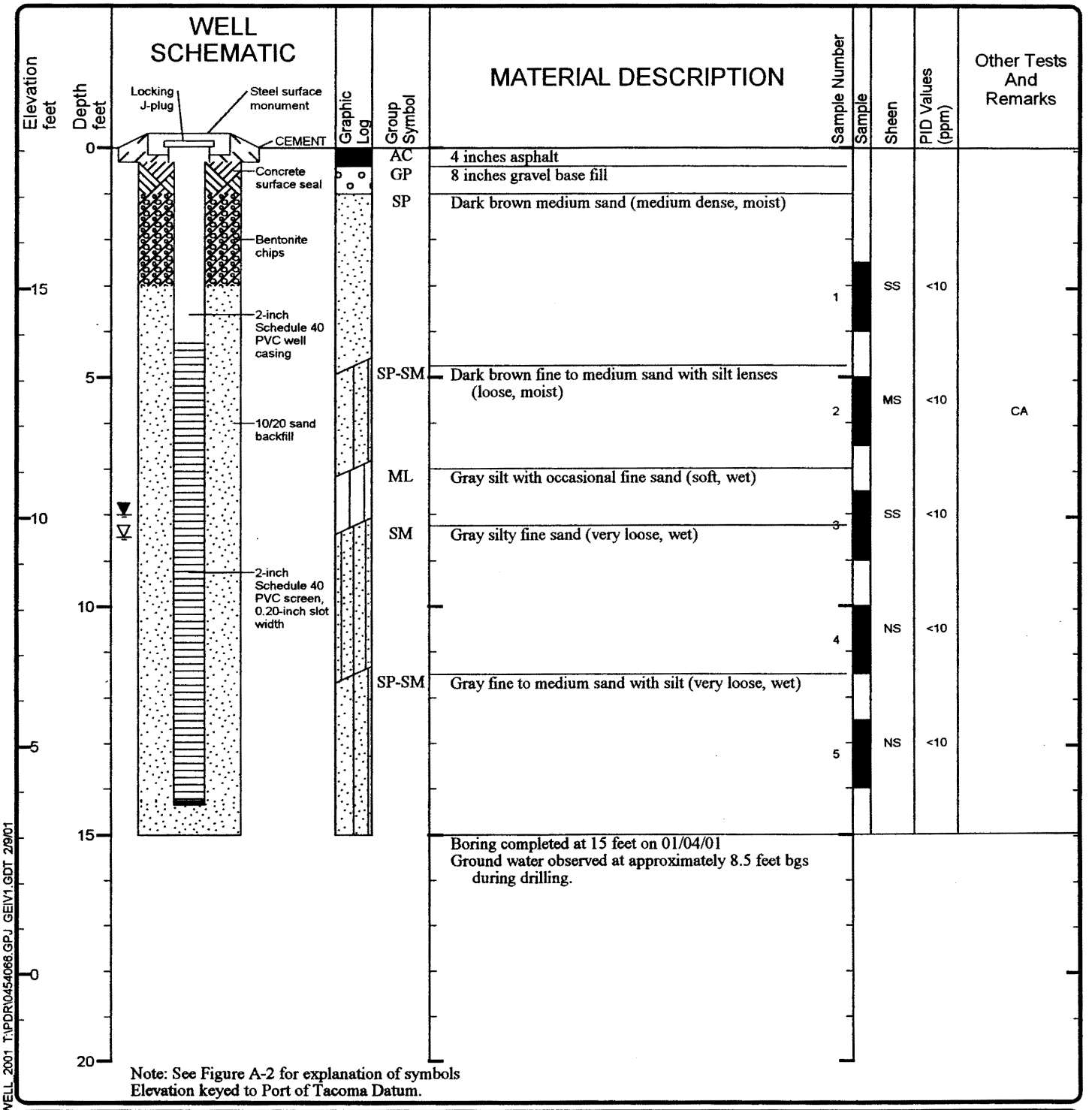
LOG OF MONITORING WELL MW-4

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-6
Sheet 1 of 1

Date(s) Drilled	01/04/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/05/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	17.67	Ground Water Elevation (ft)	9.18
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164611	Northing	708833



Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

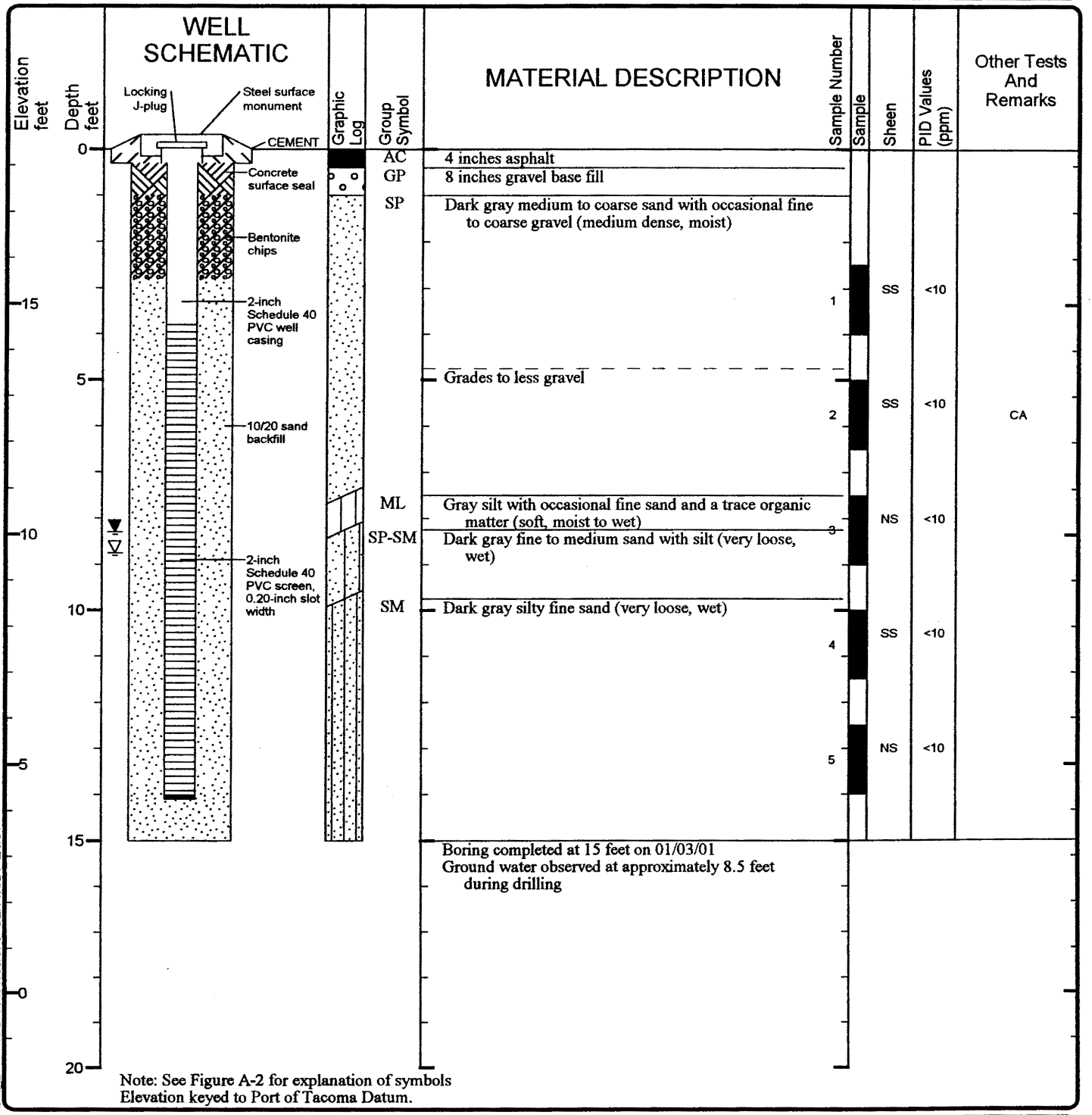
LOG OF MONITORING WELL MW-5

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-7
Sheet 1 of 1

Date(s) Drilled	01/03/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/08/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	17.95	Ground Water Elevation (ft)	9.19
Datum/ System	NAD 83/WA State Plane (South)	Easting	1165005	Northing	708881



Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

LOG OF MONITORING WELL MW-6

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-8
Sheet 1 of 1

Date(s) Drilled	01/05/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Auger Data	4.25" ID	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Drilling Equipment	Truck-mounted HSA
Total Depth (ft)	14	Surface Elevation (ft)	N/A	Ground Water Level (ft. bgs)	11
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164566	Northing	708599

Elevation feet / Depth feet	SAMPLES: Interval Number	Recovered (in)	Blows/foot	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	PID Values (ppm)	OTHER TESTS AND NOTES
0						AC	4 inches asphalt			
						GP	8 inches gravel base fill			
						SP	Brown medium to coarse sand with gravel and a trace silt (medium dense, moist)			
	1	18	29					SS	<10	
							Grades to less gravel and higher density			
5	2	18	13					NS/SS	<10	
	3	17	11					NS	<10	CA
10	4	0	4	▼			Color becomes gray			
	5	18	3					NS	<10	
15							Boring completed at 14 feet on 01/05/01 Ground water observed at approximately 11 feet bgs during drilling.			
20										

0454-066-00 GEI ENVBORING_2001 T:\PDR\0454066.GPJ GEIV1.GDT 2/9/01

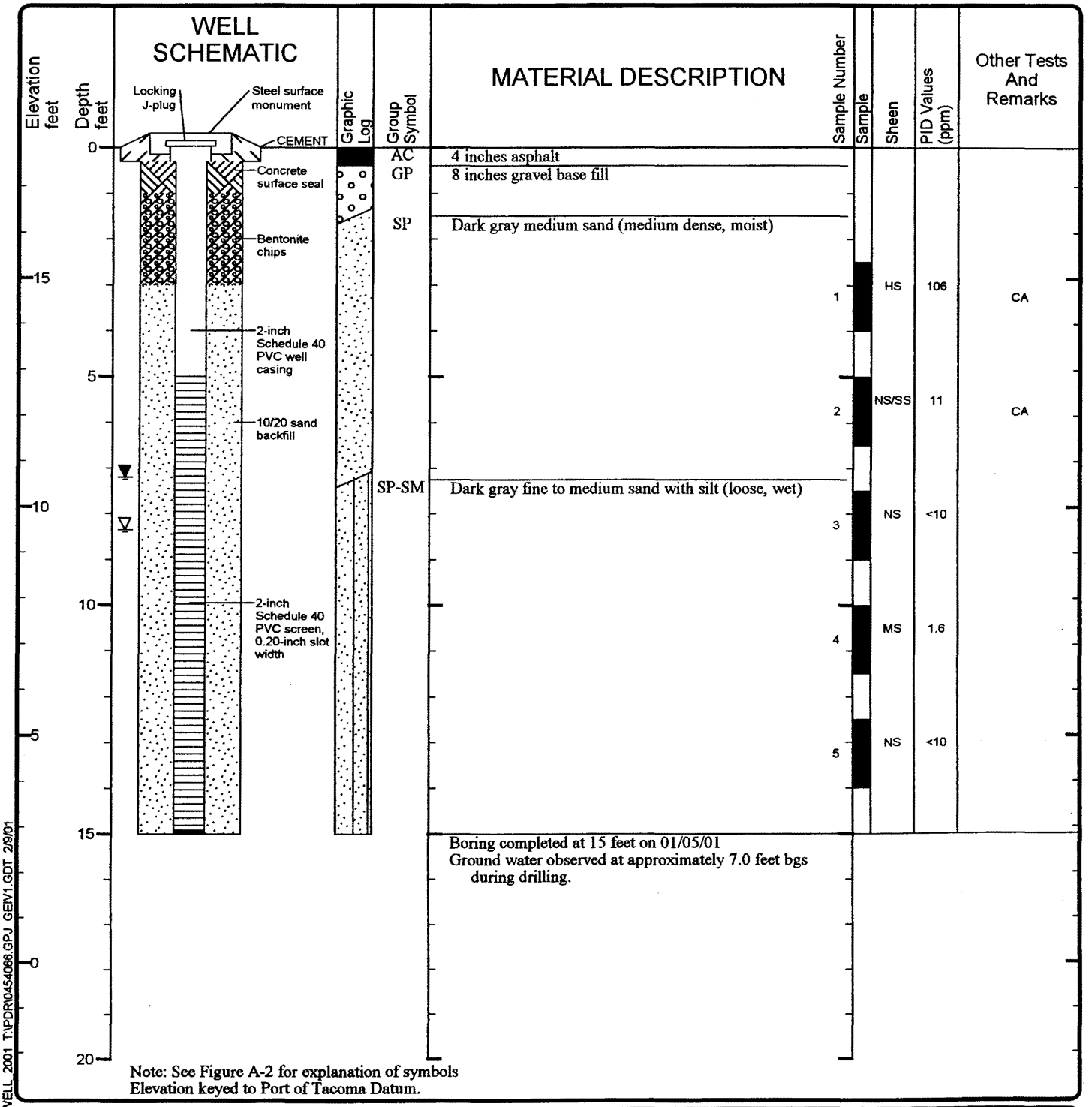
LOG OF BORING B-7

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-9
Sheet 1 of 1

Date(s) Drilled	01/05/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/05/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	17.45	Ground Water Elevation (ft)	9.1
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164929	Northing	709047



Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

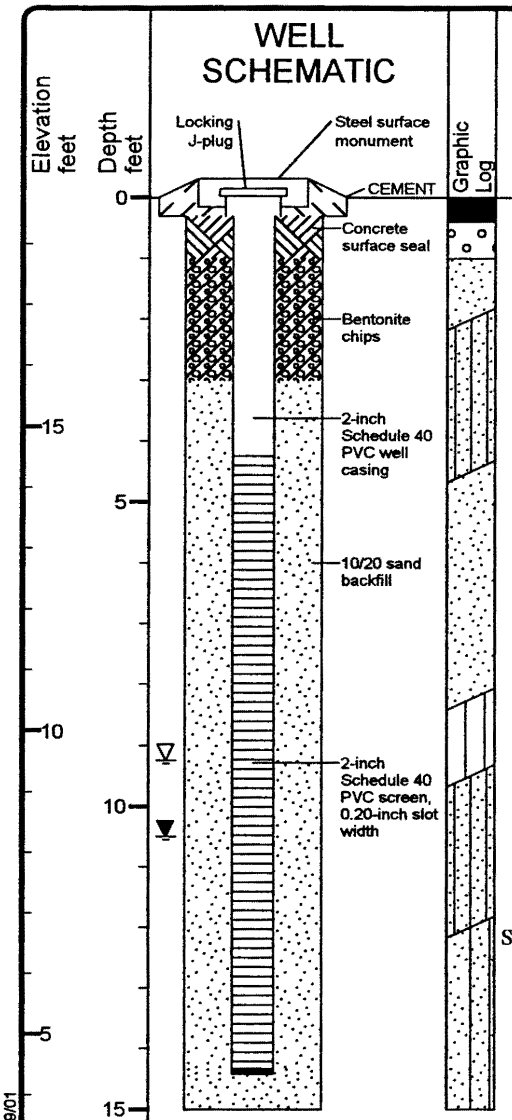
LOG OF MONITORING WELL MW-8

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-10
Sheet 1 of 1

Date(s) Drilled	01/03/01	Logged By	JJO	Checked By	PDR
Drilling Contractor	Holt Drilling	Drilling Method	Hollow Stem Auger	Sampling Methods	2.4" ID into Sleeves
Total Boring Depth (ft)	15	Hammer Data	300 (lb) hammer/ 30 (in) drop Wire release	Date Developed	01/08/2001
Well Depth (ft)	14	Top of Well Elevation (ft)	18.36	Ground Water Elevation (ft)	9.12
Datum/ System	NAD 83/WA State Plane (South)	Easting	1164680	Northing	708612



Elevation feet	Depth feet	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sample Number	Sample	Sheen	PID Values (ppm)	Other Tests And Remarks
	0		AC	4 inches asphalt					
			GP	8 inches gravel base fill					
			SP	Gray medium to coarse sand with occasional fine to coarse gravel (medium dense, moist)					
15			SM	Dark brown-black silty medium to coarse sand with gravel and occasional brick fragments (medium dense, moist) (fill)	1		SS	<10	
	5		SP	Dark gray medium sand (medium dense, moist)	2		SS	<10	
					3		SS	<10	CA
10			ML	Gray silt and a trace organic matter (soft, moist)					
	10		SM	Gray silty fine sand (very loose, wet)	4		HS	232	CA
			SP-SM	Gray fine to medium sand with silt (interbedded silty) (loose, wet)	5		SS	<10	
5									
	15			Boring completed at 15 feet on 01/05/01 Ground water observed at approximately 10.5 feet bgs during drilling.					
0									
	20								

Note: See Figure A-2 for explanation of symbols
Elevation keyed to Port of Tacoma Datum.

LOG OF MONITORING WELL MW-9

Geo Engineers

Project: Maersk Pacific
Project Location: Tacoma, WA
Project Number: 0454-066-00

Figure: A-11
Sheet 1 of 1

APPENDIX B

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East o Tacoma, WA 98424
(253) 922-2310 o FAX (253) 922-5047
e-mail: info@saslab.com

TRANSMITTAL MEMORANDUM

DATE: January 23, 2001

TO: Suzanne Dudziak
Port of Tacoma
P.O. Box 1837
Tacoma, WA 98401

PROJECT: Port of Tacoma/0454-066-00

REPORT NUMBER: 95191

Enclosed are the test results for thirty samples received at Sound Analytical Services on January 4, 2001.

The report consists of this transmittal memo, analytical results, quality control reports, a copy of the chain-of-custody, a list of data qualifiers and analytical narrative when applicable, and a copy of any requested raw data.

Should there be any questions regarding this report, please contact me at (253) 922-2310.

Sincerely,

Terri Howard
Project Manager

SOUND ANALYTICAL EPH / VPH

SAMPLE SUMMARY REPORTS
AND
WORKSHEETS

SOUND ANALYTICAL EPH / VPH SUMMARY REPORT

Client Sample ID:	MW-9 (11')						
Work Order	95191						
Laboratory ID:	95191-04						
Date Sampled:			Date Received:	1/4/01			
Date Prepared:	EPH	1/12/01	PAHs	1/4/01	VPH	1/10/01	
Date Analyzed:	EPH	1/15/01	PAHs	1/9/01	VPH	1/12/01	
Matrix:	solid	% Solids:	74.03				

ANALYTICAL RESULTS:

Non-Carcinogen - Human Health Hazard Index Compounds

Compound	mg/kg
Total Aliphatics	1400
Total Aromatics *	670
Benzene	ND
Ethylbenzene	1.5
Toluene	ND
Xylenes	2.6

* Total aromatics is aromatic fractions + benzene - ethylbenzene, toluene & xylenes

Carcinogen - Human Health Risk Compounds

Compound	mg/kg	PQL
Benzene *	0.13	0.25
Total cPAHs *	0.17	0.18

* For compounds not detected, 1/2 PQL values are Substituted

Soil to Groundwater - Fate and Transport Fractions

Aliphatic Fractions	mg/kg
C5 - C6	ND
>C6 - C8	1.9
>C8 - C10	52
>C10 - C12	210
>C12 - C16	660
>C16 - C21	450
Total Aliphatic Fractions	1400

Aromatic Fractions	mg/kg
>C8 - C10*	36
>C10 - C12	47
>C12 - C16	290
>C16 - C21	270
>C21 - C34	30
Total Aromatic Fractions	670

* Does not include ethylbenzene and xylenes

HUMAN HEALTH SOILS CONTACT WORKSHEETS

CLIENT ID: MW-9 (11')

LAB ID: 95191-04

Non-Carcinogen--Hazard Index

			Residential			***Commercial***			***Industrial***		
Compound	Soil ppm	ORfD	Factor	Res. Mult.	HQ	Factor	Com. Mult.	HQ	Factor	Ind. Mult.	HQ
Total aliphatic	1400	0.06	1.25E-05	2.08E-04	0.29	3.13E-06	5.21E-05	0.07	2.86E-07	4.77E-06	0.01
Total aromatic*	670	0.03	1.25E-05	4.17E-04	0.28	3.13E-06	1.04E-04	0.07	2.86E-07	9.53E-06	0.01
Benzene	0.0										
Ethylbenzene	1.5	0.10	1.25E-05	1.25E-04	0.00	3.13E-06	3.13E-05	0.00	2.86E-07	2.86E-06	0.00
Toluene	0.0	0.20	1.25E-05	6.25E-05	0.00	3.13E-06	1.56E-05	0.00	2.86E-07	1.43E-06	0.00
Xylenes	2.6	2.00	1.25E-05	6.25E-06	0.00	3.13E-06	1.56E-06	0.00	2.86E-07	1.43E-07	0.00
Hazard Index					0.57			0.14			0.01

* Total aromatic is total of aromatic fractions plus benzene minus ethylbenzene, toluene and xylenes

Carcinogen Risk

			Residential		***Commercial***		***Industrial***	
Compound	Soil ppm	OCPF	Res. Mult.	Risk	Com. Mult.	Risk	Ind. Mult.	Risk
Benzene *	0.13	0.029	1.00E-06	3.77E-09	2.50E-07	9.43E-10	7.62E-08	2.87E-10
Total cPAHs *	0.17	7.30	1.00E-06	1.21E-06	2.50E-07	3.03E-07	7.62E-08	9.23E-08

* For parameters not detected 1/2 PQL values are substituted

FATE AND TRANSPORT - SOIL TO GROUNDWATER

"Raoult's Law" Worksheet

CLIENT ID: MW-9 (11')

LAB ID: 95191-04

COMPOUND	Soil mg/kg	MW g/mol	Moles mmol/kg	Mol Frac.	Solubility mg/l	Effect. Sol. mg/l	DF	Well Conc. mg/l
Aliphatics								
EC 5 - 6	0	81	0.0	0.00	2.8E+01	0.0E+00	20	0.0E+00
EC >6 - 8	2	100	0.0	0.00	4.2E+00	7.3E-03	20	3.7E-04
EC >8 - 10	52	130	0.4	0.04	3.3E-01	1.2E-02	20	6.1E-04
EC >10 - 12	210	160	1.3	0.12	2.6E-02	3.1E-03	20	1.6E-04
EC >12 - 16	660	200	3.3	0.30	5.9E-04	1.8E-04	20	9.0E-06
EC >16 - 21	450	270	1.7	0.15	1.0E-06	1.5E-07	20	7.7E-09
Aromatics								
Benzene	0.0	78	0.0	0.00	1.8E+03	0.0E+00	20	0.0E+00
Toluene	0.0	92	0.0	0.00	5.2E+02	0.0E+00	20	0.0E+00
EC >8 - 10*	40	120	0.3	0.03	6.5E+01	2.0E+00	20	1.0E-01
EC >10 - 12	47	130	0.4	0.03	2.5E+01	8.3E-01	20	4.2E-02
EC >12 - 16	290	150	1.9	0.18	5.8E+00	1.0E+00	20	5.2E-02
EC >16 - 21	270	190	1.4	0.13	5.1E-01	6.7E-02	20	3.3E-03
EC >21 - 35	30	240	0.1	0.01	6.6E-03	7.6E-05	20	3.8E-06
			10.9	1.00				0.2

* Includes ethylbenzene & xylenes

Well Conc. must be 1 mg/l or less for soil concentrations to be protective of Method A drinking water standard.

SOUND ANALYTICAL EPH / VPH SUMMARY REPORT

Client Sample ID:	MW-1 (8.5')					
Work Order	95191					
Laboratory ID:	95191-08					
Date Sampled:		Date Received:	1/4/01			
Date Prepared:	EPH	1/12/01	PAHs	1/4/01	VPH	1/10/01
Date Analyzed:	EPH	1/15/01	PAHs	1/9/01	VPH	1/12/01

Matrix: solid % Solids: 88.02

ANALYTICAL RESULTS:

Non-Carcinogen - Human Health Hazard Index Compounds

Compound	mg/kg
Total Aliphatics	15000
Total Aromatics *	9500
Benzene	ND
Ethylbenzene	3.9
Toluene	0.53
Xylenes	8

* Total aromatics is aromatic fractions + benzene - ethylbenzene, toluene & xylenes

Carcinogen - Human Health Risk Compounds

Compound	mg/kg	PQL
Benzene *	0.11	0.21
Total cPAHs *	17.40	1.50

* For compounds not detected, 1/2 PQL values are Substituted

Soil to Groundwater - Fate and Transport Fractions

Aliphatic Fractions	mg/kg
C5 - C6	1.9
>C6 - C8	9
>C8 - C10	420
>C10 - C12	1900
>C12 - C16	7900
>C16 - C21	5000
Total Aliphatic Fractions	15000

Aromatic Fractions	mg/kg
>C8 - C10*	170
>C10 - C12	660
>C12 - C16	3400
>C16 - C21	4200
>C21 - C34	1100
Total Aromatic Fractions	9500

* Does not include ethylbenzene and xylenes

HUMAN HEALTH SOILS CONTACT WORKSHEETS

CLIENT ID: MW-1 (8.5')

LAB ID: 95191-08

Non-Carcinogen--Hazard Index

			Residential			***Commercial***			***Industrial***		
Compound	Soil ppm	ORfD	Factor	Res. Mult.	HQ	Factor	Com. Mult.	HQ	Factor	Ind. Mult.	HQ
Total aliphatic	15000	0.06	1.25E-05	2.08E-04	3.13	3.13E-06	5.21E-05	0.78	2.86E-07	4.77E-06	0.07
Total aromatic*	9500	0.03	1.25E-05	4.17E-04	3.96	3.13E-06	1.04E-04	0.99	2.86E-07	9.53E-06	0.09
Benzene	0.0										
Ethylbenzene	3.9	0.10	1.25E-05	1.25E-04	0.00	3.13E-06	3.13E-05	0.00	2.86E-07	2.86E-06	0.00
Toluene	0.5	0.20	1.25E-05	6.25E-05	0.00	3.13E-06	1.56E-05	0.00	2.86E-07	1.43E-06	0.00
Xylenes	8.0	2.00	1.25E-05	6.25E-06	0.00	3.13E-06	1.56E-06	0.00	2.86E-07	1.43E-07	0.00
Hazard Index					7.08			1.77			0.16

* Total aromatic is total of aromatic fractions plus benzene minus ethylbenzene, toluene and xylenes

Carcinogen Risk

			Residential		***Commercial***		***Industrial***	
Compound	Soil ppm	OCPF	Res. Mult.	Risk	Com. Mult.	Risk	Ind. Mult.	Risk
Benzene *	0.11	0.029	1.00E-06	3.19E-09	2.50E-07	7.98E-10	7.62E-08	2.43E-10
Total cPAHs *	17.40	7.30	1.00E-06	1.27E-04	2.50E-07	3.18E-05	7.62E-08	9.68E-06

* For parameters not detected 1/2 PQL values are substituted

FATE AND TRANSPORT - SOIL TO GROUNDWATER

"Raoult's Law" Worksheet

CLIENT ID: MW-1 (8.5')

LAB ID: 95191-08

COMPOUND	Soil mg/kg	MW g/mol	Moles mmol/kg	Mol Frac.	Solubility mg/l	Effect. Sol. mg/l	DF	Well Conc. mg/l
Aliphatics								
EC 5 - 6	2	81	0.0	0.00	2.8E+01	5.1E-03	20	2.5E-04
EC >6 - 8	9	100	0.1	0.00	4.2E+00	2.9E-03	20	1.5E-04
EC >8 - 10	420	130	3.2	0.03	3.3E-01	8.3E-03	20	4.1E-04
EC >10 - 12	1900	160	11.9	0.09	2.6E-02	2.4E-03	20	1.2E-04
EC >12 - 16	7900	200	39.5	0.31	5.9E-04	1.8E-04	20	9.0E-06
EC >16 - 21	5000	270	18.5	0.14	1.0E-06	1.4E-07	20	7.2E-09
Aromatics								
Benzene	0.0	78	0.0	0.00	1.8E+03	0.0E+00	20	0.0E+00
Toluene	0.5	92	0.0	0.00	5.2E+02	2.3E-02	20	1.2E-03
EC >8 - 10*	182	120	1.5	0.01	6.5E+01	7.6E-01	20	3.8E-02
EC >10 - 12	660	130	5.1	0.04	2.5E+01	9.8E-01	20	4.9E-02
EC >12 - 16	3400	150	22.7	0.18	5.8E+00	1.0E+00	20	5.1E-02
EC >16 - 21	4200	190	22.1	0.17	5.1E-01	8.7E-02	20	4.4E-03
EC >21 - 35	1100	240	4.6	0.04	6.6E-03	2.3E-04	20	1.2E-05
			129.2	1.00				0.1

* Includes ethylbenzene & xylenes

Well Conc. must be 1 mg/l or less for soil concentrations to be protective of Method A drinking water standard.

SOUND ANALYTICAL EPH / VPH

VOLATILE PETROLEUM HYDROCARBONS

ALIPHATIC AND AROMATIC FRACTIONS
TARGET INDICATOR COMPOUNDS

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-9 (11')
Lab ID:	95191-04
Date Received:	1/4/01
Date Prepared:	1/10/01
Date Analyzed:	1/12/01
% Solids	74.03
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	97.5		60	140
Bromofluorobenzene	105		60	140

Sample results are on a dry weight basis.

		Result			
Analyte		**(mg/kg)**		**PQL**	**Flags**
MTBE	ND			0.25	
Benzene	ND			0.25	
Toluene	ND			0.25	
Ethylbenzene		1.5		0.25	
m- & p-Xylene		1.3		0.51	
o-Xylene		1.3		0.25	
Total EC >8-10 Aromatics		36		1.3	
Total EC 5-6 Aliphatics	ND			0.76	
Total EC >6-8 Aliphatics		1.9		0.51	
Total EC >8-10 Aliphatics		36		1.5	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (8.5')
Lab ID:	95191-08
Date Received:	1/4/01
Date Prepared:	1/10/01
Date Analyzed:	1/12/01
% Solids	88.02
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	109		60	140
Bromofluorobenzene	88		60	140

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
MTBE	ND	0.21	
Benzene	ND	0.21	
Toluene	0.53	0.21	
Ethylbenzene	3.9	0.21	
m- & p-Xylene	3.2	0.42	
o-Xylene	4.8	0.21	
Total EC >8-10 Aromatics	170	1.1	D10
Total EC 5-6 Aliphatics	1.9	0.63	
Total EC >6-8 Aliphatics	9	0.42	
Total EC >8-10 Aliphatics	110	1.3	D10

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2557
Date Received:	-
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	116		60	140
Bromofluorobenzene	116		60	140

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
MTBE	ND	0.2	
Benzene	ND	0.2	
Toluene	ND	0.2	
Ethylbenzene	ND	0.2	
m- & p-Xylene	ND	0.4	
o-Xylene	ND	0.2	
Total EC >8-10 Aromatics	ND	1	
Total EC 5-6 Aliphatics	ND	0.6	
Total EC >6-8 Aliphatics	ND	0.4	
Total EC >8-10 Aliphatics	ND	1.2	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2557
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
MTBE	0	2	2.3	115	2.22	111	-3.5	
Benzene	0	2	2.13	107	2.12	106	-0.94	
Toluene	0	2	2.14	107	2.1	105	-1.9	
Ethylbenzene	0	2	2.05	102	2.07	103	0.98	
m- & p-Xylene	0	4	4.7	117	4.72	118	0.85	
o-Xylene	0	2	2.1	105	2.11	105	0	
Total EC >8-10 Aromatics	0	10	10.5	105	10.5	105	0	
Total EC 5-6 Aliphatics	0	6	6.13	102	5.77	96.1	-6	
Total EC >6-8 Aliphatics	0	4	3.87	96.8	4	99.9	3.2	
Total EC >8-10 Aliphatics	0	12	12.1	101	12.2	102	0.99	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
MTBE	0	2	2.11	104	
Benzene	0	2	1.75	86	
Toluene	0	2	1.86	92	
Ethylbenzene	0	2	1.86	92	
m- & p-Xylene	0	4	4.27	106	
o-Xylene	0	2.02	1.92	95	
Total EC >8-10 Aromatics	0	10	9.74	96	
Total EC 5-6 Aliphatics	0	6.1	3.93	65	
Total EC >6-8 Aliphatics	0	4	3.26	81	
Total EC >8-10 Aliphatics	0	12	11.3	93	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
MTBE	0	0	NC	
Benzene	0	0	NC	
Toluene	0	0	NC	
Ethylbenzene	0	0	NC	
m- & p-Xylene	0	0	NC	
o-Xylene	0	0	NC	
Total EC >8-10 Aromatics	0	0	NC	
Total EC 5-6 Aliphatics	0	0	NC	
Total EC >6-8 Aliphatics	0	0	NC	
Total EC >8-10 Aliphatics	0	0	NC	

SOUND ANALYTICAL EPH / VPH

EXTRACTABLE PETROLEUM HYDROCARBONS

ALIPHATIC AND AROMATIC FRACTIONS

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-9 (11')
Lab ID:	95191-04
Date Received:	1/4/01
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
% Solids	74.03
Dilution Factor	10

Extractable Petroleum Hydrocarbons (EPH) Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctadecane	92.1		50	150
o-terphenyl	87.3		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
>nC8-nC10 Aliphatic	52	5.8	
>nC10-nC12 Aliphatic	210	5.8	
>nC12-nC16 Aliphatic	660	5.8	
>nC16-nC21 Aliphatic	450	5.8	
>nC21-nC34 Aliphatic	42	5.8	
>nC10-nC12 Aromatic	47	5.8	
>nC12-nC16 Aromatic	290	5.8	
>nC16-nC21 Aromatic	270	5.8	
>nC21-nC34 Aromatic	30	5.8	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (8.5')
Lab ID:	95191-08
Date Received:	1/4/01
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
% Solids	88.02
Dilution Factor	10

Extractable Petroleum Hydrocarbons (EPH) Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctadecane	86.1		50	150
o-terphenyl	79.7		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
>nC8-nC10 Aliphatic	420	5.1	
>nC10-nC12 Aliphatic	1900	5.1	
>nC12-nC16 Aliphatic	7900	51	D10
>nC16-nC21 Aliphatic	5000	51	D10
>nC21-nC34 Aliphatic	1100	5.1	
>nC10-nC12 Aromatic	660	5.1	
>nC12-nC16 Aromatic	3400	51	D10
>nC16-nC21 Aromatic	4200	51	D10
>nC21-nC34 Aromatic	1100	5.1	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - EP228
Date Received:	-
Date Prepared:	1/12/01
Date Analyzed:	1/16/01
% Solids	
Dilution Factor	10

Extractable Petroleum Hydrocarbons (EPH) Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctadecane	94.8		60	140
o-terphenyl	87.9		60	140

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
>nC8-nC10 Aliphatic	ND	4.5	
>nC10-nC12 Aliphatic	ND	4.5	
>nC12-nC16 Aliphatic	ND	4.5	
>nC16-nC21 Aliphatic	ND	4.5	
>nC21-nC34 Aliphatic	ND	4.5	
>nC10-nC12 Aromatic	ND	4.5	
>nC12-nC16 Aromatic	ND	4.5	
>nC16-nC21 Aromatic	ND	4.5	
>nC21-nC34 Aromatic	ND	4.5	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike Report

Lab ID:	EP228
Date Prepared:	1/12/01
Date Analyzed:	1/16/01
QC Batch ID:	EP228

Extractable Petroleum Hydrocarbons (EPH) Modified

Parameter Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	Flag
>nC8-nC10 Aliphatic	0	18	17.1	94	
>nC10-nC12 Aliphatic	0	18	17.8	98	
>nC12-nC16 Aliphatic	0	18	17.7	97	
>nC16-nC21 Aliphatic	0	18	17.4	96	
>nC21-nC34 Aliphatic	0	18	18.4	101	
>nC10-nC12 Aromatic	0	18.2	16.9	93	
>nC12-nC16 Aromatic	0	18	16.9	93	
>nC16-nC21 Aromatic	0	18	17.3	95	
>nC21-nC34 Aromatic	0	18	19	104	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
QC Batch ID:	EP228

Extractable Petroleum Hydrocarbons (EPH) Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
>nC8-nC10 Aliphatic	45.5	21	68.3	108	
>nC10-nC12 Aliphatic	173	21	126	-222	X7a
>nC12-nC16 Aliphatic	1720	21	1890	812	X7a
>nC16-nC21 Aliphatic	2090	21	1930	-763	X7a
>nC21-nC34 Aliphatic	120	21	165	211	X7a
>nC10-nC12 Aromatic	21.1	21.1	31.2	48	X7
>nC12-nC16 Aromatic	204	21	138	-312	X7a
>nC16-nC21 Aromatic	492	21	288	-968	X7a
>nC21-nC34 Aromatic	45	21	48.2	15	X7

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
QC Batch ID:	EP228

Extractable Petroleum Hydrocarbons (EPH) Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
>nC8-nC10 Aliphatic	45.5	42.8	6.1	
>nC10-nC12 Aliphatic	173	173	0.0	
>nC12-nC16 Aliphatic	1720	1700	1.2	
>nC16-nC21 Aliphatic	2090	1990	4.9	
>nC21-nC34 Aliphatic	120	120	0.0	
>nC10-nC12 Aromatic	21.1	20.3	3.9	
>nC12-nC16 Aromatic	204	199	2.5	
>nC16-nC21 Aromatic	492	481	2.3	
>nC21-nC34 Aromatic	45	43.1	4.3	

SOUND ANALYTICAL EPA 8270 MOD.

EXTRACTABLE PETROLEUM HYDROCARBONS

TARGET PAH COMPOUNDS

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-9 (11')
Lab ID:	95191-04
Date Received:	1/4/01
Date Prepared:	1/9/01
Date Analyzed:	1/15/01
% Solids	74.03
Dilution Factor	20

Targeted PAH Analytes by Method 8270 Modified.

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Nitrobenzene - d5	140		56	145
2 - Fluorobiphenyl	110		55	137
p - Terphenyl - d14	86.4		45	134

Sample results are on a dry weight basis.

Analyte		**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Naphthalene		5.4	0.025	0.025	
2-Methylnaphthalene		36	0.025	0.018	D10
2-Chloronaphthalene	ND		0.025	0.011	
Acenaphthylene	ND		0.025	0.01	
Acenaphthene		1.3	0.025	0.0089	
Fluorene		2.2	0.025	0.01	
Phenanthrene		2	0.025	0.0083	
Anthracene	ND		0.025	0.012	
Fluoranthene		0.06	0.025	0.0081	
Pyrene		0.15	0.025	0.0072	
Benzo(a)anthracene		0.04	0.025	0.0081	
Chrysene		0.063	0.025	0.011	
Benzo(b)fluoranthene	ND		0.025	0.0072	
Benzo(k)fluoranthene	ND		0.025	0.0084	
Benzo(a)pyrene	ND		0.025	0.01	
Indeno(1,2,3-cd)pyrene	ND		0.025	0.0095	
Dibenz(a,h)anthracene	ND		0.025	0.0059	
Benzo(g,h,i)perylene	ND		0.025	0.0038	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (8.5')
Lab ID:	95191-08
Date Received:	1/4/01
Date Prepared:	1/9/01
Date Analyzed:	1/15/01
% Solids	88.02
Dilution Factor	200

Targeted PAH Analytes by Method 8270 Modified.

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Nitrobenzene - d5	62		56	145
2 - Fluorobiphenyl	132		55	137
p - Terphenyl - d14	82		45	134

Sample results are on a dry weight basis.

Analyte		**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Naphthalene		45	0.22	0.22	
2-Methylnaphthalene		230	0.22	0.16	D100
2-Chloronaphthalene	ND		0.22	0.093	
Acenaphthylene	ND		0.22	0.09	
Acenaphthene		17	0.22	0.078	
Fluorene		19	0.22	0.09	
Phenanthrene		27	0.22	0.073	
Anthracene		7.9	0.22	0.11	
Fluoranthene		2.6	0.22	0.071	
Pyrene		11	0.22	0.063	
Benzo(a)anthracene		3.4	0.22	0.071	
Chrysene		5.1	0.22	0.093	
Benzo(b)fluoranthene		2.6	0.22	0.063	
Benzo(k)fluoranthene		1.7	0.22	0.074	
Benzo(a)pyrene		2.2	0.22	0.092	
Indeno(1,2,3-cd)pyrene		1.3	0.22	0.083	
Dibenz(a,h)anthracene	ND		0.22	0.052	
Benzo(g,h,i)perylene		1.1	0.22	0.033	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - SS0165
Date Received:	-
Date Prepared:	1/9/01
Date Analyzed:	1/15/01
% Solids	
Dilution Factor	20

Semivolatile Organics by USEPA Method 8270

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Nitrobenzene - d5	103		56	145
2 - Fluorobiphenyl	93.6		55	137
p - Terphenyl - d14	66.6		45	134

Sample results are on an as received basis.

Analyte	**Result (ug/kg)**	**PQL**	**MDL**	**Flags**
Naphthalene	ND	20	20	
2-Methylnaphthalene	ND	20	14	
2-Chloronaphthalene	ND	20	8.4	
Acenaphthylene	ND	20	8.1	
Acenaphthene	ND	20	7.1	
Fluorene	ND	20	8.1	
Phenanthrene	ND	20	6.6	
Anthracene	ND	20	9.7	
Fluoranthene	ND	20	6.4	
Pyrene	ND	20	5.7	
Benzo(a)anthracene	ND	20	6.4	
Chrysene	ND	20	8.4	
Benzo(b)fluoranthene	ND	20	5.7	
Benzo(k)fluoranthene	ND	20	6.7	
Benzo(a)pyrene	ND	20	8.3	
Indeno(1,2,3-cd)pyrene	ND	20	7.5	
Dibenz(a,h)anthracene	ND	20	4.7	
Benzo(g,h,i)perylene	ND	20	3	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike Report

Lab ID:	SS0165
Date Prepared:	1/9/01
Date Analyzed:	1/15/01
QC Batch ID:	SS0165

Semivolatile Organics by USEPA Method 8270

Parameter Name	Blank Result (ug/kg)	Spike Amount (ug/kg)	BS Result (ug/kg)	BS % Rec.	Flag
Naphthalene	0	1000	1150	115	
Acenaphthylene	0	1000	1160	116	
Acenaphthene	0	1000	1170	117	
Fluorene	0	1000	1190	119	
Phenanthrene	0	1000	1110	111	
Anthracene	0	1000	1070	107	
Fluoranthene	0	1000	1300	130	
Pyrene	0	1000	892	89	
Benzo(a)anthracene	0	1000	1180	118	
Chrysene	0	1000	1310	131	
Benzo(b)fluoranthene	0	1000	1240	124	
Benzo(k)fluoranthene	0	1000	1010	101	
Benzo(a)pyrene	0	1000	852	85	
Indeno(1,2,3-cd)pyrene	0	1000	1030	103	
Dibenz(a,h)anthracene	0	1000	1120	112	
Benzo(g,h,i)perylene	0	1000	858	86	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike/Matrix Spike Duplicate Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/9/01
Date Analyzed:	1/15/01
QC Batch ID:	SS0165

Semivolatile Organics by USEPA Method 8270

Compound Name	Sample Result (ug/kg)	Spike Amount (ug/kg)	MS Result (ug/kg)	MS % Rec.	MSD Result (ug/kg)	MSD % Rec.	RPD	Flag
Naphthalene	140	1060	1000	81.4	774	60.1	-30	
Acenaphthylene	0	1060	1140	108	1040	97.8	-9.9	
Acenaphthene	0	1060	1160	109	1200	113	3.6	
Fluorene	36	1060	1060	96.6	1130	103	6.4	
Phenanthrene	28	1060	1080	98.8	1030	94.8	-4.1	
Anthracene	0	1060	1330	125	1030	97.4	-25	
Fluoranthene	0	1060	783	73.6	755	71.2	-3.3	
Pyrene	0	1060	909	85.4	1040	98	14	
Benzo(a)anthracene	0	1060	1330	125	973	91.8	-31	x7
Chrysene	0	1060	1450	136	973	91.8	-39	x7
Benzo(b)fluoranthene	0	1060	1320	124	1190	112	-10	
Benzo(k)fluoranthene	0	1060	1120	105	1220	115	9.1	
Benzo(a)pyrene	0	1060	1170	110	1160	110	0	
Indeno(1,2,3-cd)pyrene	0	1060	1280	120	1050	99.2	-19	
Dibenz(a,h)anthracene	0	1060	1270	119	1030	97	-20	
Benzo(g,h,i)perylene	0	1060	998	93.8	1050	99	5.4	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-9 (11')
Lab ID:	95191-04
Date Received:	1/4/01
Date Prepared:	1/10/01
Date Analyzed:	1/12/01
% Solids	74.03
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	97.5		70	130
Bromofluorobenzene	105		70	130

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	ND	0.025	0.004	
Toluene	0.12	0.051	0.0035	
Ethylbenzene	1.5	0.051	0.004	
m&p-Xylene	1.3	0.1	0.0051	
o-Xylene	1.3	0.051	0.002	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (8.5')
Lab ID:	95191-08
Date Received:	1/4/01
Date Prepared:	1/10/01
Date Analyzed:	1/12/01
% Solids	88.02
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	109		70	130
Bromofluorobenzene	88		70	130

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	0.094	0.021	0.0034	
Toluene	0.53	0.042	0.003	
Ethylbenzene	3.9	0.042	0.0034	
m&p-Xylene	3.2	0.084	0.0042	
o-Xylene	4.8	0.042	0.0017	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-9 (8.5')
Lab ID:	95191-03
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	75.23
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	84.2		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	23	32	15	J
Motor Oil	ND	64	32	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-9 (11')
Lab ID:	95191-04
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	74.03
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	105		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	3300	31	15	
Motor Oil	64	63	31	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (6')
Lab ID:	95191-07
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/9/01
% Solids	95.95
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	106		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	1000	24	12	
Motor Oil	70	49	24	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (8.5')
Lab ID:	95191-08
Date Received:	1/4/01
Date Prepared:	1/10/01
Date Analyzed:	1/12/01
% Solids	88.02
Dilution Factor	250

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	-	X8	50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	27000	680	330	X1
Motor Oil	1900	1400	680	X1

X1 - Chromatogram suggests this might be #3 fuel oil or similar product

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1 (11')
Lab ID:	95191-09
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/9/01
% Solids	77.87
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	92.4		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	130	31	15	X2
Motor Oil	35	62	31	J

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-6 (6')
Lab ID:	95191-12
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	96.12
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	99		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	26	12	
Motor Oil	ND	51	26	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-3 (6')
Lab ID:	95191-17
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	95.88
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	71.4		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	26	12	
Motor Oil	ND	51	26	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-4 (6')
Lab ID:	95191-22
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	93.39
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	98.6		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	25	12	
Motor Oil	ND	49	25	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-5 (6')
Lab ID:	95191-27
Date Received:	1/4/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	84.24
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	99.7		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	15	28	13	J
Motor Oil	30	56	28	J

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2557
Date Received:	-
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	116		75	125
Bromofluorobenzene	116		75	125

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	ND	0.02	0.0032	
Toluene	ND	0.04	0.0028	
Ethylbenzene	ND	0.04	0.0032	
m&p-Xylene	ND	0.08	0.004	
o-Xylene	ND	0.04	0.0016	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2557
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Benzene	0	2	2.13	107	2.12	106	-0.94	
Toluene	0	2	2.26	113	2.1	105	-7.3	
Ethylbenzene	0	2	2.05	102	2.07	103	0.98	
m&p-Xylene	0	4	4.7	117	4.72	118	0.85	
o-Xylene	0	2	2.06	103	2.11	105	1.9	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Benzene	0	0	NC	
Toluene	0.027	0.0243	11.0	
Ethylbenzene	0.0119	0	200.0	X4a
m&p-Xylene	0.00679	0	200.0	X4a
o-Xylene	0	0	NC	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Benzene	0	2	1.75	86	
Toluene	0.027	2	1.86	90	
Ethylbenzene	0.0119	2	1.86	91	
m&p-Xylene	0.00679	4.05	4.27	105	
o-Xylene	0	2	1.92	95	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DS0176
Date Received:	-
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	93.5		50	150

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	25	12	
Motor Oil	ND	50	25	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DS0181
Date Received:	-
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	103		50	150

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	25	12	
Motor Oil	ND	50	25	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-5 (6')
Lab ID:	95191-27
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
QC Batch ID:	DS0176

Diesel and Motor Oil by NWTPH-Dx Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
#2 Diesel	14.5	0	200.0	X4a
Motor Oil	29.7	0	200.0	X4a

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-1 (8.5')
Lab ID:	95191-08
Date Prepared:	1/10/01
Date Analyzed:	1/12/01
QC Batch ID:	DS0181

Diesel and Motor Oil by NWTPH-Dx Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
#2 Diesel	27000	27400	-1.5	
Motor Oil	1900	1720	9.9	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DS0176
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
QC Batch ID:	DS0176

Diesel and Motor Oil by NWTPH-Dx Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
#2 Diesel	0	500	513	103	522	104	0.97	
Motor Oil	0	501	460	91.8	464	92.6	0.87	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DS0181
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	DS0181

Diesel and Motor Oil by NWTPH-Dx Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
#2 Diesel	0	500	583	117	583	117	0	
Motor Oil	0	501	502	100	495	98.9	-1.1	

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East o Tacoma, WA 98424
(253) 922-2310 o FAX (253) 922-5047
e-mail: info@saslab.com

DATA QUALIFIERS AND ABBREVIATIONS

B1: This analyte was detected in the associated method blank. The analyte concentration was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).

B2: This analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).

C1: Second column confirmation was performed. The relative percent difference value (RPD) between the results on the two columns was evaluated and determined to be $\leq 40\%$.

C2: Second column confirmation was performed. The RPD between the results on the two columns was evaluated and determined to be $> 40\%$. The higher result was reported unless anomalies were noted.

M: GC/MS confirmation was performed. The result derived from the original analysis was reported.

D: The reported result for this analyte was calculated based on a secondary dilution factor.

E: The concentration of this analyte exceeded the instrument calibration range and should be considered an estimated quantity.

J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

MCL: Maximum Contaminant Level

MDL: Method Detection Limit

N: See analytical narrative.

ND: Not Detected

PQL: Practical Quantitation Limit

X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____ .

X2: Contaminant does not appear to be "typical" product.

X3: Identification and quantitation of the analyte or surrogate was complicated by matrix interference.

X4: RPD for duplicates was outside advisory QC limits. The sample was re-analyzed with similar results. The sample matrix may be nonhomogeneous.

X4a: RPD for duplicates outside advisory QC limits due to analyte concentration near the method practical quantitation limit/detection limit.

X5: Matrix spike recovery was not determined due to the required dilution.

X6: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Sample was re-analyzed with similar results.

X7: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Matrix interference may be indicated based on acceptable blank spike recovery and/or RPD.

X7a: Recovery and/or RPD values for this spiked analyte outside advisory QC limits due to high concentration of the analyte in the original sample.

X8: Surrogate recovery was not determined due to the required dilution.

X9: Surrogate recovery outside advisory QC limits due to matrix interference.

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

Geo Engineers

DATE 01/04/01
PAGE 1 OF 2
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-006-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED	NOTES/COMMENTS (Preserved, filtered, etc.)
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	TPH Dx	
11	MW-6 (3.5')	1-03-01	1000	Soil	1		Hold for pending analysis
12	MW-6 (6')		1010			X	
13	MW-6 (8.5')		1020			HOLD	Hold for pending analysis
14	MW-6 (11')		1030			HOLD	" " " "
15	MW-6 (13.5')		1050			HOLD	" " " "
16 JO	MW-103 (3.5')		1225			HOLD	" " " "
17 JO	MW-103 (6')		1230			X	
18 JO	MW-103 (8.5')		1240			HOLD	Hold for pending analysis
19 JO	MW-103 (11')		1250			HOLD	" " " "
20 JO	MW-103 (13.5')	↓	1200	↓	↓	HOLD	" " " "

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE Jamie Oakley	GEI	SIGNATURE		SIGNATURE	
PRINTED NAME JAMIE OAKLEY		PRINTED NAME		PRINTED NAME	
DATE 1-04-01 TIME 1645		DATE TIME		DATE TIME	

RECEIVED BY	FIRM	RECEIVED BY	FIRM	RECEIVED BY	FIRM
SIGNATURE AStrom	SAS	SIGNATURE		SIGNATURE	
PRINTED NAME A Strom		PRINTED NAME		PRINTED NAME	
DATE 1/4/01 TIME 445		DATE TIME		DATE TIME	

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO P.O.T. SAME REFERENCE #.

95191

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

1813

GeoEngineers

DATE 01/04/01
PAGE 1 OF 2
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-066-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF JARS	ANALYSIS REQUIRED: TPH Dx	NOTES/COMMENTS (Preserved, filtered, etc.)
LAB	GEOENGINEERS	DATE	TIME	MATRIX			
1	MW-9 (3.5')	01-03-01	1410	SOIL	1	HOLD	HOLD FOR PENDING ANALYSIS
2	MW-9 (6')	"	1415	"	"	HOLD	" " " "
3	MW-9 (8.5')	"	1425	"	"	X	—
4	MW-9 (11')	"	1435	"	"	X	—
5	MW-9 (13.5')	"	1445	"	"	HOLD	HOLD FOR PENDING ANALYSIS
6	MW-1 (3.5')	01-04-01	1355	SOIL	"	HOLD	" " " "
7	MW-1 (6')	"	1405	"	1	X	
8	MW-1 (8.5')	"	1415	"	1	HOLD	HOLD FOR PENDING ANALYSIS
9	MW-1 (11')	"	1425	"	1	X	
10	MW-1 (13.5')	"	1430	"	1	HOLD	HOLD FOR PENDING ANALYSIS

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE Jamie Oakley	GEI	SIGNATURE		SIGNATURE	
PRINTED NAME JAMIE OAKLEY		PRINTED NAME		PRINTED NAME	
DATE 1-04-01 TIME 1645		DATE TIME		DATE TIME	

RECEIVED BY	FIRM	RECEIVED BY	FIRM	RECEIVED BY	FIRM
SIGNATURE A Strom	SAS	SIGNATURE		SIGNATURE	
PRINTED NAME A Strom		PRINTED NAME		PRINTED NAME	
DATE 1/4/01 TIME 445		DATE TIME		DATE TIME	

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO P.O.T. SAME REFERENCE #.

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

GeoEngineers

DATE 01-04-01
PAGE #3 OF 3
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-066-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED	NOTES/COMMENTS
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	TPH Dx	(Preserved, filtered, etc.)
21	MW-4 (3.5')	01-04-01	1205	SOIL	1	HOLD	HOLD FOR PENDING ANALYSIS
22	MW-4 (6')	"	1210	"	"	X	—
23	MW-4 (8.5')	"	1215	"	"	HOLD	HOLD FOR PENDING ANALYSIS
24	MW-4 (11')	"	1225	"	"	HOLD	" " " "
25	MW-4 (13.5')	"	1235	"	"	HOLD	" " " "
26	MW-5 (3.5')	"	835	"	"	HOLD	" " " "
27	MW-5 (6')	"	845	"	"	X	—
28	MW-5 (8.5')	"	855	"	"	HOLD	HOLD FOR PENDING ANALYSIS
29	MW-5 (11')	"	905	"	"	HOLD	" " " "
30	MW-5 (13.5')	"	915	"	"	HOLD	" " " "
		—		—			

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE Jamie Oakley	GEI	SIGNATURE		SIGNATURE	
PRINTED NAME JAMIE OAKLEY		PRINTED NAME		PRINTED NAME	
DATE 1-4-01 TIME 1645		DATE TIME		DATE TIME	

RECEIVED BY	FIRM	RECEIVED BY	FIRM	RECEIVED BY	FIRM
SIGNATURE AStrom	SAS	SIGNATURE		SIGNATURE	
PRINTED NAME A Strom		PRINTED NAME		PRINTED NAME	
DATE 1/4/01 TIME 445		DATE TIME		DATE TIME	

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO P.O.T. SAME REFERENCE #.

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East o Tacoma, WA 98424
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e-mail: info@saslab.com

TRANSMITTAL MEMORANDUM

DATE: January 22, 2001

TO: Suzanne Dudziak
Port of Tacoma
P.O. Box 1837
Tacoma, WA 98401

PROJECT: Port of Tacoma

REPORT NUMBER: 95216

Enclosed are the test results for thirteen samples received at Sound Analytical Services on January 5, 2001.

The report consists of this transmittal memo, analytical results, quality control reports, a copy of the chain-of-custody, a list of data qualifiers and analytical narrative when applicable, and a copy of any requested raw data.

Should there be any questions regarding this report, please contact me at (253) 922-2310.

Sincerely,

Terri Howard

Terri Howard
Project Manager

SOUND ANALYTICAL EPH / VPH

SAMPLE SUMMARY REPORTS
AND
WORKSHEETS

SOUND ANALYTICAL EPH / VPH SUMMARY REPORT

Client Sample ID:	MW-8 (3.5')						
Work Order	95216						
Laboratory ID:	95216-09						
Date Sampled:			Date Received:	1/5/01			
Date Prepared:	EPH	1/12/01	PAHs	1/5/01	VPH	1/17/01	
Date Analyzed:	EPH	1/15/01	PAHs	1/12/01	VPH	1/18/01	
Matrix: solid	% Solids:	82.98					

ANALYTICAL RESULTS:

Non-Carcinogen - Human Health Hazard Index Compounds

Compound	mg/kg
Total Aliphatics	4000
Total Aromatics *	770
Benzene	ND
Ethylbenzene	0.23
Toluene	ND
Xylenes	0.28

* Total aromatics is aromatic fractions + benzene - ethylbenzene, toluene & xylenes

Carcinogen - Human Health Risk Compounds

Compound	mg/kg	PQL
Benzene *	0.12	0.23
Total cPAHs *	0.06	0.11

* For compounds not detected, 1/2 PQL values are Substituted

Soil to Groundwater - Fate and Transport Fractions

Aliphatic Fractions	mg/kg
C5 - C6	ND
>C6 - C8	0.91
>C8 - C10	45
>C10 - C12	170
>C12 - C16	1700
>C16 - C21	2100
Total Aliphatic Fractions	4000

Aromatic Fractions	mg/kg
>C8 - C10*	9.8
>C10 - C12	21
>C12 - C16	200
>C16 - C21	490
>C21 - C34	45
Total Aromatic Fractions	770

* Does not include ethylbenzene and xylenes

HUMAN HEALTH SOILS CONTACT WORKSHEETS

CLIENT ID: MW-8 (3.5')

LAB ID: 95216-09

Non-Carcinogen--Hazard Index

			Residential			***Commercial***			***Industrial***		
Compound	Soil ppm	ORfD	Factor	Res. Mult.	HQ	Factor	Com. Mult.	HQ	Factor	Ind. Mult.	HQ
Total aliphatic	4000	0.06	1.25E-05	2.08E-04	0.83	3.13E-06	5.21E-05	0.21	2.86E-07	4.77E-06	0.02
Total aromatic*	770	0.03	1.25E-05	4.17E-04	0.32	3.13E-06	1.04E-04	0.08	2.86E-07	9.53E-06	0.01
Benzene	0.0										
Ethylbenzene	0.2	0.10	1.25E-05	1.25E-04	0.00	3.13E-06	3.13E-05	0.00	2.86E-07	2.86E-06	0.00
Toluene	0.0	0.20	1.25E-05	6.25E-05	0.00	3.13E-06	1.56E-05	0.00	2.86E-07	1.43E-06	0.00
Xylenes	0.3	2.00	1.25E-05	6.25E-06	0.00	3.13E-06	1.56E-06	0.00	2.86E-07	1.43E-07	0.00
Hazard Index					1.15			0.29			0.03

* Total aromatic is total of aromatic fractions plus benzene minus ethylbenzene, toluene and xylenes

Carcinogen Risk

			Residential		***Commercial***		***Industrial***	
Compound	Soil ppm	OCPF	Res. Mult.	Risk	Com. Mult.	Risk	Ind. Mult.	Risk
Benzene *	0.12	0.029	1.00E-06	3.48E-09	2.50E-07	8.70E-10	7.62E-08	2.65E-10
Total cPAHs *	0.06	7.30	1.00E-06	4.09E-07	2.50E-07	1.02E-07	7.62E-08	3.12E-08

* For parameters not detected 1/2 PQL values are substituted

FATE AND TRANSPORT - SOIL TO GROUNDWATER

"Raoult's Law" Worksheet

CLIENT ID: MW-8 (3.5')

LAB ID: 95216-09

COMPOUND	Soil mg/kg	MW g/mol	Moles mmol/kg	Mol Frac.	Solubility mg/l	Effect. Sol. mg/l	DF	Well Conc. mg/l
Aliphatics								
EC 5 - 6	0	81	0.0	0.00	2.8E+01	0.0E+00	20	0.0E+00
EC >6 - 8	1	100	0.0	0.00	4.2E+00	1.7E-03	20	8.7E-05
EC >8 - 10	45	130	0.3	0.02	3.3E-01	5.2E-03	20	2.6E-04
EC >10 - 12	170	160	1.1	0.05	2.6E-02	1.3E-03	20	6.3E-05
EC >12 - 16	1700	200	8.5	0.39	5.9E-04	2.3E-04	20	1.1E-05
EC >16 - 21	2100	270	7.8	0.35	1.0E-06	3.5E-07	20	1.8E-08
Aromatics								
Benzene	0.0	78	0.0	0.00	1.8E+03	0.0E+00	20	0.0E+00
Toluene	0.0	92	0.0	0.00	5.2E+02	0.0E+00	20	0.0E+00
EC >8 - 10*	10	120	0.1	0.00	6.5E+01	2.5E-01	20	1.3E-02
EC >10 - 12	21	130	0.2	0.01	2.5E+01	1.8E-01	20	9.2E-03
EC >12 - 16	200	150	1.3	0.06	5.8E+00	3.5E-01	20	1.8E-02
EC >16 - 21	490	190	2.6	0.12	5.1E-01	6.0E-02	20	3.0E-03
EC >21 - 35	45	240	0.2	0.01	6.6E-03	5.6E-05	20	2.8E-06
			22.0	1.00				0.0

* Includes ethylbenzene & xylenes

Well Conc. must be 1 mg/l or less for soil concentrations to be protective of Method A drinking water standard.

SOUND ANALYTICAL EPH / VPH

VOLATILE PETROLEUM HYDROCARBONS

ALIPHATIC AND AROMATIC FRACTIONS
TARGET INDICATOR COMPOUNDS

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Received:	1/5/01
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
% Solids	82.98
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	109		60	140
Bromofluorobenzene	110		60	140

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
MTBE	ND	0.23	
Benzene	ND	0.23	
Toluene	ND	0.23	
Ethylbenzene	0.23	0.23	
m- & p-Xylene	ND	0.46	
o-Xylene	0.28	0.23	
Total EC >8-10 Aromatics	9.8	1.1	
Total EC 5-6 Aliphatics	ND	0.68	
Total EC >6-8 Aliphatics	0.91	0.46	
Total EC >8-10 Aliphatics	9.1	1.4	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2569
Date Received:	-
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
% Solids	
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	120		60	140
Bromofluorobenzene	112		60	140

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
MTBE	ND	0.2	
Benzene	ND	0.2	
Toluene	ND	0.2	
Ethylbenzene	ND	0.2	
m- & p-Xylene	ND	0.4	
o-Xylene	ND	0.2	
Total EC >8-10 Aromatics	ND	1	
Total EC 5-6 Aliphatics	ND	0.6	
Total EC >6-8 Aliphatics	ND	0.4	
Total EC >8-10 Aliphatics	ND	1.2	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2569
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2569

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
MTBE	0	2	2.66	133	2.51	126	-5.4	
Benzene	0	2	2.11	106	2.1	105	-0.95	
Toluene	0	2	2.1	105	2.08	104	-0.96	
Ethylbenzene	0	2	2.07	103	2.03	102	-0.98	
m- & p-Xylene	0	4	4.31	108	4.4	110	1.8	
o-Xylene	0	2	2.03	101	2.04	102	0.99	
Total EC >8-10 Aromatics	0	10	10.4	104	10.5	105	0.96	
Total EC 5-6 Aliphatics	0	6	6.69	112	6.74	112	0	
Total EC >6-8 Aliphatics	0	4	4.46	111	4.49	112	0.9	
Total EC >8-10 Aliphatics	0	12	13	108	12.7	106	-1.9	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2569

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
MTBE	0	2.2	2.74	124	
Benzene	0	2.2	1.95	88	
Toluene	0	2.2	2.1	95	
Ethylbenzene	0.233	2.2	2.11	85	
m- & p-Xylene	0	4.4	4.23	96	
o-Xylene	0.285	2.21	2.58	104	
Total EC >8-10 Aromatics	9.77	11	17.9	74	
Total EC 5-6 Aliphatics	0	6.6	4.91	74	
Total EC >6-8 Aliphatics	0.913	4.4	4.03	71	
Total EC >8-10 Aliphatics	9.12	13	18.5	71	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2569

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
MTBE	0	0	NC	
Benzene	0	0	NC	
Toluene	0	0	NC	
Ethylbenzene	0.233	0.245	-5.0	
m- & p-Xylene	0	0	NC	
o-Xylene	0.285	0.283	0.7	
Total EC >8-10 Aromatics	9.77	11.4	-15.0	
Total EC 5-6 Aliphatics	0	0.741	-200.0	X4a
Total EC >6-8 Aliphatics	0.913	0.839	8.4	
Total EC >8-10 Aliphatics	9.12	10.3	-12.0	

SOUND ANALYTICAL EPH / VPH

EXTRACTABLE PETROLEUM HYDROCARBONS

ALIPHATIC AND AROMATIC FRACTIONS

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Received:	1/5/01
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
% Solids	82.98
Dilution Factor	10

Extractable Petroleum Hydrocarbons (EPH) Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctadecane	73.1		50	150
o-terphenyl	90.4		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
>nC8-nC10 Aliphatic	45	5.2	
>nC10-nC12 Aliphatic	170	5.2	
>nC12-nC16 Aliphatic	1700	5.2	
>nC16-nC21 Aliphatic	2100	26	D5
>nC21-nC34 Aliphatic	120	5.2	
>nC10-nC12 Aromatic	21	5.2	
>nC12-nC16 Aromatic	200	5.2	
>nC16-nC21 Aromatic	490	5.2	
>nC21-nC34 Aromatic	45	5.2	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - EP228
Date Received:	-
Date Prepared:	1/12/01
Date Analyzed:	1/16/01
% Solids	
Dilution Factor	10

Extractable Petroleum Hydrocarbons (EPH) Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctadecane	94.8		60	140
o-terphenyl	87.9		60	140

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
>nC8-nC10 Aliphatic	ND	4.5	
>nC10-nC12 Aliphatic	ND	4.5	
>nC12-nC16 Aliphatic	ND	4.5	
>nC16-nC21 Aliphatic	ND	4.5	
>nC21-nC34 Aliphatic	ND	4.5	
>nC10-nC12 Aromatic	ND	4.5	
>nC12-nC16 Aromatic	ND	4.5	
>nC16-nC21 Aromatic	ND	4.5	
>nC21-nC34 Aromatic	ND	4.5	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike Report

Lab ID:	EP228
Date Prepared:	1/12/01
Date Analyzed:	1/16/01
QC Batch ID:	EP228

Extractable Petroleum Hydrocarbons (EPH) Modified

Parameter Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	Flag
>nC8-nC10 Aliphatic	0	18	17.1	94	
>nC10-nC12 Aliphatic	0	18	17.8	98	
>nC12-nC16 Aliphatic	0	18	17.7	97	
>nC16-nC21 Aliphatic	0	18	17.4	96	
>nC21-nC34 Aliphatic	0	18	18.4	101	
>nC10-nC12 Aromatic	0	18.2	16.9	93	
>nC12-nC16 Aromatic	0	18	16.9	93	
>nC16-nC21 Aromatic	0	18	17.3	95	
>nC21-nC34 Aromatic	0	18	19	104	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
QC Batch ID:	EP228

Extractable Petroleum Hydrocarbons (EPH) Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
>nC8-nC10 Aliphatic	45.5	21	68.3	108	
>nC10-nC12 Aliphatic	173	21	126	-222	X7a
>nC12-nC16 Aliphatic	1720	21	1890	812	X7a
>nC16-nC21 Aliphatic	2090	21	1930	-763	X7a
>nC21-nC34 Aliphatic	120	21	165	211	X7a
>nC10-nC12 Aromatic	21.1	21.1	31.2	48	X7
>nC12-nC16 Aromatic	204	21	138	-312	X7a
>nC16-nC21 Aromatic	492	21	288	-968	X7a
>nC21-nC34 Aromatic	45	21	48.2	15	X7

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
QC Batch ID:	EP228

Extractable Petroleum Hydrocarbons (EPH) Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
>nC8-nC10 Aliphatic	45.5	42.8	6.1	
>nC10-nC12 Aliphatic	173	173	0.0	
>nC12-nC16 Aliphatic	1720	1700	1.2	
>nC16-nC21 Aliphatic	2090	1990	4.9	
>nC21-nC34 Aliphatic	120	120	0.0	
>nC10-nC12 Aromatic	21.1	20.3	3.9	
>nC12-nC16 Aromatic	204	199	2.5	
>nC16-nC21 Aromatic	492	481	2.3	
>nC21-nC34 Aromatic	45	43.1	4.3	

SOUND ANALYTICAL EPA 8270 MOD.

EXTRACTABLE PETROLEUM HYDROCARBONS

TARGET PAH COMPOUNDS

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Received:	1/5/01
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
% Solids	82.98
Dilution Factor	20

Targeted PAH Analytes by Method 8270 Modified.

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Nitrobenzene - d5	104		56	145
2 - Fluorobiphenyl	95		55	137
p - Terphenyl - d14	88.8		45	134

Sample results are on a dry weight basis.

Analyte		**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Naphthalene		0.37	0.016	0.016	
2-Methylnaphthalene		7.4	0.016	0.011	
2-Chloronaphthalene	ND		0.016	0.0067	
Acenaphthylene	ND		0.016	0.0065	
Acenaphthene		0.25	0.016	0.0057	
Fluorene	ND		0.016	0.0065	
Phenanthrene	ND		0.016	0.0053	
Anthracene	ND		0.016	0.0078	
Fluoranthene	ND		0.016	0.0051	
Pyrene		0.11	0.016	0.0046	
Benzo(a)anthracene	ND		0.016	0.0051	
Chrysene	ND		0.016	0.0067	
Benzo(b)fluoranthene	ND		0.016	0.0046	
Benzo(k)fluoranthene	ND		0.016	0.0054	
Benzo(a)pyrene	ND		0.016	0.0067	
Indeno(1,2,3-cd)pyrene	ND		0.016	0.006	
Dibenz(a,h)anthracene	ND		0.016	0.0037	
Benzo(g,h,i)perylene	ND		0.016	0.0024	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - SS0167
Date Received:	-
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
% Solids	
Dilution Factor	20

Semivolatile Organics by USEPA Method 8270

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Nitrobenzene - d5	137		56	145
2 - Fluorobiphenyl	117		55	137
p - Terphenyl - d14	80.8		45	134

Sample results are on an as received basis.

Analyte	**Result (ug/kg)**	**PQL**	**MDL**	**Flags**
Naphthalene	ND	13	13	
2-Methylnaphthalene	ND	13	9.6	
2-Chloronaphthalene	ND	13	5.6	
Acenaphthylene	ND	13	5.4	
Acenaphthene	ND	13	4.7	
Fluorene	ND	13	5.4	
Phenanthrene	ND	13	4.4	
Anthracene	ND	13	6.5	
Fluoranthene	ND	13	4.3	
Pyrene	ND	13	3.8	
Benzo(a)anthracene	ND	13	4.3	
Chrysene	ND	13	5.6	
Benzo(b)fluoranthene	ND	13	3.8	
Benzo(k)fluoranthene	ND	13	4.4	
Benzo(a)pyrene	ND	13	5.5	
Indeno(1,2,3-cd)pyrene	ND	13	5	
Dibenz(a,h)anthracene	ND	13	3.1	
Benzo(g,h,i)perylene	ND	13	2	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike Report

Lab ID:	SS0167
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
QC Batch ID:	SS0167

Semivolatile Organics by USEPA Method 8270

Parameter Name	Blank Result (ug/kg)	Spike Amount (ug/kg)	BS Result (ug/kg)	BS % Rec.	Flag
Phenol	0	670	456	68	
2-Chlorophenol	0	670	597	90	
1,4-Dichlorobenzene	0	670	673	101	
N-nitroso-di-n-propylamine	0	670	464	70	
1,2,4-Trichlorobenzene	0	670	548	82	
4-Chloro-3-methylphenol	0	670	341	51	
Acenaphthene	0	670	708	106	
4-Nitrophenol	0	670	388	58	
2,4-Dinitrotoluene	0	670	764	115	
Pentachlorophenol	0	670	520	78	
Pyrene	0	670	552	83	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike/Matrix Spike Duplicate Report

Client Sample ID:	WMSP-SG-02
Lab ID:	95343-02
Date Prepared:	1/12/01
Date Analyzed:	1/15/01
QC Batch ID:	SS0167

Semivolatile Organics by USEPA Method 8270

Compound Name	Sample Result (ug/kg)	Spike Amount (ug/kg)	MS Result (ug/kg)	MS % Rec.	MSD Result (ug/kg)	MSD % Rec.	RPD	Flag
Phenol	0	788	561	71.2	632	80.4	12	
2-Chlorophenol	0	788	676	85.8	786	100	15	
1,4-Dichlorobenzene	0	788	624	79.2	720	91.6	15	
N-nitroso-di-n-propylamine	0	788	533	67.6	467	59.4	-13	
1,2,4-Trichlorobenzene	0	788	588	74.6	764	97.2	26	
4-Chloro-3-methylphenol	0	788	545	69.2	649	82.6	18	
Acenaphthene	0	788	859	109	807	103	-5.7	
4-Nitrophenol	0	788	487	61.8	629	80	26	
2,4-Dinitrotoluene	0	788	1060	134	912	116	-14	
Pentachlorophenol	0	788	758	96.2	638	81.2	-17	
Pyrene	0	788	692	87.8	582	74	-17	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-2 (6')
Lab ID:	95216-02
Date Received:	1/5/01
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	93.65
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	110		60	140
Bromofluorobenzene	113		60	140

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
MTBE	ND	0.21	
Benzene	ND	0.21	
Toluene	ND	0.21	
Ethylbenzene	ND	0.21	
m- & p-Xylene	ND	0.41	
o-Xylene	ND	0.21	
Total EC >8-10 Aromatics	ND	1	
Total EC 5-6 Aliphatics	ND	0.62	
Total EC >6-8 Aliphatics	ND	0.41	
Total EC >8-10 Aliphatics	ND	1.2	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-2 (6')
Lab ID:	95216-02
Date Received:	1/5/01
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	93.65
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	110		70	130
Bromofluorobenzene	113		70	130

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	ND	0.021	0.0033	
Toluene	0.027	0.041	0.0029	J
Ethylbenzene	0.012	0.041	0.0033	J
m&p-Xylene	0.0068	0.082	0.0041	J
o-Xylene	ND	0.041	0.0016	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Received:	1/5/01
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
% Solids	82.98
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	109		70	130
Bromofluorobenzene	110		70	130

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	ND	0.023	0.0036	
Toluene	0.11	0.046	0.0032	
Ethylbenzene	0.23	0.046	0.0036	
m&p-Xylene	ND	0.091	0.0046	
o-Xylene	0.28	0.046	0.0018	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-2 (6')
Lab ID:	95216-02
Date Received:	1/5/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	93.65
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	97.9		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	26	12	
Motor Oil	ND	51	26	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-7 (8.5')
Lab ID:	95216-07
Date Received:	1/5/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	92.83
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	101		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	25	12	
Motor Oil	ND	50	25	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Received:	1/5/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	82.98
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	97.7		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	9500	150	70	D 5
Motor Oil	170	58	29	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-8 (6')
Lab ID:	95216-10
Date Received:	1/5/01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	95.15
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	96.1		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	120	58	
Motor Oil	ND	48	24	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2557
Date Received:	-
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	
Dilution Factor	1

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	116		60	140
Bromofluorobenzene	116		60	140

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**Flags**
MTBE	ND	0.2	
Benzene	ND	0.2	
Toluene	ND	0.2	
Ethylbenzene	ND	0.2	
m- & p-Xylene	ND	0.4	
o-Xylene	ND	0.2	
Total EC >8-10 Aromatics	ND	1	
Total EC 5-6 Aliphatics	ND	0.6	
Total EC >6-8 Aliphatics	ND	0.4	
Total EC >8-10 Aliphatics	ND	1.2	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2557
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
MTBE	0	2	2.3	115	2.22	111	-3.5	
Benzene	0	2	2.13	107	2.12	106	-0.94	
Toluene	0	2	2.14	107	2.1	105	-1.9	
Ethylbenzene	0	2	2.05	102	2.07	103	0.98	
m- & p-Xylene	0	4	4.7	117	4.72	118	0.85	
o-Xylene	0	2	2.1	105	2.11	105	0	
Total EC >8-10 Aromatics	0	10	10.5	105	10.5	105	0	
Total EC 5-6 Aliphatics	0	6	6.13	102	5.77	96.1	-6	
Total EC >6-8 Aliphatics	0	4	3.87	96.8	4	99.9	3.2	
Total EC >8-10 Aliphatics	0	12	12.1	101	12.2	102	0.99	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
MTBE	0	2	2.11	104	
Benzene	0	2	1.75	86	
Toluene	0	2	1.86	92	
Ethylbenzene	0	2	1.86	92	
m- & p-Xylene	0	4	4.27	106	
o-Xylene	0	2.02	1.92	95	
Total EC >8-10 Aromatics	0	10	9.74	96	
Total EC 5-6 Aliphatics	0	6.1	3.93	65	
Total EC >6-8 Aliphatics	0	4	3.26	81	
Total EC >8-10 Aliphatics	0	12	11.3	93	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

WSDOE Method for Determination of Volatile Petroleum Hydrocarbon Fractions Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
MTBE	0	0	NC	
Benzene	0	0	NC	
Toluene	0	0	NC	
Ethylbenzene	0	0	NC	
m- & p-Xylene	0	0	NC	
o-Xylene	0	0	NC	
Total EC >8-10 Aromatics	0	0	NC	
Total EC 5-6 Aliphatics	0	0	NC	
Total EC >6-8 Aliphatics	0	0	NC	
Total EC >8-10 Aliphatics	0	0	NC	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2557
Date Received:	-
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
% Solids	
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	116		75	125
Bromofluorobenzene	116		75	125

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	ND	0.02	0.0032	
Toluene	ND	0.04	0.0028	
Ethylbenzene	ND	0.04	0.0032	
m&p-Xylene	ND	0.08	0.004	
o-Xylene	ND	0.04	0.0016	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2557
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Benzene	0	2	2.13	107	2.12	106	-0.94	
Toluene	0	2	2.26	113	2.1	105	-7.3	
Ethylbenzene	0	2	2.05	102	2.07	103	0.98	
m&p-Xylene	0	4	4.7	117	4.72	118	0.85	
o-Xylene	0	2	2.06	103	2.11	105	1.9	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Benzene	0	2	1.75	86	
Toluene	0.027	2	1.86	90	
Ethylbenzene	0.0119	2	1.86	91	
m&p-Xylene	0.00679	4.05	4.27	105	
o-Xylene	0	2	1.92	95	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-2 (6')
Lab ID:	95216-02
Date Prepared:	1/10/01
Date Analyzed:	1/11/01
QC Batch ID:	GB2557

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Benzene	0	0	NC	
Toluene	0.027	0.0243	11.0	
Ethylbenzene	0.0119	0	200.0	X4a
m&p-Xylene	0.00679	0	200.0	X4a
o-Xylene	0	0	NC	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2569
Date Received:	-
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
% Solids	
Dilution Factor	1

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	120		75	125
Bromofluorobenzene	112		75	125

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
Benzene	ND	0.02	0.0032	
Toluene	ND	0.04	0.0028	
Ethylbenzene	ND	0.04	0.0032	
m&p-Xylene	ND	0.08	0.004	
o-Xylene	ND	0.04	0.0016	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2569
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2569

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
Benzene	0	2	2.11	106	2.1	105	-0.95	
Toluene	0	2	2.1	105	2.08	104	-0.96	
Ethylbenzene	0	2	2.06	103	2.03	102	-0.98	
m&p-Xylene	0	4	4.31	108	4.4	110	1.8	
o-Xylene	0	2	2.03	101	2.04	102	0.99	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2569

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Benzene	0	0	NC	
Toluene	0.108	0.105	2.8	
Ethylbenzene	0.233	0.237	-1.7	
m&p-Xylene	0	0	NC	
o-Xylene	0.285	0.274	3.9	

SOUND ANALYTICAL SERVICES, INC.

Matrix Spike Report

Client Sample ID:	MW-8 (3.5')
Lab ID:	95216-09
Date Prepared:	1/17/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2569

Volatile Aromatic Hydrocarbons by USEPA Method 8021B/5030B Modified

Parameter Name	Sample Result (mg/kg)	Spike Amount (mg/kg)	MS Result (mg/kg)	MS % Rec.	Flag
Benzene	0	2.2	1.95	88	
Toluene	0.108	2.2	2.1	90	
Ethylbenzene	0.233	2.2	2.11	85	
m&p-Xylene	0	4.42	4.23	96	
o-Xylene	0.285	2.2	2.58	104	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DS0177
Date Received:	-
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
% Solids	
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	92.7		50	150

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND	25	12	
Motor Oil	ND	50	25	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DS0177
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
QC Batch ID:	DS0177

Diesel and Motor Oil by NWTPH-Dx Modified

Compound Name	Blank Result (mg/kg)	Spike Amount (mg/kg)	BS Result (mg/kg)	BS % Rec.	BSD Result (mg/kg)	BSD % Rec.	RPD	Flag
#2 Diesel	0	500	556	111	546	109	-1.8	
Motor Oil	0	501	448	89.5	440	88	-1.7	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	TC3
Lab ID:	95128-01
Date Prepared:	1/8/01
Date Analyzed:	1/8/01
QC Batch ID:	DS0177

Diesel and Motor Oil by NWTPH-Dx Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
#2 Diesel	0	0	NC	
Motor Oil	160	174	-8.4	

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East • Tacoma, WA 98424
(253) 922-2310 • FAX (253) 922-5047
e-mail: info@saslab.com

DATA QUALIFIERS AND ABBREVIATIONS

B1: This analyte was detected in the associated method blank. The analyte concentration was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).

B2: This analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).

C1: Second column confirmation was performed. The relative percent difference value (RPD) between the results on the two columns was evaluated and determined to be $\leq 40\%$.

C2: Second column confirmation was performed. The RPD between the results on the two columns was evaluated and determined to be $> 40\%$. The higher result was reported unless anomalies were noted.

M: GC/MS confirmation was performed. The result derived from the original analysis was reported.

D: The reported result for this analyte was calculated based on a secondary dilution factor.

E: The concentration of this analyte exceeded the instrument calibration range and should be considered an estimated quantity.

J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

MCL: Maximum Contaminant Level

MDL: Method Detection Limit

N: See analytical narrative.

ND: Not Detected

PQL: Practical Quantitation Limit

X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____ .

X2: Contaminant does not appear to be "typical" product.

X3: Identification and quantitation of the analyte or surrogate was complicated by matrix interference.

X4: RPD for duplicates was outside advisory QC limits. The sample was re-analyzed with similar results. The sample matrix may be nonhomogeneous.

X4a: RPD for duplicates outside advisory QC limits due to analyte concentration near the method practical quantitation limit/detection limit.

X5: Matrix spike recovery was not determined due to the required dilution.

X6: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Sample was re-analyzed with similar results.

X7: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Matrix interference may be indicated based on acceptable blank spike recovery and/or RPD.

X7a: Recovery and/or RPD values for this spiked analyte outside advisory QC limits due to high concentration of the analyte in the original sample.

X8: Surrogate recovery was not determined due to the required dilution.

X9: Surrogate recovery outside advisory QC limits due to matrix interference.

95216

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

8/3

Geo Engineers

DATE 01-05-01
PAGE 1 OF 2
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-066-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED	NOTES/COMMENTS
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	TPH Dx	(Preserved, filtered, etc.)
1	MW-2 (3.5')	1-05-01	915	SOIL	1	HOLD	HOLD FOR PENDING ANALYSIS
2	MW-2 (6')		930			X	—
3	MW-2 (8.5')		945			HOLD	HOLD FOR PENDING ANALYSIS
4	MW-2 (13.5')		955			HOLD	" " " "
5	B-7 (3.5')		1200			HOLD	" " " "
6	B-7 (6')		1210			HOLD	" " " "
7	B-7 (8.5')		1215			X	—
8	B-7 (13.5')	↓	1225	↓	↓	HOLD	HOLD FOR PENDING ANALYSIS

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE	GEI	SIGNATURE		SIGNATURE	
PRINTED NAME	JAMIE OAKLEY	PRINTED NAME		PRINTED NAME	
DATE 1-5-01	TIME 1700	DATE	TIME	DATE	TIME
RECEIVED BY	**FIRM**	**RECEIVED BY**	**FIRM**	**RECEIVED BY**	**FIRM**
SIGNATURE	SAS	SIGNATURE		SIGNATURE	
PRINTED NAME	Terri Howard	PRINTED NAME		PRINTED NAME	
DATE 1-5-01	TIME 1700	DATE	TIME	DATE	TIME

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO P.O.T. SAME REFERENCE #.

REVISED PG 2

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

Geo Engineers

DATE 01-05-01
PAGE 2 OF 2
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-066-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED			NOTES/COMMENTS
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	TPH Dx	TPH Dx		(Preserved, filtered, etc.)
9	MW-8 (35')	01-05-01	1345	Soil	1	X		1/8/01	
10	MW-8 (6')	"	1355	"	"	HOLD	X		HOLD
11	MW-8 (9.5')	"	1405	"	"	HOLD			"
12	MW-8 (11')	"	1415	"	"	HOLD			"
13	MW-8 (13.5')	"	1420	"	"	HOLD			"

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE Jamie Oakley	GEI	SIGNATURE		SIGNATURE	
PRINTED NAME JAMIE OAKLEY		PRINTED NAME		PRINTED NAME	
DATE 1-5-01 TIME 1700		DATE TIME		DATE TIME	
RECEIVED BY	**FIRM**	**RECEIVED BY**	**FIRM**	**RECEIVED BY**	**FIRM**
SIGNATURE Terri Howard	SAS	SIGNATURE		SIGNATURE	
PRINTED NAME Terri Howard		PRINTED NAME		PRINTED NAME	
DATE 1-5-01 TIME 1700		DATE TIME		DATE TIME	

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO PAT. SAME REFERENCE #.

Original pg 2

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

Geo Engineers

DATE 01-05-01
PAGE 2 OF 2
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-066-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED	NOTES/COMMENTS
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	TPH Dx	(Preserved, filtered, etc.)
9	MW-8 (35')	01-05-01	1345	SOIL	1	X	
10	MW-8 (6')	"	1355	"	"	HOLD	HOLD FOR PENDING ANALYSIS
11	MW-8 (85')	"	1405	"	"	HOLD	" " " "
12	MW-8 (11')	"	1415	"	"	HOLD	" " " "
13	MW-8 (135')	"	1420	"	"	HOLD	" " " "

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE Jamie Oakley	GE	SIGNATURE		SIGNATURE	
PRINTED NAME JAMIE OAKLEY		PRINTED NAME		PRINTED NAME	
DATE 1-5-01 TIME 1700		DATE TIME		DATE TIME	
RECEIVED BY	**FIRM**	**RECEIVED BY**	**FIRM**	**RECEIVED BY**	**FIRM**
SIGNATURE Terri Howard	SAS	SIGNATURE		SIGNATURE	
PRINTED NAME Terri Howard		PRINTED NAME		PRINTED NAME	
DATE 1-5-01 TIME 1700		DATE TIME		DATE TIME	

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO P.O.T. SAME REFERENCE #.

8/3

95216

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

Geo Engineers

DATE 01-05-01
PAGE 1 OF 2
LAB SOUND ANALYTICAL
LAB NO.

PROJECT NAME/LOCATION PORT OF TACOMA
PROJECT NUMBER 0454-066-00
PROJECT MANAGER SALLY FISHER
SAMPLED BY JAMIE OAKLEY

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED												NOTES/COMMENTS
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	TPH-Dx	[illegible]	(ITPH)-ERH	(ITPH)-VPH	BETX	PAHs-8270							(Preserved, filtered, etc.)
	MW-2 (3.5')	1-05-01	915	SOIL	1	HOLD												HOLD FOR PENDING ANALYSIS
	MW-2 (6')		930			X		X	X	X	X							~~HOLD~~ ITPH ANALYSES
	MW-2 (8.5')		945			HOLD												HOLD FOR PENDING ANALYSIS
	MW-2 (13.5')		955			HOLD												" " " "
	~~MW~~ B-7 (3.5')		1200			HOLD												" " " "
	B-7 (6')		1210			HOLD												" " " "
	B-7 (8.5')		1215			X												
	B-7 (13.5')		1225			HOLD												HOLD FOR PENDING ANALYSIS

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE	GEI	SIGNATURE		SIGNATURE	
PRINTED NAME JAMIE OAKLEY		PRINTED NAME		PRINTED NAME	
DATE 1-5-01 TIME 1700		DATE TIME		DATE TIME	
RECEIVED BY	**FIRM** SAS	**RECEIVED BY**	**FIRM**	**RECEIVED BY**	**FIRM**
SIGNATURE Terri Howard		SIGNATURE		SIGNATURE	
PRINTED NAME Terri Howard		PRINTED NAME		PRINTED NAME	
DATE 1-5-01 TIME 1700		DATE TIME		DATE TIME	

ADDITIONAL COMMENTS: *PLEASE BILL THE PORT DIRECTLY REFERENCE #E1845, ALSO CC REPORT TO P.O.T. SAME REFERENCE #.
Suzanne Dudziak

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East o Tacoma, WA 98424
(253) 922-2310 o FAX (253) 922-5047
e-mail: info@saslab.com

GeoEngineers

TRANSMITTAL MEMORANDUM

JAN 23 2001

Routing ☐ ☐ ☐ ☐ ☐

File

DATE: January 22, 2001

TO: Suzanne Dudziak
Port of Tacoma
P.O. Box 1837
Tacoma, WA 98401

PROJECT: Port of Tacoma-0454-066-00

REPORT NUMBER: 95247

Enclosed are the test results for eight samples received at Sound Analytical Services on January 9, 2001.

The report consists of this transmittal memo, analytical results, quality control reports, a copy of the chain-of-custody, a list of data qualifiers and analytical narrative when applicable, and a copy of any requested raw data.

Should there be any questions regarding this report, please contact me at (253) 922-2310.

Sincerely,

Terri Howard
Project Manager

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Project Name	Port of Tacoma-0454-066-00
Date Received	01-09-01

General Chemistry Parameters

Client Sample ID	95247-01
Lab ID	GEIMW-2

Parameter	Method	Date Analyzed	Units	Result	PQL
Specific Gravity	ASTM D1550	01-19-01	g/mL	0.08350	N/A

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-4
Lab ID:	95247-03
Date Received:	1/9/01
Date Prepared:	1/18/01
Date Analyzed:	1/18/01
% Solids	-
Dilution Factor	1

Volatile Petroleum Products by WSDOE Method NWTPH-Gx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	75.4		50	150
Bromofluorobenzene	75.8		56.8	143

Analyte	**Result (mg/L)**	**PQL**	**Flags**
Gasoline by NWTPH-G	0.17	0.1	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-8
Lab ID:	95247-06
Date Received:	1/9/01
Date Prepared:	1/18/01
Date Analyzed:	1/18/01
% Solids	-
Dilution Factor	1

Volatile Petroleum Products by WSDOE Method NWTPH-Gx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	80.2		50	150
Bromofluorobenzene	85.6		56.8	143

Analyte	**Result (mg/L)**	**PQL**	**Flags**
Gasoline by NWTPH-G	0.51	0.1	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-9
Lab ID:	95247-07
Date Received:	1/9/01
Date Prepared:	1/18/01
Date Analyzed:	1/18/01
% Solids	-
Dilution Factor	1

Volatile Petroleum Products by WSDOE Method NWTPH-Gx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	79.7		50	150
Bromofluorobenzene	83.1		56.8	143

Analyte	**Result (mg/L)**	**PQL**	**Flags**
Gasoline by NWTPH-G	0.58	0.1	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-2
Lab ID:	95247-01
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/13/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	95.9		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	1.9	0.27	0.13	
Motor Oil	0.87	0.53	0.27	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-4
Lab ID:	95247-03
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/17/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	88.7		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	0.76	0.26	0.13	X1
Motor Oil	0.42	0.53	0.26	J

X1 - Chromatogram suggests this might be aged or degraded diesel

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-5
Lab ID:	95247-04
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/17/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	85.5		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	0.59	0.27	0.14	X1
Motor Oil	0.43	0.55	0.27	J

X1 - Chromatogram suggests this might be aged or degraded diesel

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-6
Lab ID:	95247-05
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/17/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	87.6		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	0.41	0.27	0.14	X1
Motor Oil	0.52	0.54	0.27	J

X1 - Chromatogram suggests this might be aged or degraded diesel

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-8
Lab ID:	95247-06
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/17/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	74.3		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	3	0.27	0.14	X1
Motor Oil	1.1	0.55	0.27	

X1 - Chromatogram suggests this might be aged or degraded diesel

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-9
Lab ID:	95247-07
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/17/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	77.9		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	2	0.27	0.13	X1
Motor Oil	0.45	0.54	0.27	J

X1 - Chromatogram suggests this might be aged or degraded diesel

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-3
Lab ID:	95247-02
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	87.8		50	150
o-terphenyl	89.7		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	<0.1	0.1	
Diesel (>nC12-nC24)	<0.26	0.26	
Motor Oil (>nC24-nC32)	<0.52	0.52	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-4
Lab ID:	95247-03
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	86.4		50	150
o-terphenyl	90.5		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	>0.11	0.11	
Diesel (>nC12-nC24)	>0.26	0.26	
Motor Oil (>nC24-nC32)	<0.53	0.53	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-5
Lab ID:	95247-04
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	83.3		50	150
o-terphenyl	86.2		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	<0.11	0.11	
Diesel (>nC12-nC24)	>0.27	0.27	
Motor Oil (>nC24-nC32)	<0.55	0.55	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-6
Lab ID:	95247-05
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	86.2		50	150
o-terphenyl	89.4		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	<0.11	0.11	
Diesel (>nC12-nC24)	>0.27	0.27	
Motor Oil (>nC24-nC32)	<0.54	0.54	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-8
Lab ID:	95247-06
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	85.9		50	150
o-terphenyl	88.4		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	>0.11	0.11	
Diesel (>nC12-nC24)	>0.27	0.27	
Motor Oil (>nC24-nC32)	>0.55	0.55	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-9
Lab ID:	95247-07
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	86		50	150
o-terphenyl	86.7		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	>0.11	0.11	
Diesel (>nC12-nC24)	>0.27	0.27	
Motor Oil (>nC24-nC32)	<0.54	0.54	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	GEIMW-1
Lab ID:	95247-08
Date Received:	1/9/01
Date Prepared:	1/11/01
Date Analyzed:	1/12/01
% Solids	100
Dilution Factor	20

NWTPH-HCID - Hydrocarbon Identification Method for Soil Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	108		50	150
o-terphenyl	97.6		50	150

Sample results are on a dry weight basis.

	Result		
Analyte	**(mg/kg)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	>1800	1800	
Diesel (>nC12-nC24)	>4500	4500	
Motor Oil (>nC24-nC32)	<9000	9000	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - GB2570
Date Received:	-
Date Prepared:	1/18/01
Date Analyzed:	1/18/01
% Solids	-
Dilution Factor	1

Volatile Petroleum Products by WSDOE Method NWTPH-Gx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Trifluorotoluene	81.5		50	150
Bromofluorobenzene	89.1		56.8	143

Analyte		**Result (mg/L)**	**PQL**	**Flags**
Gasoline by NWTPH-G	ND		0.1	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	GB2570
Date Prepared:	1/18/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2570

Volatile Petroleum Products by WSDOE Method NWTPH-Gx Modified

Compound Name	Blank Result (mg/L)	Spike Amount (mg/L)	BS Result (mg/L)	BS % Rec.	BSD Result (mg/L)	BSD % Rec.	RPD	Flag
Gasoline by NWTPH-G	0	1.25	1.11	88.6	1.14	90.9	2.6	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MF-003-1000
Lab ID:	95456-03
Date Prepared:	1/18/01
Date Analyzed:	1/18/01
QC Batch ID:	GB2570

Volatile Petroleum Products by WSDOE Method NWTPH-Gx Modified

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Gasoline by NWTPH-G	9.81	10.3	-4.9	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DI2814
Date Prepared:	1/11/01
Date Analyzed:	1/12/01
QC Batch ID:	DI2814

Diesel and Motor Oil by NWTPH-Dx Modified

Compound Name	Blank Result (mg/L)	Spike Amount (mg/L)	BS Result (mg/L)	BS % Rec.	BSD Result (mg/L)	BSD % Rec.	RPD	Flag
#2 Diesel	0	5	5.59	112	5.08	102	-9.3	
Motor Oil	0	5.01	5.24	105	4.29	85.8	-20	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DI2814
Date Received:	-
Date Prepared:	1/11/01
Date Analyzed:	1/12/01
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	98.2		50	150

Analyte		**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	ND		0.25	0.13	
Motor Oil	ND		0.5	0.25	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DI2814
Date Prepared:	1/11/01
Date Analyzed:	1/12/01
QC Batch ID:	DI2814

Diesel and Motor Oil by NWTPH-Dx Modified

Compound Name	Blank Result (mg/L)	Spike Amount (mg/L)	BS Result (mg/L)	BS % Rec.	BSD Result (mg/L)	BSD % Rec.	RPD	Flag
#2 Diesel	0	5	5.59	112	5.08	102	-9.3	
Motor Oil	0	5.01	5.24	105	4.29	85.8	-20	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DI2814
Date Received:	-
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	-
Dilution Factor	10

NWTPH-HCID - Hydrocarbon Identification Method for Water Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	56.8		50	150
o-terphenyl	92.1		50	150

Analyte	**Result (mg/L)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	<0.1	0.1	
Diesel (>nC12-nC24)	<0.25	0.25	
Motor Oil (>nC24-nC32)	<0.5	0.5	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - HC565
Date Received:	-
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
% Solids	
Dilution Factor	20

NWTPH-HCID - Hydrocarbon Identification Method for Soil Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
1-chlorooctane	93.6		50	150
o-terphenyl	90.8		50	150

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**MDL**	**Flags**
Gasoline (Toluene-nC12)	<20	20	
Diesel (>nC12-nC24)	<50	50	
Motor Oil (>nC24-nC32)	<100	100	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	SPW 2
Lab ID:	95341-02
Date Prepared:	1/11/01
Date Analyzed:	1/11/01
QC Batch ID:	HC565

NWTPH-HCID - Hydrocarbon Identification Method for Soil Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
Gasoline (Toluene-nC12)	<20	<19	NC	
Diesel (>nC12-nC24)	<50	<48	NC	
Motor Oil (>nC24-nC32)	<99	<97	NC	

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East • Tacoma, WA 98424
(253) 922-2310 • FAX (253) 922-5047
e-mail: info@saslab.com

DATA QUALIFIERS AND ABBREVIATIONS

B1: This analyte was detected in the associated method blank. The analyte concentration was determined not to be significantly higher than the associated method blank (less than ten times the concentration reported in the blank).

B2: This analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (greater than ten times the concentration reported in the blank).

C1: Second column confirmation was performed. The relative percent difference value (RPD) between the results on the two columns was evaluated and determined to be $\leq 40\%$.

C2: Second column confirmation was performed. The RPD between the results on the two columns was evaluated and determined to be $> 40\%$. The higher result was reported unless anomalies were noted.

M: GC/MS confirmation was performed. The result derived from the original analysis was reported.

D: The reported result for this analyte was calculated based on a secondary dilution factor.

E: The concentration of this analyte exceeded the instrument calibration range and should be considered an estimated quantity.

J: The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

MCL: Maximum Contaminant Level

MDL: Method Detection Limit

N: See analytical narrative.

ND: Not Detected

PQL: Practical Quantitation Limit

X1: Contaminant does not appear to be "typical" product. Elution pattern suggests it may be _____ .

X2: Contaminant does not appear to be "typical" product.

X3: Identification and quantitation of the analyte or surrogate was complicated by matrix interference.

X4: RPD for duplicates was outside advisory QC limits. The sample was re-analyzed with similar results. The sample matrix may be nonhomogeneous.

X4a: RPD for duplicates outside advisory QC limits due to analyte concentration near the method practical quantitation limit/detection limit.

X5: Matrix spike recovery was not determined due to the required dilution.

X6: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Sample was re-analyzed with similar results.

X7: Recovery and/or RPD values for matrix spike(/matrix spike duplicate) outside advisory QC limits. Matrix interference may be indicated based on acceptable blank spike recovery and/or RPD.

X7a: Recovery and/or RPD values for this spiked analyte outside advisory QC limits due to high concentration of the analyte in the original sample.

X8: Surrogate recovery was not determined due to the required dilution.

X9: Surrogate recovery outside advisory QC limits due to matrix interference.

95247 7/4 8V0

CHAIN OF CUSTODY RECORD

GEOENGINEERS, INC.
1101 FAWCETT, SUITE 200
TACOMA, WASHINGTON 98402
(206) 383-4940

Geo Engineers

DATE 01/08/04
PAGE 1 OF
LAB Sound Analytical
LAB NO.

PROJECT NAME/LOCATION Port of Tacoma
PROJECT NUMBER 0454-066-00
PROJECT MANAGER ~~Sally~~ Sally Fisher
SAMPLED BY SLM

SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF	ANALYSIS REQUIRED			NOTES/COMMENTS
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS	HCID	DW METHOD	SOIL-GRAV	(Preserved, filtered, etc.)
1	GEIMW-2	1/08/00	1340	water	1		X		preserved w/ HCL
2	GEIMW-3	1/08/00	1600	water	4	X	NWTPH		Follow up A: Appropriate
3	GEIMW-4	1/08/00	1515	water	4	X			
4	GEIMW-5	1/08/00	1440	water	4	X			
5	GEIMW-6	1/08/00	1715	water	4	X			
6	GEIMW-8	1/08/00	1400	water	4	X			
7	GEIMW-9	1/08/00	1635	water	4+4	X			
8	GCIMW-1	1/08/00	1820	product	1	X		X	Non-Preserve

RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM	RELINQUISHED BY	FIRM
SIGNATURE	GEE	SIGNATURE		SIGNATURE	
PRINTED NAME	Scott Mandirola	PRINTED NAME		PRINTED NAME	
DATE 1/08/01	TIME 848	DATE	TIME	DATE	TIME
RECEIVED BY	FIRM SAS	RECEIVED BY	FIRM	RECEIVED BY	FIRM
SIGNATURE		SIGNATURE		SIGNATURE	
PRINTED NAME	Roy	PRINTED NAME		PRINTED NAME	
DATE 1/8/01	TIME 848	DATE	TIME	DATE	TIME

ADDITIONAL COMMENTS: Please Bill the Port Directly Reference #E1845 c/o C.C. the Port of Tacoma (ATTN Suzanne Dubzinski).

APPENDIX C

Soil Recycling Certificate

TPS Technologies Inc. does hereby certify

that 1.82 tons of non-hazardous contaminated soil

received from

Maersk Sealand
Geo Engineers Inc. (Consultant)
1675 Lincoln Avenue
Tacoma, WA 98421

Under Manifest / authorization number 03-03230
5049

have been properly recycled to approved regulatory standards

at our Soil Recycling Facility in Lakewood, WA

Dated this February 12th 2001

Sworn and Attested by:
TPS Technologies Inc.

By:

Emerald Petroleum Services

THIS IS NOT AN INVOICE

Tel. (206) 832-3100 or 1-888-832-3008

37390

Bill of Lading

EPA ID #WAD058367152 TIN # 91-1578671 24 Hour Emergency Response Line 1-800-424-9300

Corporate Office: 7343 E. Marginal Way South, Seattle, WA 98108

Facility Addresses: 3401 Lincoln Avenue, Tacoma, WA. 98421 **Manifest #**

1500 Airport Way South, Seattle, WA 98134 1300 West 12th Street, Vancouver, WA 98660 3808 North Sullivan #N-5, Spokane, WA 99216

Account Name: Date: 1/31/01

Site Address: 1675 LINCOLN AVE. Billing Address: 1101 FAWCETT AVE

City: TACOMA City: SUITE 200 TACOMA

State & Zip: WA 98421 State & Zip: WA 98402

Driver: FD Equip No.:

Customer Phone Number: (206) 730- Customer Contact : SALLY FISHER

~~P.O. Number~~ : (253) 383-4940 Next Service Date: W/C

Qty/Gal	Item	Description PO# 0454-055-00	Unit Price	Amount
	UO	Used Oil (Not USDOT Regulated)		
	OW	Oil/Water Mixture (Not USDOT Reg)		
	WCOOL	Used Machine Coolant		
	WANTI	Used Anti-Freeze (Recycling)		
	WPAD	Used Absorbent Pads		
	WOF55	Used Oil Filters (Recycling)		
	WSOLV	Used Solvent **(REQUIRES MANIFEST)**		
	SOL	Oil/Water Sludge		
	WDRUM	Drum Disposal		
	SERV	Service Fee		
	NAF *	Antifreeze, New 100%, 50/50 R/C		
	SOLV *	Solvent		
	PAD *	New Absorbent Pads		
	TT *	Truck/ Operator Time		
5 DRUMS		WASTE WATER	@ 77.00	385.00
		Subtotal		
	*	Sales Tax (%)		0
		Total		385.00

I hereby declare that the contents of the consignment are fully and accurately described on the above Bill of Lading by proper DOT shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport, by highway according to 49CFR. I further declare that this material is not regulated as a hazardous or dangerous waste nor mixed with a hazardous or dangerous waste regulated under WAC 173-303, or 40 CFR, part 261. Nor does the material contain any detectable quantity of Polychlorinated Biphenyls. Generator agrees to indemnify and hold harmless Emerald Petroleum Service or its subsidiary harmless for any damages, costs, attorneys, and expert fees arising our of or in any way related to a breach of the above certifications.

Customer Signature: Date: 1-31-01

CUSTOMER