PHASE 2 ENVIRONMENTAL SITE ASSESSMENT
Maersk Pacific Limited
Building 600
Tacoma, Washington

GEOTECH
CONSULTANTS, INC.

13256 Northeast 20th Street, Suite 16
Bellevue, Washington 98005
(425) 747-5618 FAX (425) 747-8561

March 30, 2000

JN 00026E

Port of Tacoma
One Sitcum Plaza
Tacoma, Washington 98225

Attention: Suzanne Dudziak, Environmental Program Manager

Subject: **Phase 2 Environmental Site Assessment**
Maersk Pacific Limited
Building 600
Tacoma, Washington

Dear Ms. Dudziak:

We are pleased to present this report for the Maersk Pacific Limited site located at the north end of Milwaukee Way in Tacoma, Washington. This report was prepared in general accordance with the terms of the Port of Tacoma's Contract for Professional Services No. 997091, Work Order No. E1909 dated November 8, 1999. Our scope of work, methodologies, findings, and conclusions are summarized in this report.

BACKGROUND AND SCOPE OF WORK

The area of study for this report was the east side of Building 600 on the Maersk Pacific Limited site. This building houses a truck maintenance shop. We understand that an underground storage tank (UST) for diesel fuel was reportedly removed from the east side of the building, and petroleum-contaminated soil and groundwater were observed in the excavation. Approximately 900 feet to the northeast are underground fuel and lube oil storage tanks. A 1961 topographical map of the Tacoma North Quadrangle, prepared by the U.S. Geological Survey, shows an above-ground oil tank in the approximate location of Building 600 on the Maersk Pacific site. Adjoining the Maersk Pacific site to the northeast is a former railroad yard with soil and groundwater contaminated by petroleum products.

To investigate soil and groundwater conditions in the area of the former UST, we drilled nine shallow borings and installed three groundwater monitoring wells on January 20, 2000. Soil samples for laboratory analysis were obtained from each of the nine borings. From the three groundwater monitoring wells, we obtained groundwater samples for laboratory analysis. We determined relative wellhead elevations, and, with additional data developed by IT Corporation (IT), calculated the local groundwater gradient. The scope of work for this project did not include review of any reports that may exist describing conditions at the time the tank was removed and what remedial actions, if any, were taken. We were not provided with any reports of that nature.

METHODOLOGY

Drilling and Soil Sampling Procedures

The drilling equipment consisted of a truck-mounted hydraulic push unit equipped with 3-foot samplers. At each sampling location, the soil was sampled continuously over 3-foot intervals for the total explored depth. The samplers were decontaminated between sampling intervals using laboratory-grade detergent, then rinsed twice with potable water. Soil samples were placed directly into sterilized glass containers with Teflon-sealed lids furnished by the project laboratory. Samples were stored in an iced chest at the site and taken to the laboratory in the chest. Each container was labeled as to boring number, sample number, and date. EPA-recommended sample management protocol, including the maintenance of chain-of-custody documentation, was observed at each stage of the project.

During drilling and sampling, a field log was made by the project environmental engineer for each boring. Information recorded versus corresponding depth included soil classification (Unified Soil Classification System), color, texture, moisture, seepage zones, odors, and iridescent sheens.

Monitoring Well Installation and Groundwater Sampling

A PVC casing, with a blank riser in the upper few feet of the boring followed by a slotted well screen, was installed in each boring. Monitoring well design and construction methods conformed to requirements and specifications outlined in Washington Administrative Code, Chapter 173-160, for resource protection wells in the State of Washington. A waiver was obtained to allow installation of 3/4-inch-diameter wells, rather than the standard 2-inch-diameter wells. This allowed the wells to be installed in the smaller diameter hole created by the hydraulic push sampler.

The well screen in each installation was positioned to span the maximum and minimum range of the anticipated seasonal groundwater fluctuation, facilitating sampling at any time of the year. The annulus of each well casing was sand-packed 2 to 3 feet above its well screen. A bentonite seal was placed above the sand and carried to within 2 feet of the ground surface to prevent the infiltration of surface contamination along the well casing. A non-shrinking cement grout was used to stabilize the upper section of each well. A protective, flush-mounted casing with provisions for locking access to the well head was also provided.

A peristaltic pump was used to develop each well by removing a minimum of five well volumes of water. Prior to groundwater sampling, an electronic water level indicator was used to measure the depth to groundwater. The well was then purged by removing a minimum of three additional well volumes of water. This procedure was followed to ensure that samples obtained from the wells would be representative of groundwater conditions in the surrounding water-bearing strata. After purging, the water levels were allowed to recover to at least 95 percent of the static water level. A peristaltic pump was used to collect samples from each well. New disposable plastic tubing was used at each well to avoid cross-contamination.

The water samples were pumped directly into preconditioned containers furnished by the project laboratory, stored in an iced chest at, or below, 4 degrees centigrade, and transported to the project laboratory in the chest. EPA-recommended sample management protocol, including the maintenance of chain-of-custody documentation, was observed at each stage of the project.

Water Table Survey

To determine the relative water level in each well, we used a laser level to define the relative elevation of a measuring point (MP) at the top of each well casing to an accuracy of 0.01 foot. An electronic water level indicator was then used to sound the depth to groundwater from the MP to an accuracy of 0.01 foot. The relative elevation of the water table in each well was calculated by subtracting the depth to water from the elevation of the MP. In the wells containing liquid-phase hydrocarbons, the depth to the hydrocarbon layer was measured by IT using an electronic indicator capable of detecting hydrocarbon as well as water. The measured water level elevations were corrected by multiplying the measured product thickness by an assumed product specific gravity of 0.80 and adding that value to the measured water level elevation. As groundwater flows from areas of higher elevation to areas of lower elevation, we were able to determine the direction of flow.

Laboratory Analyses

The contaminants of concern at this site were diesel fuel, lube oil, and solvents. Selected soil samples were analyzed for total petroleum hydrocarbons in the diesel and oil range by method NWTPH-D (extended) and for solvent as volatile organic compounds by EPA Method 8260B. Groundwater samples were analyzed for diesel-range petroleum hydrocarbons by NWTHPH-D (extended). This analytical approach is intended to provide a basis for comparing the site environment to existing standards offered in the Model Toxics Control Act (MTCA), Chapter 173-320 and 173-340, Washington Administrative Code.

FINDINGS

Surface

The area under investigation is immediately east of Building 600 on the Maersk Pacific Limited site. The property is owned by the Port of Tacoma and leased to Maersk Pacific Limited. The portion of the site not covered by the building is paved with asphalt. As noted earlier, underground fuel storage tanks are located approximately 900 feet northeast of the building. We were informed by Maersk Pacific Limited personnel that an underground line for lubricating oil runs from the UST pad to the building (see Plate 2). This line was discovered to be leaking several years ago, and was abandoned in favor of a new line. The dates the leakage took place, the volume released, and the method of abandonment of the line are not known, nor was it known if the leakage was reported.

Subsurface

The locations of the test borings and monitoring wells are illustrated on the Sampling Location Map, Plate 2. In general, the subsurface soil in the borings consisted of dark gray, slightly silty, fine- to medium-grained sand underlain by a gray, sandy silt. In some locations, this was underlain by a gray, silty sand. Obvious signs of petroleum contamination (odors, sheen, etc.) were observed in many of the borings. The boring logs, appended as Plates 4 through 12, give greater detail on the specific conditions encountered at each drilling location. Groundwater was encountered during drilling at approximately 10 feet below the ground surface (bgs) in each of the borings.

Results of Laboratory Analysis

The results of the laboratory analyses of the soil and groundwater samples are provided in Tables 1 through 3. Laboratory reports documenting the analyses have also been appended. At each location, we selected the soil sample from the interval between 7.0 to 10.0 feet, the approximate top of the water table, for analysis. Please note that MTCA cleanup levels for Methods A and B are provided for comparison purposes only. Further evaluation is required to identify the appropriate cleanup levels for this site.

TABLE 1
DIESEL-RANGE PETROLEUM HYDROCARBONS IN SOIL[1]

SAMPLE NUMBER	SAMPLING INTERVAL	#2 DIESEL	MOTOR OIL
B-1-3	7 - 10 ft.	13,000	12,000
B-2-3	7 - 10 ft.	29,000	90,000
B-3-3	7 - 10 ft.	16,000	2,200
B-4-3	7 - 10 ft.	12,000	610
B-5-3	7 - 10 ft.	1,800	70
B-6-3	7 - 10 ft.	5,600	380
B-7-3	7 - 10 ft.	950	60
B-8-3	7 - 10 ft.	31,000	650
B-9-3	7 - 10 ft.	26,000	650
MTCA Cleanup Level[2]	-	200	200

Notes:

1. Results are reported in parts per million (ppm).
2. Method A Cleanup Levels for Soils, from the Model Toxics Control Act (MTCA) 173-340-740.

TABLE 2
VOLATILE ORGANIC COMPOUNDS IN SOIL[1]

Compound	MTCA Cleanup Level[2]	B-2-3 (7 - 10 ft.)	B-5-3 (7 - 10 ft.)	B-8-3 (7 - 10 ft.)
1,2,4-Trimethylbenzene	na[3]	nd[4]	300	1,100
1,2-Dichlorobenzene	7,200	6,100	nd	nd
1,3,5-Trimethylbenzene	na	3,000	nd	1,500
1,3-Dichlorobenzene	na	750	nd	nd
1,4-Dichlorobenzene	41.7	490	nd	nd
2-Chlorotoluene	1,600	740	nd	nd
4-Isopropyltoluene	na	1,600	470	3,600
Chlorobenzene	1,600	2,000	350	1,600
Ethylbenzene	8,000	810	nd	1,900
Isopropylbenzene	na	630	nd	1,800
m,p Xylenes	160,000	5,100	nd	nd
Naphthalene	3,200	5,300	2,200	16,000
n-Butylbenzene	na	3,500	800	6,200
n-Propylbenzene	na	nd	410	3,300
o-Xylene	160,000	2,000	nd	nd
sec-Butylbenzene	na	nd	nd	9,300
t-Butylbenzene	na	1,600	470	3,600
Toluene	16,000	480	nd	nd

Notes:

1. Results are reported in parts per million (ppm).
2. MTCA Method B cleanup levels for soil from Model Toxics Control Act Cleanup levels and Risk Calculations (CLARC II) Update, Publication No. 94-145.
3. "na" denotes that no Method A or B cleanup values for this compound have been published.
4. "nd" denotes not detected above the detection limit.

TABLE 3
DIESEL-RANGE PETROLEUM HYDROCARBONS IN GROUNDWATER[1]

SAMPLE NUMBER	#2 DIESEL	MOTOR OIL	FREE PRODUCT[2]
MW-1	850,000	14,000	0.92
MW-2	3.1	0.66	na
MW-3	22	1.6	0.25
MTCA Cleanup Level[2]	1.0 Total (includes diesel and oil)		

Notes:

1. Results are reported in parts per million (ppm).
2. Thickness of free product in feet, as measured by IT on February 4, 2000.
3. Method A Cleanup Levels for Groundwater, from the Model Toxics Control Act (MTCA) 173-340-720.

Free product was found in Monitoring Wells 1 and 3.

Water Table Survey

Information regarding hydraulic gradients and the direction of groundwater flow is frequently useful in applications such as risk assessments or evaluations of possible alternative sources of water-borne contaminants. We completed this water table survey (using the data provided by IT as described earlier) to determine the flow direction of shallow groundwater across the subject property. For this survey, the top of the casing at MW-1 was assumed to be at an elevation of 18.00 feet above mean sea level. The water table survey data are presented in the following table:

WATER TABLE SURVEY
February 4, 2000

	MW-1	MW-2	MW-3
Elevation of Top of Casing (feet) [1]	18.00[2]	17.07	17.82
Depth to Product from Top of Casing (feet)	8.96	-	8.79
Depth to Water from Top of Casing (feet)	9.88	7.96	9.04
Product Thickness (feet)	0.92	-	0.25
Adjusted Depth to Water (feet)	9.14	9.11	8.84
Elevation of Water Table Surface (feet)	8.86	9.11	8.98

Notes:

1. All elevations are relative, rather than true.
2. Elevation of top of casing at MW-1 assumed to be 18.00 feet above mean sea level.

The water table elevations suggest that the direction of groundwater flow at that time of the survey was toward the north-northwest. Tidal influences may affect the direction of groundwater flow and the distribution of contaminants.

CONCLUSIONS

Our investigation found that the soil and groundwater samples from the entire area investigated contained diesel- and oil-range petroleum products. The concentrations of oil-range petroleum hydrocarbons were generally highest in the samples closest to the abandoned lube line, and decreased with distance from that area. This suggests that leakage from the lube oil line is probably a major contributor to hydrocarbons in soil and groundwater in that area. The hydrocarbon fraction attributable to diesel was highest at boring B-2, and may be due to a release from the former UST or from past use of the site. The full extent of hydrocarbon-impacted soil and groundwater was beyond the scope of this Phase 2 investigation and was not defined.

The scope of work accomplished for this project did not include evaluating appropriate cleanup levels for this site or preparing remediation alternatives for cleanup of soil and groundwater. The full extent of impacted soils and groundwater, along with groundwater flow direction, should be defined prior to evaluating remedial alternatives.

The Washington Administrative Code (WAC) 173-340-000 (2) regarding site discovery and reporting requires that "Any owner or operator who has information that a hazardous substance has been released to the environment at the owner or operator's facility and may be a threat to human health or to the environment shall report such information [to WDOE]... within ninety days of discovery." Although conditions at the former diesel UST may have been reported, the release from the lube oil line discovered during this investigation would require reporting as well.

When the groundwater monitoring wells are no longer required, they should also be lawfully abandoned in accordance with the appropriate sections of WAC, Chapter 173-160.

LIMITATIONS

This report has been prepared for specific application to this project in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. It was prepared in accordance with the terms of the Port of Tacoma's Contract for Professional Services No. 997091, Work Order No. E1909, dated November 8, 1999. This report is for the exclusive use of the Port of Tacoma and its representatives for specific application to this site. No warranty is expressed or implied. If new information is developed in future site work, which may include excavations, borings, or studies, Geotech Consultants, Inc. should be allowed to re-evaluate the conclusions of this report and provide amendments as required.

The following documents are attached to complete this report:

Plate 1	Vicinity Map
Plate 2	Sampling Location Map
Plate 3	Groundwater Data
Plates 4 - 12	Boring Logs
Appendix	Laboratory Reports

We appreciate our opportunity to provide environmental consulting services on this project. If you have any questions, or if we can be of further assistance, please do not hesitate to contact us.

Respectfully submitted,

GEOTECH CONSULTANTS, INC.

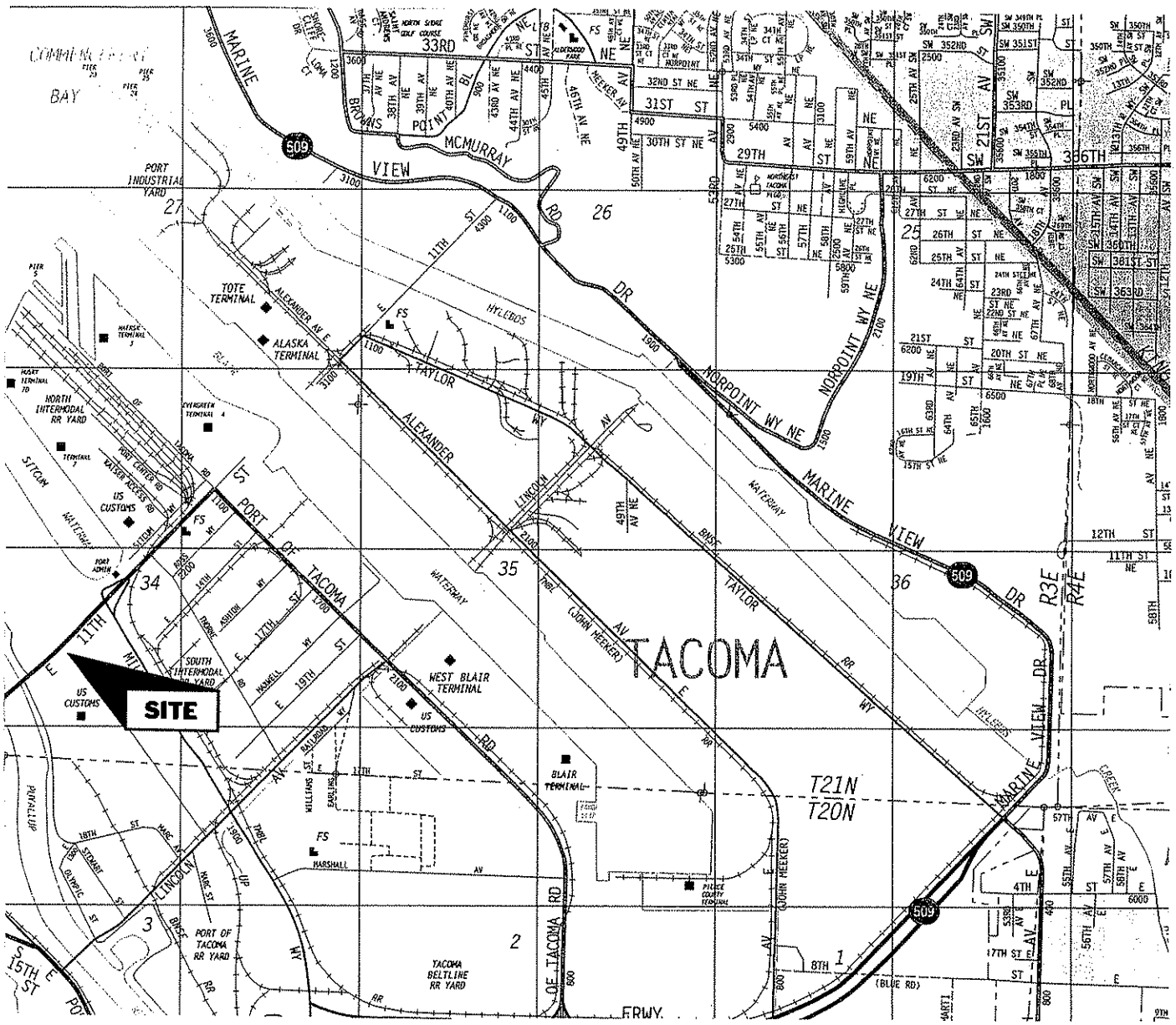
David Bair

David Bair
Environmental Engineer

EXPIRES 10/25/2001

Marc R. McGinnis, P.E.
Principal

DLB/MRM: alt



Scale

0 1/2 1 mile

N

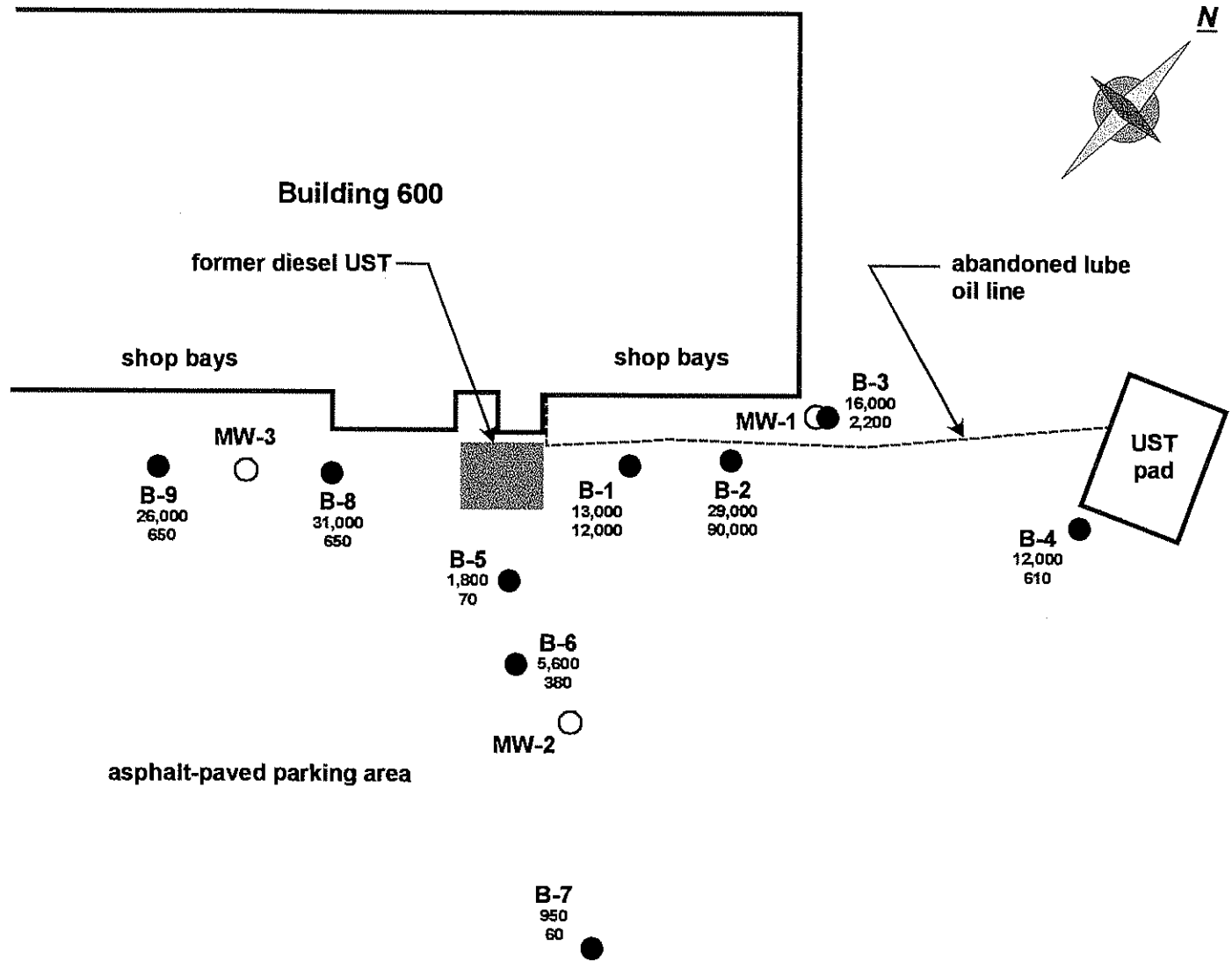
(Source: The Thomas Guide, Pierce County, Washington, 1998)

GEOTECH
CONSULTANTS, INC.

VICINITY MAP

Maersk Pacific Limited
Tacoma, Washington

Job No:	Date:		Plate:
00026E	Mar. 2000		1



Legend:

- ● soil boring
- ○ groundwater monitoring well

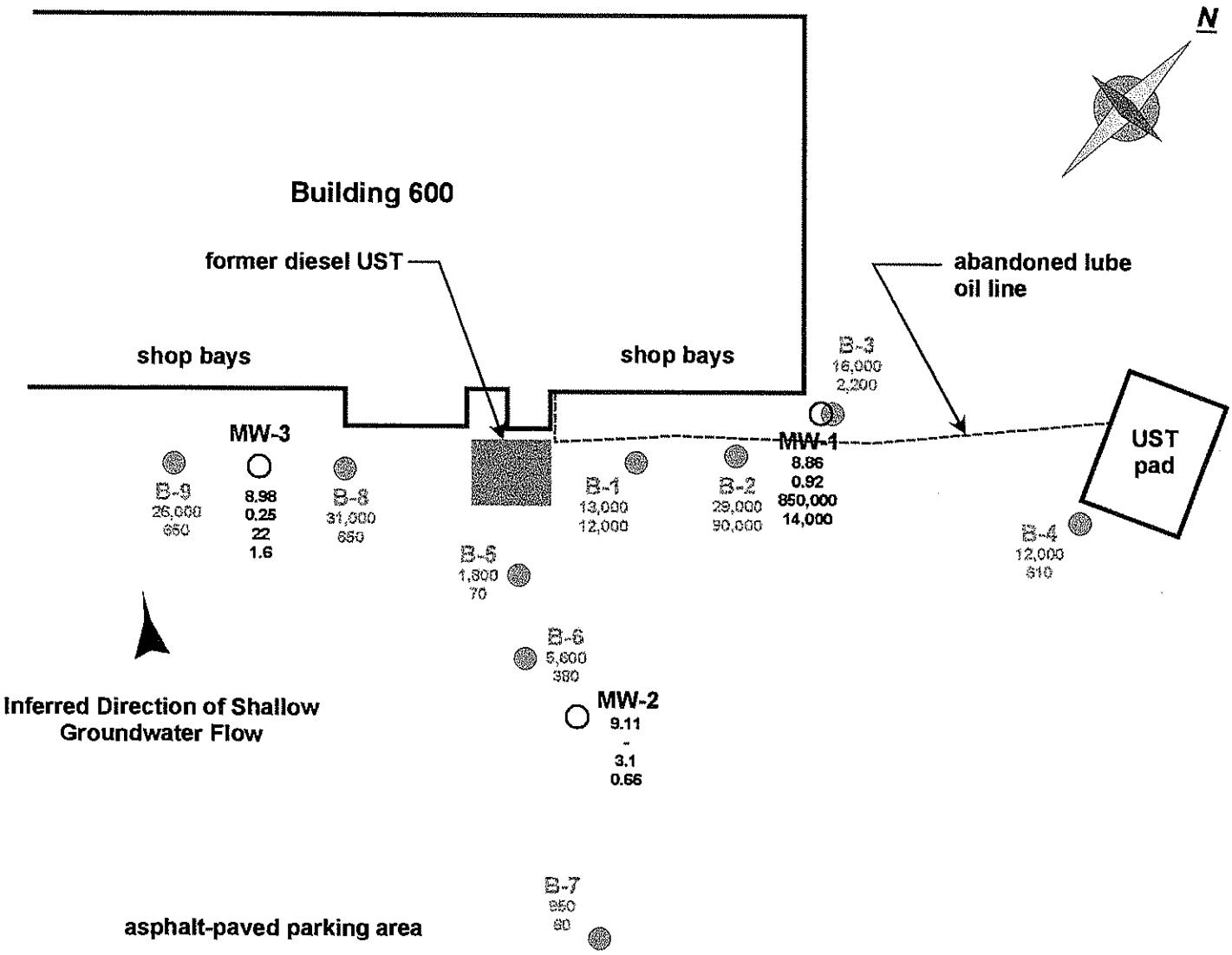
12,000 diesel-range petroleum, ppm (1st value)
610 oil-range petroleum, ppm (2nd value)

GEOTECH
CONSULTANTS, INC.

SAMPLING LOCATION MAP

Maersk Pacific Limited
Tacoma, Washington

Job No:	Date:	Scale:	Plate:
00026E	Mar. 2000	1" = 50 '	2



Legend:

- soil boring
- groundwater monitoring well

8.98 groundwater elevation
0.25 thickness of free product, ft.
22 diesel-range petroleum, ppm
1.6 oil-range petroleum, ppm

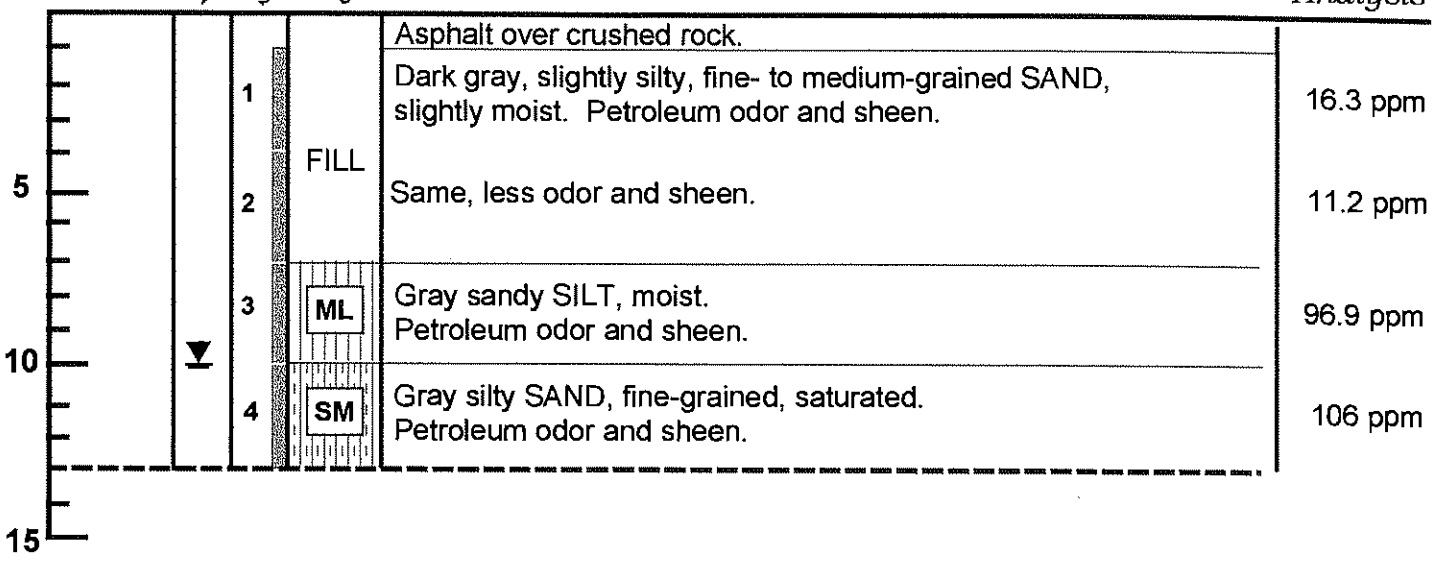
GEOTECH CONSULTANTS, INC.

GROUNDWATER DATA MAP

Maersk Pacific Limited
Tacoma, Washington

Job No:	Date:	Scale:	Plate:
00026E	Mar. 2000	1" = 50 '	3

BORING B-1



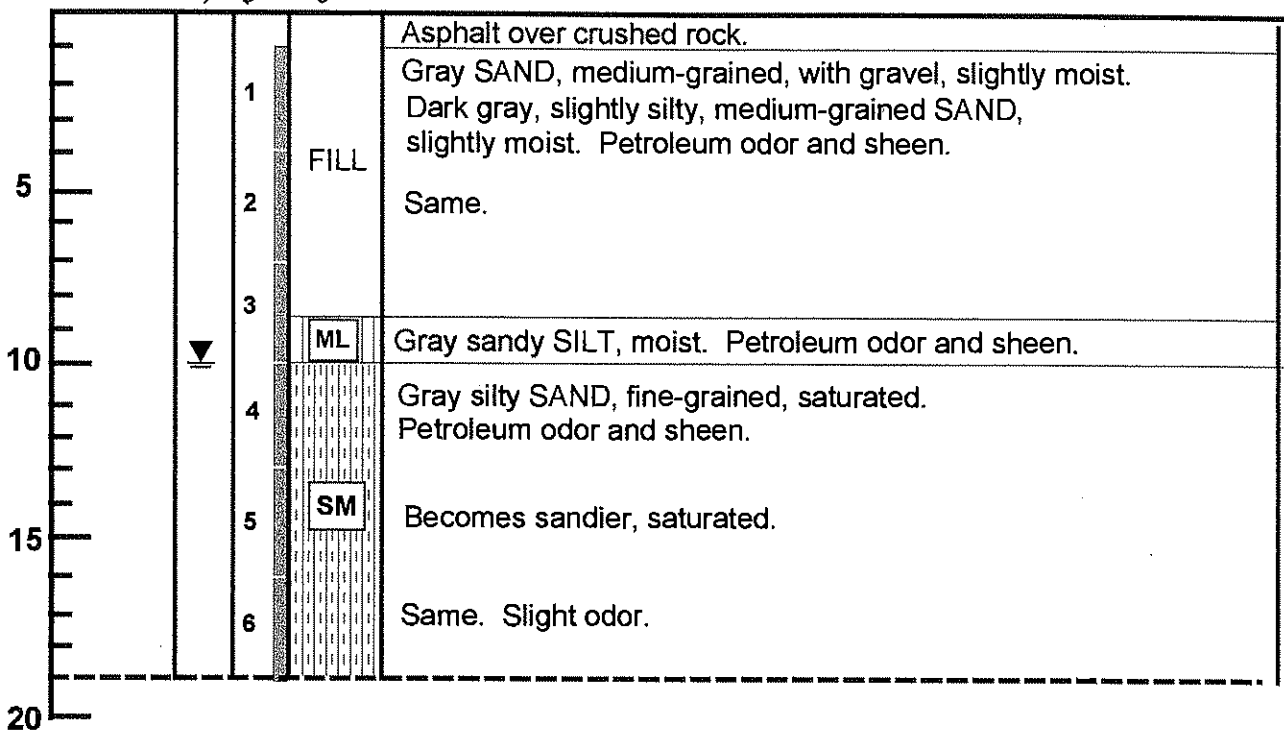
* Boring drilled to to 13.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-1
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	4

BORING B-2



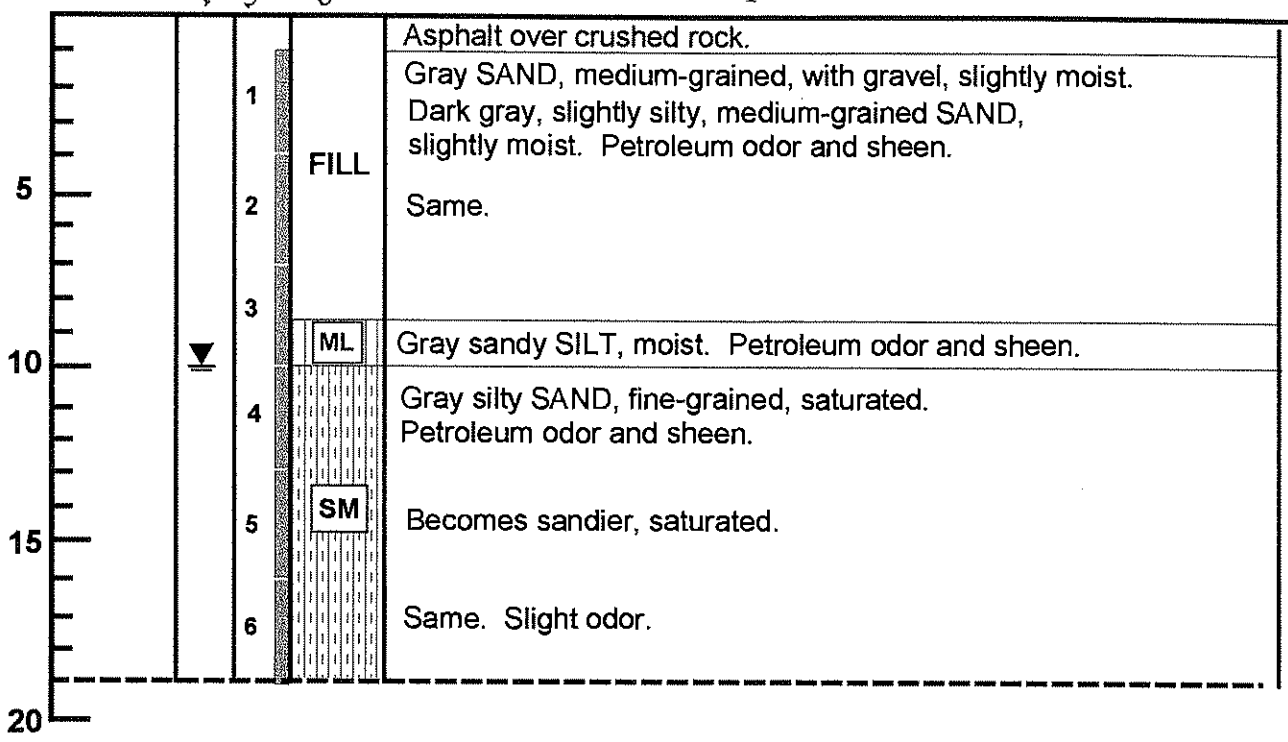
* Boring drilled to to 19.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measuredr using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-2
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	5

BORING B-3



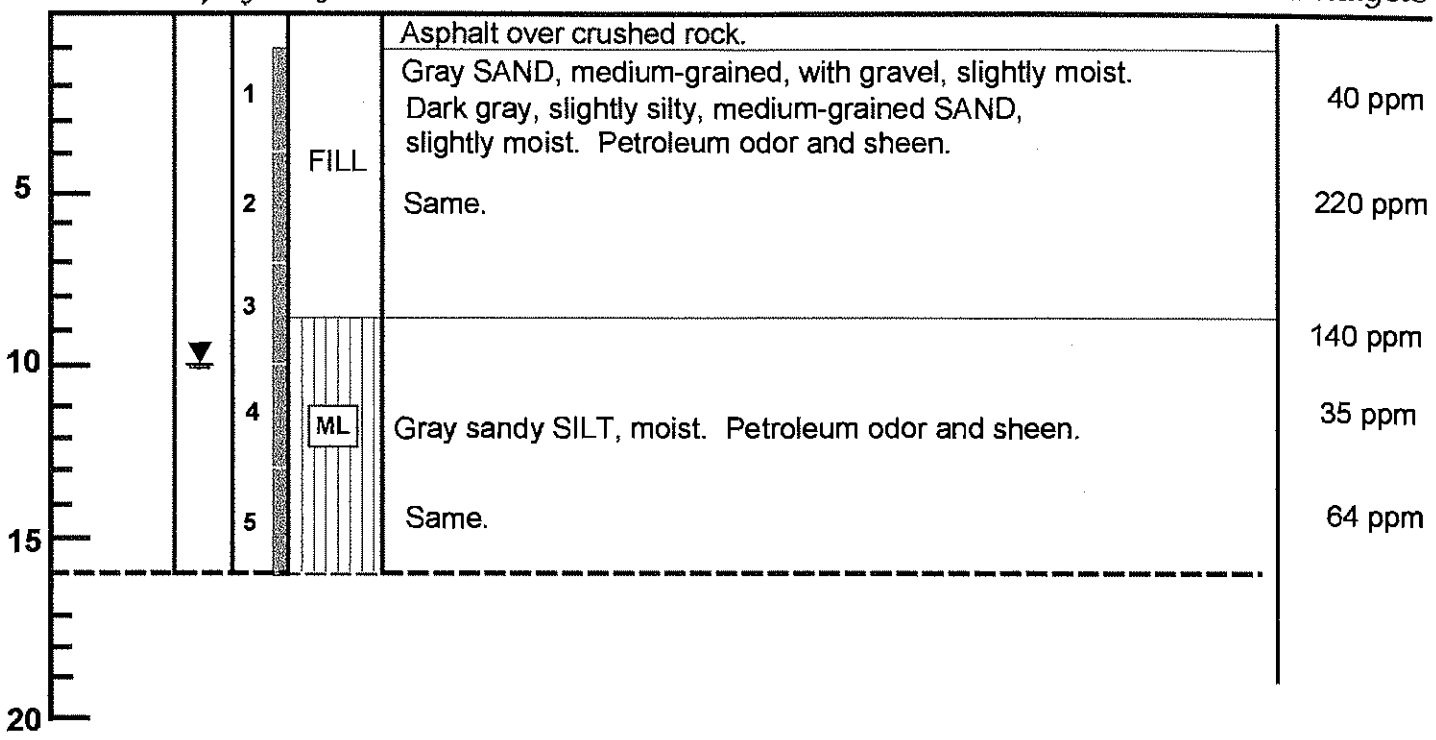
* Boring drilled to to 19.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measuredr using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-3
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	6

BORING B-4



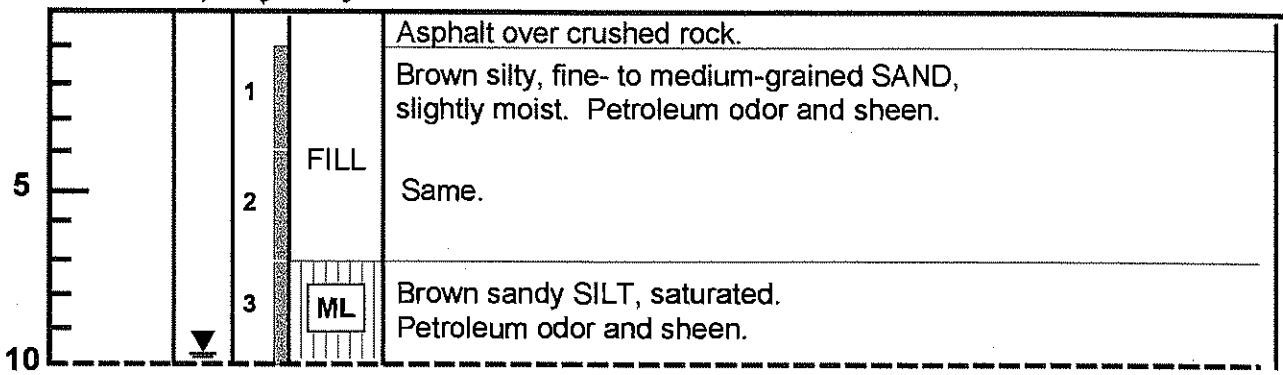
* Boring drilled to to 16.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-4
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	7

BORING B-5



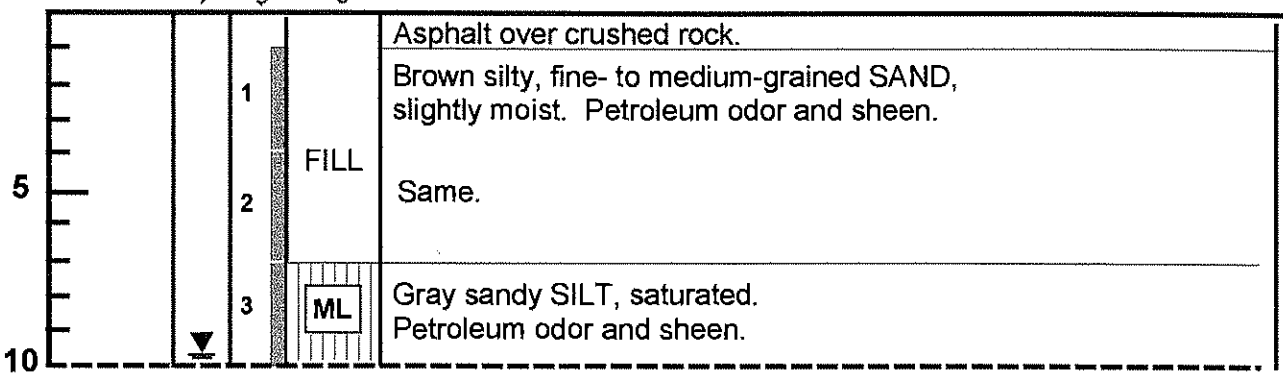
* Boring drilled to to 10.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-5
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	8

BORING B-6



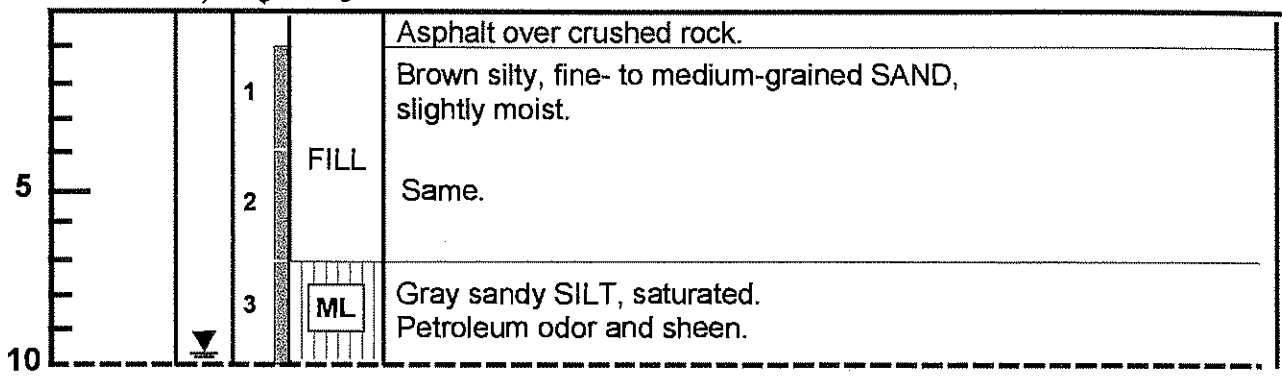
* Boring drilled to to 10.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-6
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	9

BORING B-7



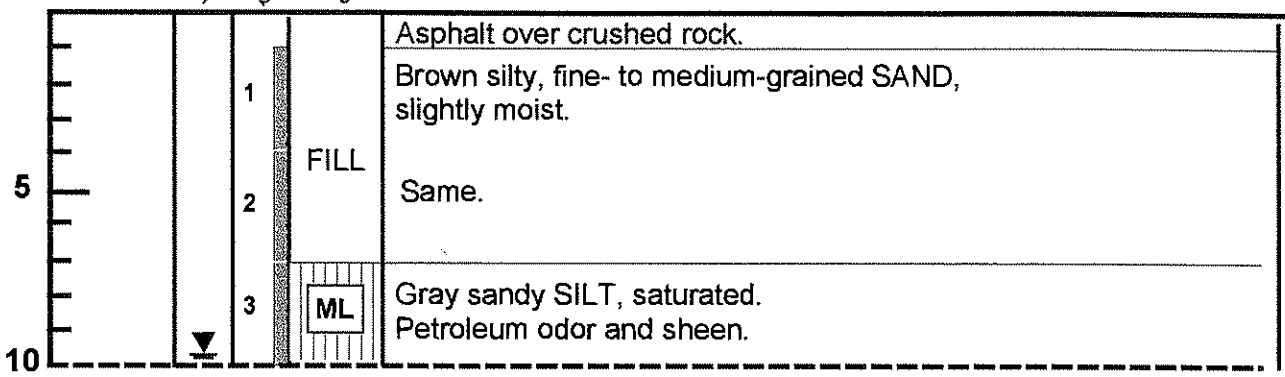
* Boring drilled to to 10.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-7
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	10

BORING B-8



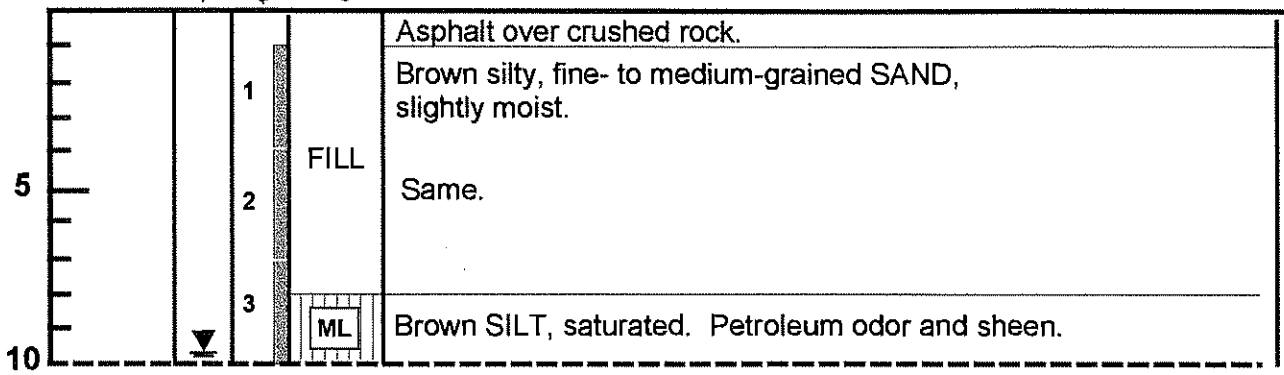
* Boring drilled to to 10.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-8
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	11

BORING B-9



* Boring drilled to to 10.0 feet on January 20, 2000.
* Depth to groundwater (▼) observed during drilling.
* Headspace measured using a Photovac 2020 photoionization detector.
* Boring made by Transglobal Environmental Geosciences, Inc.

GEOTECH
CONSULTANTS, INC.

BORING LOG B-9
Maersk Pacific Limited
Building 600
Tacoma, Washington

Job No:	Date:	Logged by:	Plate:
00026E	Mar. 2000	DLB	12

APPENDIX

Laboratory Reports

86956

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: sainc1@uswest.net

TRANSMITTAL MEMORANDUM

DATE: February 3, 2000

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

PROJECT: Sea Land Terminal

REPORT NUMBER: 86956

Enclosed are the test results for nine samples received at Sound Analytical Services on January 20, 2000.

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,

Katie Downie
Project Manager

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-2-3
Lab ID:	86956-02
Date Received:	1/20/00
Date Prepared:	1/26/00
Date Analyzed:	1/29/00
% Solids	88.04
Dilution Factor	25

Volatile Organics by USEPA Method 5030/8260B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Dibromofluoromethane	89.3		87	110
Fluorobenzene	97.7		94	111
Toluene-D8	102		87	110
Ethylbenzene-d10	100		91	107
Bromofluorobenzene	101		92	105

Sample results are on a dry weight basis.

		Result			
Analyte		**(ug/kg)**	**PQL**	**MDL**	**Flags**
Dichlorodifluoromethane	ND		420	210	
Chloromethane	ND		420	210	
Vinyl chloride	ND		420	210	
Bromomethane	ND		420	210	
Chloroethane	ND		420	210	
Trichlorofluoromethane	ND		420	210	
1,1-Dichloroethene	ND		420	210	
Methylene chloride	ND		420	210	
trans-1,2-Dichloroethene	ND		420	210	
1,1-Dichloroethane	ND		420	210	
2,2-Dichloropropane	ND		420	210	
cis-1,2-Dichloroethene	ND		420	210	
Bromochloromethane	ND		420	210	
Chloroform	ND		420	210	
1,1,1-Trichloroethane	ND		420	210	
Carbon Tetrachloride	ND		420	210	
1,1-Dichloropropene	ND		420	210	
Benzene	ND		420	210	
1,2-Dichloroethane	ND		420	210	
Trichloroethene	ND		420	210	
1,2-Dichloropropane	ND		420	210	
Dibromomethane	ND		420	210	
Bromodichloromethane	ND		420	210	
cis-1,3-Dichloropropene	ND		420	210	
Toluene	480		420	210	
trans-1,3-Dichloropropene	ND		420	210	

SOUND ANALYTICAL SERVICES, INC.

Volatile Organics by USEPA Method 5030/8260B Modified data for 86956-02 continued...

Analyte	Result (ug/kg)	PQL	MDL
1,1,2-Trichloroethane	ND	420	210
Tetrachloroethene	ND	420	210
1,3-Dichloropropane	ND	420	210
Dibromochloromethane	ND	420	210
1,2-Dibromoethane	ND	420	210
Chlorobenzene	2000	420	210
Ethylbenzene	810	420	210
1,1,1,2-Tetrachloroethane	ND	420	210
m,p-Xylene	3100	840	420
o-Xylene	2000	420	210
Styrene	ND	420	210
Bromoform	ND	420	210
Isopropylbenzene	630	420	210
Bromobenzene	ND	420	210
n-Propylbenzene	ND	420	210
1,1,2,2-Tetrachloroethane	ND	420	210
1,2,3-Trichloropropane	ND	420	210
2-Chlorotoluene	740	420	210
1,3,5-Trimethylbenzene	3000	420	210
4-Chlorotoluene	ND	420	210
t-Butylbenzene	1600	420	210
1,2,4-Trimethylbenzene	ND	420	210
sec-Butylbenzene	ND	420	210
1,3-Dichlorobenzene	750	420	210
4-Isopropyltoluene	1600	420	210
1,4-Dichlorobenzene	490	420	210
n-Butylbenzene	3500	420	210
1,2-Dichlorobenzene	6100	420	210
1,2-Dibromo-3-chloropropane	ND	420	210
1,2,4-Trichlorobenzene	ND	420	210
Hexachlorobutadiene	ND	420	210
Naphthalene	5300	420	210
1,2,3-Trichlorobenzene	ND	420	210

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-5-3
Lab ID:	86956-05
Date Received:	1/20/00
Date Prepared:	1/26/00
Date Analyzed:	1/29/00
% Solids	67.87
Dilution Factor	25

Volatile Organics by USEPA Method 5030/8260B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Dibromofluoromethane	87.1		87	110
Fluorobenzene	96.6		94	111
Toluene-D8	104		87	110
Ethylbenzene-d10	106		91	107
Bromofluorobenzene	105		92	105

Sample results are on a dry weight basis.

Analyte	**Result (ug/kg)**	**PQL**	**MDL**	**Flags**
Dichlorodifluoromethane	ND	540	270	
Chloromethane	ND	540	270	
Vinyl chloride	ND	540	270	
Bromomethane	ND	540	270	
Chloroethane	ND	540	270	
Trichlorofluoromethane	ND	540	270	
1,1-Dichloroethene	ND	540	270	
Methylene chloride	ND	540	270	
trans-1,2-Dichloroethene	ND	540	270	
1,1-Dichloroethane	ND	540	270	
2,2-Dichloropropane	ND	540	270	
cis-1,2-Dichloroethene	ND	540	270	
Bromochloromethane	ND	540	270	
Chloroform	ND	540	270	
1,1,1-Trichloroethane	ND	540	270	
Carbon Tetrachloride	ND	540	270	
1,1-Dichloropropene	ND	540	270	
Benzene	ND	540	270	
1,2-Dichloroethane	ND	540	270	
Trichloroethene	ND	540	270	
1,2-Dichloropropane	ND	540	270	
Dibromomethane	ND	540	270	
Bromodichloromethane	ND	540	270	
cis-1,3-Dichloropropene	ND	540	270	
Toluene	ND	540	270	
trans-1,3-Dichloropropene	ND	540	270	

SOUND ANALYTICAL SERVICES, INC.

Volatile Organics by USEPA Method 5030/8260B Modified data for 86956-05 continued...

Analyte	Result (ug/kg)	PQL	MDL	
1,1,2-Trichloroethane	ND	540	270	
Tetrachloroethene	ND	540	270	
1,3-Dichloropropane	ND	540	270	
Dibromochloromethane	ND	540	270	
1,2-Dibromoethane	ND	540	270	
Chlorobenzene	350	540	270	J
Ethylbenzene	ND	540	270	
1,1,1,2-Tetrachloroethane	ND	540	270	
m,p-Xylene	ND	1100	540	
o-Xylene	ND	540	270	
Styrene	ND	540	270	
Bromoform	ND	540	270	
Isopropylbenzene	ND	540	270	
Bromobenzene	ND	540	270	
n-Propylbenzene	410	540	270	J
1,1,2,2-Tetrachloroethane	ND	540	270	
1,2,3-Trichloropropane	ND	540	270	
2-Chlorotoluene	ND	540	270	
1,3,5-Trimethylbenzene	ND	540	270	
4-Chlorotoluene	ND	540	270	
t-Butylbenzene	470	540	270	J
1,2,4-Trimethylbenzene	300	540	270	J
sec-Butylbenzene	ND	540	270	
1,3-Dichlorobenzene	ND	540	270	
4-Isopropyltoluene	470	540	270	J
1,4-Dichlorobenzene	ND	540	270	
n-Butylbenzene	800	540	270	
1,2-Dichlorobenzene	ND	540	270	
1,2-Dibromo-3-chloropropane	ND	540	270	
1,2,4-Trichlorobenzene	ND	540	270	
Hexachlorobutadiene	ND	540	270	
Naphthalene	2200	540	270	
1,2,3-Trichlorobenzene	ND	540	270	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-8-3
Lab ID:	86956-08
Date Received:	1/20/00
Date Prepared:	1/26/00
Date Analyzed:	1/29/00
% Solids	75.8
Dilution Factor	25

Volatile Organics by USEPA Method 5030/8260B Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
Dibromofluoromethane	85.7	X9	87	110
Fluorobenzene	103		94	111
Toluene-D8	110		87	110
Ethylbenzene-d10	106		91	107
Bromofluorobenzene	102		92	105

Sample results are on a dry weight basis.

Analyte	**Result (ug/kg)**	**PQL**	**MDL**	**Flags**
Dichlorodifluoromethane	ND	510	260	
Chloromethane	ND	510	260	
Vinyl chloride	ND	510	260	
Bromomethane	ND	510	260	
Chloroethane	ND	510	260	
Trichlorofluoromethane	ND	510	260	
1,1-Dichloroethene	ND	510	260	
Methylene chloride	ND	510	260	
trans-1,2-Dichloroethene	ND	510	260	
1,1-Dichloroethane	ND	510	260	
2,2-Dichloropropane	ND	510	260	
cis-1,2-Dichloroethene	ND	510	260	
Bromochloromethane	ND	510	260	
Chloroform	ND	510	260	
1,1,1-Trichloroethane	ND	510	260	
Carbon Tetrachloride	ND	510	260	
1,1-Dichloropropene	ND	510	260	
Benzene	ND	510	260	
1,2-Dichloroethane	ND	510	260	
Trichloroethene	ND	510	260	
1,2-Dichloropropane	ND	510	260	
Dibromomethane	ND	510	260	
Bromodichloromethane	ND	510	260	
cis-1,3-Dichloropropene	ND	510	260	
Toluene	ND	510	260	
trans-1,3-Dichloropropene	ND	510	260	

SOUND ANALYTICAL SERVICES, INC.

Volatile Organics by USEPA Method 5030/8260B Modified data for 86956-08 continued...

Analyte	Result (ug/kg)	PQL	MDL	
1,1,2-Trichloroethane	ND	510	260	
Tetrachloroethene	ND	510	260	
1,3-Dichloropropane	ND	510	260	
Dibromochloromethane	ND	510	260	
1,2-Dibromoethane	ND	510	260	
Chlorobenzene	1600	510	260	
Ethylbenzene	1900	510	260	
1,1,1,2-Tetrachloroethane	ND	510	260	
m,p-Xylene	ND	1000	510	
o-Xylene	ND	510	260	
Styrene	ND	510	260	
Bromoform	ND	510	260	
Isopropylbenzene	1800	510	260	
Bromobenzene	ND	510	260	
n-Propylbenzene	3300	510	260	
1,1,2,2-Tetrachloroethane	ND	510	260	
1,2,3-Trichloropropane	ND	510	260	
2-Chlorotoluene	ND	510	260	
1,3,5-Trimethylbenzene	1500	510	260	
4-Chlorotoluene	ND	510	260	
t-Butylbenzene	3600	510	260	
1,2,4-Trimethylbenzene	1100	510	260	
sec-Butylbenzene	9300	510	260	
1,3-Dichlorobenzene	ND	510	260	
4-Isopropyltoluene	3600	510	260	
1,4-Dichlorobenzene	ND	510	260	
n-Butylbenzene	6200	510	260	
1,2-Dichlorobenzene	ND	510	260	
1,2-Dibromo-3-chloropropane	ND	510	260	
1,2,4-Trichlorobenzene	ND	510	260	
Hexachlorobutadiene	ND	510	260	
Naphthalene	16000	510	260	D
1,2,3-Trichlorobenzene	ND	510	260	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-1-3
Lab ID:	86956-01
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/25/00
% Solids	77.07
Dilution Factor	100

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	13000	620	380	
Motor Oil	12000	1200	640	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-2-3
Lab ID:	86956-02
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
% Solids	88.04
Dilution Factor	400

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	29000	2100	1300	
Motor Oil	90000	4200	2200	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-3-3
Lab ID:	86956-03
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/25/00
% Solids	85.06
Dilution Factor	100

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	16000	570	360	
Motor Oil	2200	1100	590	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-4-3
Lab ID:	86956-04
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
% Solids	75.26
Dilution Factor	40

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	87.7		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	12000	260	160	
Motor Oil	610	520	270	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-5-3
Lab ID:	86956-05
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/25/00
% Solids	67.87
Dilution Factor	4

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	79.1		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	1800	28	18	
Motor Oil	70	57	29	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-6-3
Lab ID:	86956-06
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
% Solids	71.01
Dilution Factor	20

Diesel and Motor Oil by NWTPH-Dx Modified

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

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	5600	130	83	
Motor Oil	380	270	140	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-7-3
Lab ID:	86956-07
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/25/00
% Solids	75.28
Dilution Factor	4

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	104		50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	950	26	16	
Motor Oil	60	52	27	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-8-3
Lab ID:	86956-08
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
% Solids	75.8
Dilution Factor	40

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	-	X9	50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	31000	240	150	D
Motor Oil	650	480	250	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	B-9-3
Lab ID:	86956-09
Date Received:	1/20/00
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
% Solids	74.14
Dilution Factor	40

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	-	X9	50	150

Sample results are on a dry weight basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	26000	250	160	D
Motor Oil	650	510	260	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - ITS569
Date Received:	-
Date Prepared:	1/26/00
Date Analyzed:	1/27/00
% Solids	
Dilution Factor	25

Volatile Organics by USEPA Method 5030/8260B Modified

Surrogate	% Recovery	Flags	Recovery Limits Low	High
Dibromofluoromethane	87.3		87	110
Fluorobenzene	98.6		94	111
Toluene-D8	102		87	110
Ethylbenzene-d10	98.3		91	107
Bromofluorobenzene	98.5		92	105

Sample results are on an as received basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorodifluoromethane	ND	400	200	
Chloromethane	ND	400	200	
Vinyl chloride	ND	400	200	
Bromomethane	ND	400	200	
Chloroethane	ND	400	200	
Trichlorofluoromethane	ND	400	200	
1,1-Dichloroethene	ND	400	200	
Methylene chloride	ND	400	200	
trans-1,2-Dichloroethene	ND	400	200	
1,1-Dichloroethane	ND	400	200	
2,2-Dichloropropane	ND	400	200	
cis-1,2-Dichloroethene	ND	400	200	
Bromochloromethane	ND	400	200	
Chloroform	ND	400	200	
1,1,1-Trichloroethane	ND	400	200	
Carbon Tetrachloride	ND	400	200	
1,1-Dichloropropene	ND	400	200	
Benzene	ND	400	200	
1,2-Dichloroethane	ND	400	200	
Trichloroethene	ND	400	200	
1,2-Dichloropropane	ND	400	200	
Dibromomethane	ND	400	200	
Bromodichloromethane	ND	400	200	
cis-1,3-Dichloropropene	ND	400	200	
Toluene	ND	400	200	
trans-1,3-Dichloropropene	ND	400	200	

SOUND ANALYTICAL SERVICES, INC.

Volatile Organics by USEPA Method 5030/8260B Modified data for ITS569 continued...

Analyte	Result (ug/kg)	PQL	MDL
1,1,2-Trichloroethane	ND	400	200
Tetrachloroethene	ND	400	200
1,3-Dichloropropane	ND	400	200
Dibromochloromethane	ND	400	200
1,2-Dibromoethane	ND	400	200
Chlorobenzene	ND	400	200
Ethylbenzene	ND	400	200
1,1,1,2-Tetrachloroethane	ND	400	200
m,p-Xylene	ND	800	400
o-Xylene	ND	400	200
Styrene	ND	400	200
Bromoform	ND	400	200
Isopropylbenzene	ND	400	200
Bromobenzene	ND	400	200
n-Propylbenzene	ND	400	200
1,1,2,2-Tetrachloroethane	ND	400	200
1,2,3-Trichloropropane	ND	400	200
2-Chlorotoluene	ND	400	200
1,3,5-Trimethylbenzene	ND	400	200
4-Chlorotoluene	ND	400	200
t-Butylbenzene	ND	400	200
1,2,4-Trimethylbenzene	ND	400	200
sec-Butylbenzene	ND	400	200
1,3-Dichlorobenzene	ND	400	200
4-Isopropyltoluene	ND	400	200
1,4-Dichlorobenzene	ND	400	200
n-Butylbenzene	ND	400	200
1,2-Dichlorobenzene	ND	400	200
1,2-Dibromo-3-chloropropane	ND	400	200
1,2,4-Trichlorobenzene	ND	400	200
Hexachlorobutadiene	ND	400	200
Naphthalene	ND	400	200
1,2,3-Trichlorobenzene	ND	400	200

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	ITS569
Date Prepared:	1/26/00
Date Analyzed:	1/27/00
QC Batch ID:	ITS569

Volatile Organics by USEPA Method 5030/8260B Modified

Compound Name	Blank Result (ug/kg)	Spike Amount (ug/kg)	BS Result (ug/kg)	BS % Rec.	BSD Result (ug/kg)	BSD % Rec.	RPD	Flag
1,1-Dichloroethene	0	1000	782	78.2	858	85.8	9.3	
Benzene	0	1000	723	72.3	774	77.4	6.8	
Trichloroethene	0	1000	766	76.6	1040	104	30	N
Toluene	0	1000	823	82.3	835	83.5	1.4	
Chlorobenzene	0	1000	812	81.2	858	85.8	5.5	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DI2470
Date Received:	-
Date Prepared:	1/25/00
Date Analyzed:	1/25/00
% Solids	
Dilution Factor	4

Diesel and Motor Oil by NWTPH-Dx Modified

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

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
#2 Diesel	ND	20	12	
Motor Oil	ND	40	21	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DI2470
Date Prepared:	1/25/00
Date Analyzed:	1/25/00
QC Batch ID:	DI2470

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	501	493	98.4	542	108	9.3	
Motor Oil	0	496	581	117	474	95.7	-20	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	B-1-3
Lab ID:	86956-01
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
QC Batch ID:	DI2470

Diesel and Motor Oil by NWTPH-Dx Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
#2 Diesel	13100	23500	-57.0	X4
Motor Oil	11600	20100	-54.0	X4

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	B-9-3
Lab ID:	86956-09
Date Prepared:	1/25/00
Date Analyzed:	1/26/00
QC Batch ID:	DI2470

Diesel and Motor Oil by NWTPH-Dx Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
#2 Diesel	26100	23300	11.0	
Motor Oil	646	559	14.0	

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE: (253) 922-2310 - FAX: (253) 922-5047

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.

H3 Bottom

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East • Tacoma, WA 98424
(253) 922-2310 • FAX (253) 922-5047
e-mail: sainc1@uswest.net

SAS Lab No. 86956

TURNAROUND REQUEST (business days)
Standard (10 days) X
RUSH: 24 hrs ___ 48 hrs ___ 5 day ___

CHAIN OF CUSTODY/REQUEST FOR LABORATORY ANALYSIS

Client: Port of Tacoma
Project Name: SeaLand Terminal
Contact: Suzanne Dudziak
Phone No.: (253) 383-9453
Fax No.:
Email:

Analyses Requested

Lab Use Only	Sample ID	Date	Time	Matrix	# of Containers	NWTPH-Dx	8260 added via phone call from Dave Bair
1	B-1-3	1/20		Soil	1	✓	
2	B-2-3				1	✓	X
3	B-3-3				1	✓	
4	B-4-3				1	✓	
5	B-5-3				1	✓	X
6	B-6-3				1	✓	
7	B-7-3				1	✓	
8	B-8-3				1	✓	X
9	B-9-3				1	✓	

	Signature	Printed Name	Firm	Time/Date	Special Instructions
Relinquished By:	David Bair	David Bair	Geotech	3:43/1-20	
Received By	SGiang	S Giang	SAS	3:43 1/20/00	
Relinquished By:					
Received By					
Relinquished By:					
Received By					

COC No. ___

Page 1 of 1

87081

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: sainc1@uswest.net

TRANSMITTAL MEMORANDUM

DATE: February 8, 2000

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

PROJECT: Sea Land Terminal

REPORT NUMBER: 87081

Enclosed are the test results for three samples received at Sound Analytical Services on January 27, 2000.

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,

Katie Downie

Katie Downie
Project Manager

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-1
Lab ID:	87081-01
Date Received:	1/27/00
Date Prepared:	2/2/00
Date Analyzed:	2/4/00
% Solids	
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	90.1		50	150

Sample results are on an as received basis.

Analyte	**Result (mg/kg)**	**PQL**	**MDL**	**Flags**
#2 Diesel	850000	4900	3000	D
Motor Oil	14000	9800	5100	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-2
Lab ID:	87081-02
Date Received:	1/27/00
Date Prepared:	2/2/00
Date Analyzed:	2/3/00
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
o-terphenyl	100		50	150

Analyte	Result (mg/L)	PQL	MDL	Flags
#2 Diesel	3.1	0.25	0.13	
Motor Oil	0.66	0.5	0.25	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Port of Tacoma
Client ID:	MW-3
Lab ID:	87081-03
Date Received:	1/27/00
Date Prepared:	2/2/00
Date Analyzed:	2/3/00
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

			Recovery Limits	
Surrogate	**% Recovery**	**Flags**	**Low**	**High**
o-terphenyl	83.4		50	150

Analyte	**Result (mg/L)**	**PQL**	**MDL**	**Flags**
#2 Diesel	22	0.25	0.13	
Motor Oil	1.6	0.5	0.25	

SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - DI2482
Date Received:	-
Date Prepared:	2/2/00
Date Analyzed:	2/3/00
% Solids	-
Dilution Factor	5

Diesel and Motor Oil by NWTPH-Dx Modified

Surrogate	% Recovery	Flags	Recovery Limits Low	Recovery Limits High
o-terphenyl	87.3		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.

Lab ID:	Method Blank - DI2483
Date Received:	-
Date Prepared:	2/2/00
Date Analyzed:	2/3/00
% Solids	
Dilution Factor	10

Diesel and Motor Oil by NWTPH-Dx Modified

Surrogate	% Recovery	Flags	Recovery Limits Low	High
o-terphenyl	81.2		50	150

Sample results are on an as received basis.

Analyte	Result (mg/kg)	PQL	MDL	Flags
#2 Diesel	ND	5000	3100	
Motor Oil	ND	10000	5200	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DI2482
Date Prepared:	2/2/00
Date Analyzed:	2/3/00
QC Batch ID:	DI2482

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	5.01	5.31	106	4.85	96.9	-9	
Motor Oil	0	4.96	5.35	108	4.87	98.2	-9.5	

SOUND ANALYTICAL SERVICES, INC.

Blank Spike/Blank Spike Duplicate Report

Lab ID:	DI2483
Date Prepared:	2/2/00
Date Analyzed:	2/3/00
QC Batch ID:	DI2483

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	50100	42000	83.9	44200	88.3	5.1	
Motor Oil	0	49600	42700	86.1	43400	87.6	1.7	

SOUND ANALYTICAL SERVICES, INC.

Duplicate Report

Client Sample ID:	MW-1
Lab ID:	87081-01
Date Prepared:	2/2/00
Date Analyzed:	2/4/00
QC Batch ID:	DI2483

Diesel and Motor Oil by NWTPH-Dx Modified

Parameter Name	Sample Result (mg/kg)	Duplicate Result (mg/kg)	RPD %	Flag
#2 Diesel	848000	1190000	-34.0	
Motor Oil	14200	14400	-1.4	

SOUND ANALYTICAL SERVICES, INC.

ANALYTICAL & ENVIRONMENTAL CHEMISTS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE: (253) 922-2310 - FAX: (253) 922-5047

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.

Sound Analytical Services, Inc.
ANALYTICAL & ENVIRONMENTAL CHEMISTS
4813 Pacific Hwy East • Tacoma, WA 98424
(253) 922-2310 • FAX (253) 922-5047
e-mail: sainc1@uswest.net

3/4

SAS Lab No. 87081

TURNAROUND REQUEST (business days)
Standard (10 days) ✓
RUSH: 24 hrs ___ 48 hrs ___ 5 day ___

CHAIN OF CUSTODY/REQUEST FOR LABORATORY ANALYSIS

Client: Port of Tacoma
Project Name: Sea Land Terminal
Contact: Suzanne Dudziak
Phone No.: (253) 383-9453
Fax No.:
Email:

Analyses Requested

Lab Use Only	Sample ID	Date	Time	Matrix	# of Containers	NWTPH-D extended
	MW-1	1-27		W	2	✓
	MW-2	1-26		W	2	✓
	MW-3	1-27		W	2	✓

	Signature	Printed Name	Firm	Time/Date	Special Instructions
Relinquished By:	David Bair	David Bair	Geo Tech	1:22/1-27	
Received By	SGiang	Giang	SAS	1/27/00 1:23pm	Standard turnaround
Relinquished By:					
Received By					
Relinquished By:					
Received By					

COC No. _____ Page ____ of ____