



September 25, 2000

Anchorage

City Investors XIII, L.L.C.  
c/o Joe Delaney  
Foster Pepper Shefleman  
1111 Third Avenue, Suite 3400  
Seattle, WA 98101

Boston

**Re: Limited Soil and Groundwater Subsurface Assessment and  
Preliminary Remediation Cost Estimate  
Denny's Property  
966 Mercer Street  
Seattle, Washington  
J-7436**

Chicago

Denver

Dear Joe:

This letter report presents the results of our Limited Soil and Groundwater Subsurface Assessment and Preliminary Remediation Cost Estimate for the Denny's property located at 966 Mercer Street on the north side of Mercer Street in the South Lake Union area of Seattle, Washington. This report has been prepared in accordance with our contract order dated July 25, 2000. We understand that City Investors XIII, L.L.C., is in the process of purchasing the property for future redevelopment.

Fairbanks

Jersey City

**BACKGROUND AND REPORT ORGANIZATION**

Juneau

This Limited Soil and Groundwater Subsurface Assessment focused on the soil and groundwater on the subject property, to assess whether they have been adversely affected by past on-site and/or off-site uses. In particular, the service station (Unocal Station) located directly adjacent to the west had a known significant gasoline release in the early 1980s. Following this section our report begins with **FIELD ACTIVITIES, CHEMICAL RESULTS**, and **PRELIMINARY REMEDIATION COST ESTIMATE** sections followed by the **LIMITATIONS** section.

Long Beach

Figure 1 presents a Vicinity Map and Figure 2 a Site and Exploration Plan showing prominent subject property features and boring locations. Figure 3 illustrates the occurrence of TPH-G in the subsurface. Chemical results for site soil and groundwater samples are presented in Tables 1 and 2. Table 3 includes the Preliminary Cost Estimate for

Portland

Seattle



Remediation at the subject property. Appendix A presents the strataprobe boring logs for the field explorations. Appendix B contains the chemical data quality review and the Transglobal Environmental Geosciences Northwest, Inc. (TEG) chemistry laboratory reports.

The observed environmental impacts will likely result in additional costs during redevelopment of the property. Following the summary of results we present a remedial cost estimate based on preliminary development plans.

## **FIELD ACTIVITIES**

On August 29, 2000, nine Strataprobe borings, labeled B-1 and B-3 through B-10, were advanced by TEG, NW at locations shown on Figure 2. The borings were advanced to depths of 12 to 20 feet. Groundwater was encountered at depths between 10 and 13 feet. Boring logs are presented in Appendix A. The Hart Crowser field representative collected soil samples at continuous 4-foot-depth intervals and placed the samples in pre-cleaned headspace-free jars. Groundwater samples were collected from borings B-1, B-3, B-5, B-7, and B-10. Selected soil and groundwater samples were analyzed for the following constituents:

- ▶ Total petroleum hydrocarbons (TPH) by Ecology Method NWTPH-HCID;
- ▶ Gasoline-range petroleum (TPH-G) and BTEX by Ecology Method NWTPH-Gx/BTEX;
- ▶ Diesel-range petroleum (TPH-D) and oil-range petroleum (TPH-O) by Ecology Method NWTPH-Dx;
- ▶ Volatile organic compounds (VOCs) by EPA Method 8021B;
- ▶ Polycyclic aromatic hydrocarbons (PAHs) by EPA Method 8100; and
- ▶ Metals by EPA Method 7000 series.

The chemical analyses for soil and groundwater samples are summarized in Tables 1 and 2, respectively. Each soil sample was also screened for volatile organics using a photoionization detector (PID). PID readings are indicated on the boring logs. Low PID readings (less than 10) were observed in vadose-zone samples (0- to 4- and 4- to 8-foot-depth intervals) in the borings. PID readings above 10 were observed in borings B-1, B-3, B-4, B-6, and B-10 near water table.

## **Geology**

The downtown Seattle area is typically underlain by glacial till. Due to the close proximity to Lake Union, the subject property probable contains fill material overlying glacial till as describe below.





Based on materials encountered in our soil borings, subsurface conditions at the subject property generally consist of a surficial fill layer of gray silty sand and sandy gravel with trace of fill debris (brick, wood, glass) to depths of 12 to 18 feet. In the northern corner of the subject property an 8-inch peat zone was encountered in soil borings B-7, B-9, and B-10. Groundwater was generally encountered at depths of 10 to 13 feet below grade in the explorations and the inferred groundwater flow direction is to the north toward Lake Union.

## CHEMICAL RESULTS

Summaries of chemical results are presented in Table 1 for soil samples and in Table 2 for groundwater samples. The chemical data quality review and TEG laboratory certificates of analysis are provided in Appendix B.

Gasoline-range petroleum (TPH-G) was detected above Method A cleanup levels in groundwater and in saturated-zone soil under most of the property, as shown on Figure 3. The highest concentrations of TPH-G in soil (3,700 mg/kg) and groundwater (80 mg/L) occur along the northern property boundary. High TPH-G concentrations were also detected along the western property boundary (bordering the Unocal station). BTEX concentrations in soil and groundwater generally mirror TPH-G occurrences. The highest concentrations of BTEX were detected in B3-S3 for soil and B1 for groundwater samples, although benzene concentrations at B-1 in soil (not detected) and groundwater (0.29 mg/L) were proportionately less than other gasoline constituents compared to borings closer to the Unocal property.

Diesel-range petroleum was not detected in any of the soil or groundwater samples analyzed. Oil-range petroleum was detected in shallow soil in B-5 (280 mg/kg) above MTCA Method A cleanup levels.

Low concentrations of PAHs were detected in several soil and water samples; however, no carcinogenic PAHs were detected in the soil samples analyzed. The only VOC detection in a groundwater sample not associated with gasoline was of tetrachloroethene (210 ug/L) in boring B-1. This concentration is above the MTCA Method A cleanup level of 5 ug/L.

Low concentrations of chromium and lead were detected in the soil samples analyzed. However, none of the samples were above the MTCA Method cleanup levels. Arsenic, cadmium, chromium, lead, and mercury were detected above the MTCA Method A cleanup levels in groundwater samples B-1, B-3, B-7, and B-10. Since the samples were not filtered prior to analysis and groundwater samples collected from strataprobe borings typically



contain high concentrations of suspended solids, the reported concentrations are total metal concentrations and do not represent true dissolved metal concentrations.

## **PRELIMINARY REMEDIATION COST ESTIMATE**

The observed gasoline impacts on the Denny's property are likely due to the adjacent Unocal station to the west. The highest concentrations of gasoline are associated with groundwater or soil within the groundwater smear zone, suggesting groundwater transport of gasoline to the property. Isolated occurrences of oil-range petroleum in surface soils are likely the result of past site use. Field screening indicated that vadose zone soils may contain low concentrations of gasoline due to contaminant transport from the saturated zone or the adjacent site.

A preliminary cost estimate for remediation of the site is provided in Table 3. We estimate remediation of TPH-impacted soils will likely involve excavation and off-site disposal. Since redevelopment of the site will likely include excavating the site, we have included only the additional costs for handling and disposing of contaminated soils. Soils in the vadose zone that are impacted and possibly below MTCA cleanup levels will likely require more costly disposal than clean fill and an additional disposal charge for these soils is also included. Since future site use may include a subsurface parking garage, groundwater surrounding the parking garage will likely require continued remediation. The costs for treating and disposing of contaminated groundwater is included as capital and O&M costs for a groundwater pump and treat system.

## **LIMITATIONS**

Work for this project was performed, and this letter report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed, in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of City Investors XIII, L.L.C., for specific application to the subject property. Use of this report by City Investors XIII, L.L.C. is with the understanding that the limitations and terms and conditions of the contract between Hart Crowser and City Investors XIII, L.L.C. apply. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made. These cost estimates do not represent a bid to conduct this work and are provided for budget planning purposes only.

All MTCA cleanup levels included in this report are provided for comparison purposes only and are based on our understanding of cleanup levels required by Ecology for similar



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September 25, 2000

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projects. They do not represent MTCA interpretations. By using them for comparison purposes, we are not implying that remedial actions at this site are required under MTCA. Specific MTCA interpretations may involve separate calculations and determinations upon which a range of cleanup standards may be established by Ecology.

Any questions regarding our work and this letter report, the presentation of the information and the interpretation of the data are welcome and should be referred the undersigned.

We trust that this report meets your needs.

Sincerely,

**HART CROWSER, INC.**

**JEREMY PORTER**  
Senior Staff Engineer

**JULIE K. W. WUKELIC**  
Principal

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**Attachments:**

- Table 1 - Soil Chemical Analysis Summary
- Table 2 - Groundwater Chemical Analysis Summary
- Table 3 - Preliminary Cost Estimate for Remediation
- Figure 1 - Vicinity Map
- Figure 2 - Site and Exploration Plan
- Figure 3 - TPH-G Occurrence in the Subsurface
- Appendix A - Strataprobe Boring Logs

Appendix B - Chemical Data Quality Review  
and Certificates of Analysis  
Transglobal Environmental Geosciences Northwest, Inc.  
and Sound Analytical Services, Inc.

**Table 1 - Soil Chemical Analysis Summary**

Sample Location	MTCA Method A Residential	MTCA Method B	B1-S1	B1-S2	B1-S3	B3-S1	B3-S2	B3-S3	B4-S2	B4-S3
<b>NWTPH-HCID in mg/kg</b>										
Gasoline	100	NA	20 U	20 U		20 U	20 U			20 U
Mineral Spirits/Stoddard Solvent	100	NA	20 U	20 U		20 U	20 U			20 U
Kensol	200	NA	20 U	20 U		20 U	20 U			20 U
Kerosene/Jet Fuel	200	NA	20 U	20 U		20 U	20 U			50 U
Diesel/Fuel Oil	200	NA	50 U	50 U		50 U	50 U			20 U
Bunker C	200	NA	50 U	50 U		50 U	50 U			50 U
Heavy Oil	200	NA	100 U	100 U		100 U	100 U			100 U
Unidentifiable Petroleum	200	NA	20 U	20 U		>20	20 U			20 U
<b>NWTPH-Gx in mg/kg</b>										
Gasoline	100	NA			3700			3400	12	
Stoddard Solvent/Mineral Spirits	100	NA			5 U			5 U	5 U	
<b>NWTPH-Dx in mg/kg</b>										
Kerosene/Jet Fuel	200	NA			20 U			20 U	20 U	
Diesel/Fuel Oil	200	NA			20 U			20 U	20 U	
Heavy Oil	200	NA			50 U			50 U	50 U	
<b>Volatile Organics in <del>mg/kg</del> <span style="border: 1px solid red; padding: 2px;">µg/kg</span></b> (detected constituents only)										
Benzene	0.5	34.5			50 U			2700	50 U	
Toluene	40	16000			1000			20000	250	
Ethylbenzene	20	8000			17000			59000	210	
Xylenes	20	160000			99000			240000	1100	
<b>Polycyclic Aromatic Hydrocarbons (PAH) in mg/kg</b> (detected constituents only)										
Fluoranthene	NA	3200		0.1 U	0.1 U	0.98		0.1 U	0.1 U	
Phenanthrene	NA	NA		0.1 U	0.1 U	1.5		0.1 U	0.1 U	
Pyrene	NA	2400		0.1 U	0.1 U	1.2		0.1 U	0.1 U	
<b>Total Metals in mg/kg</b>										
Arsenic	20	1.67			5 U			5 U		
Barium	NA	5600			50 U			50 U		
Cadmium	2	80			1 U			1 U		
Chromium	100	NA			51			29		
Lead	250	NA			12			25		
Mercury	1	24			0.1 U			0.1 U		
Selenium	NA	400			50 U			50 U		
Silver	NA	400			20 U			20 U		

Table 1 - Soil Chemical Analysis Summary

Hart Crowser  
1-7436

Sample Location	MTCA Method A Residential	MTCA Method B	B5-S1	B5-S2	B5-S3	B6-S1	B6-S2	B6-S3	B7-S1	B7-S2	B7-S3
<b>NWTPH-HCID in mg/kg</b>											
Gasoline	100	NA	20 U		20 U	20 U	20 U	20 U	20 U	20 U	
Mineral Spirits/Stoddard Solvent	100	NA	20 U		20 U	20 U	20 U	20 U	20 U	20 U	
Kensol	200	NA	20 U		20 U	20 U	20 U	20 U	20 U	20 U	
Kerosene/Jet Fuel	200	NA	20 U		20 U	20 U	20 U	20 U	20 U	20 U	
Diesel/Fuel Oil	200	NA	50 U		50 U	50 U	50 U	50 U	50 U	50 U	
Bunker C	200	NA	50 U		50 U	50 U	50 U	50 U	50 U	50 U	
Heavy Oil	200	NA	280		100 U	100 U	100 U	100 U	100 U	100 U	
Unidentifiable Petroleum	200	NA	20 U		20 U	20 U	20 U	20 U	20 U	20 U	
<b>NWTPH-Gx in mg/kg</b>											
Gasoline	100	NA		5 U				6200			1500
Stoddard Solvent/Mineral Spirits	100	NA		5 U				5 U			5 U
<b>NWTPH-Dx in mg/kg</b>											
Kerosene/Jet Fuel	200	NA		20 U							20 U
Diesel/Fuel Oil	200	NA		20 U							20 U
Heavy Oil	200	NA		50 U							50 U
<b>Volatile Organics in mg/kg <span style="border: 1px solid red; padding: 2px;">µg/kg</span> (detected constituents only)</b>											
Benzene	0.5	34.5		50 U				2300			220
Toluene	40	16000		50 U				6900			260
Ethylbenzene	20	8000		50 U		50 U		21000			790
Xylenes	20	160000		50 U		50 U		400000			74000
<b>Polycyclic Aromatic Hydrocarbons (PAH) in mg/kg (detected constituents only)</b>											
Fluoranthene	NA	3200		0.1 U			0.1 U				0.1 U
Phenanthrene	NA	NA		0.1 U			0.1 U				0.1 U
Pyrene	NA	2400		0.1 U			0.1 U				0.1 U
<b>Total Metals in mg/kg</b>											
Arsenic	20	1.67						5 U			5 U
Barium	NA	5600						50 U			50 U
Cadmium	2	80						1 U			1 U
Chromium	100	NA						33			42
Lead	250	NA						14			5 U
Mercury	1	24						0.1 U			0.1 U
Selenium	NA	400						50 U			50 U
Silver	NA	400						20 U			20 U

Table 1 - Soil Chemical Analysis Summary

Hart Crowser  
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Sample Location	MTCA Method A Residential	MTCA Method B	B7-S4	B8-S1	B8-S3	B9-S2	B9-S3	B10-S2	B10-S3	B10-S4	B10-S5
<b>NWTPH-HCID in mg/kg</b>											
Gasoline	100	NA	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Mineral Spirits/Stoddard Solvent	100	NA	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Kensol	200	NA	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Kerosene/Jet Fuel	200	NA	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Diesel/Fuel Oil	200	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Bunker C	200	NA	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Heavy Oil	200	NA	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U
Unidentifiable Petroleum	200	NA	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
<b>NWTPH-Gx in mg/kg</b>											
Gasoline	100	NA			5 U						
Stoddard Solvent/Mineral Spirits	100	NA			5 U						
<b>NWTPH-Dx in mg/kg</b>											
Kerosene/Jet Fuel	200	NA									
Diesel/Fuel Oil	200	NA									
Heavy Oil	200	NA									
<b>Volatile Organics in <del>mg/kg</del> <span style="border: 1px solid red; padding: 2px;">µg/kg</span> (detected constituents only)</b>											
Benzene	0.5	34.5			50 U						
Toluene	40	16000			50 U						
Ethylbenzene	20	8000			50 U						
Xylenes	20	160000			50 U						
<b>Polycyclic Aromatic Hydrocarbons (PAH) in mg/kg (detected constituents only)</b>											
Fluoranthene	NA	3200			0.1 U	0.1 U			0.1 U		0.1 U
Phenanthrene	NA	NA			0.1 U	0.1 U			0.1 U		0.1 U
Pyrene	NA	2400			0.1 U	0.1 U			0.1 U		0.1 U
<b>Total Metals in mg/kg</b>											
Arsenic	20	1.67						5 U			
Barium	NA	5600						50 U			
Cadmium	2	80						1 U			
Chromium	100	NA						42			
Lead	250	NA						36			
Mercury	1	24						0.1 U			
Selenium	NA	400						50 U			
Silver	NA	400						20 U			

U Not detected at detection limit indicated.  
J Estimated value.

NA Not Applicable  
Blank indicates sample not analyzed for analyte.

**Table 2 - Groundwater Chemical Analysis Summary**

	MTCA Method A	MTCA Method B	B-1 11 8/29/2000	B-3 10 8/29/2000	B-5 10 8/29/2000	B-7 12 8/29/2000	B-10 12 8/29/2000
<b>Groundwater Depth in Feet</b>							
<b>Date Sampled</b>							
<b>NWTPH-G in mg/L</b>							
Mineral Spirits/Stoddard Solvent	1	NA	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Gasoline	1	NA	80	1.3	1.1	21	0.92
<b>NWTPH-Dx in mg/L</b>							
Kerosene/Jet Fuel	1	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Diesel/Fuel Oil	1	NA	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Heavy Oil	1	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
<b>Volatile Organics in µg/L</b>							
Tetrachloroethene	5	0.858	210	1 U	1 U	1 U	1 U
Benzene	5	1.51	290	47	11	1000	1 U
Toluene	40	1600	2400	45	1 U	520	1 U
Ethylbenzene	30	800	1700	37	6.8	630	1 U
Xylenes	20	16000	13000	170	10	2400	2.8
<b>Polycyclic Aromatic Hydrocarbons (PAH) in mg/L</b>							
Naphthalene		320	490	2 U		2 U	2 U
<b>Total Metals in mg/L</b>							
Arsenic	0.005	0.0000053	0.21	0.087		0.17	0.033
Barium	NA	1.12	6.4	1.2		6.1	0.46
Cadmium	0.005	0.016	0.028	0.0082		0.024	0.003 U
Chromium	0.05	NA	1.3	0.062		2	0.091
Mercury	0.002	0.0048	0.0021 J	0.00065 J		0.0046 J	0.0003 J
Lead	0.005	NA	3.8	2.7		1.7	0.13
Selenium	NA	0.08	0.05 U	0.05 U		0.05	0.05 U
Silver	NA	0.08	0.011	0.0013		0.01	0.0011

U Not detected at detection limit indicated.

NA Not Analyzed

Blank indicates sample not analyzed for analyte.



**Table 3 - Preliminary Cost Estimate for Remediation**

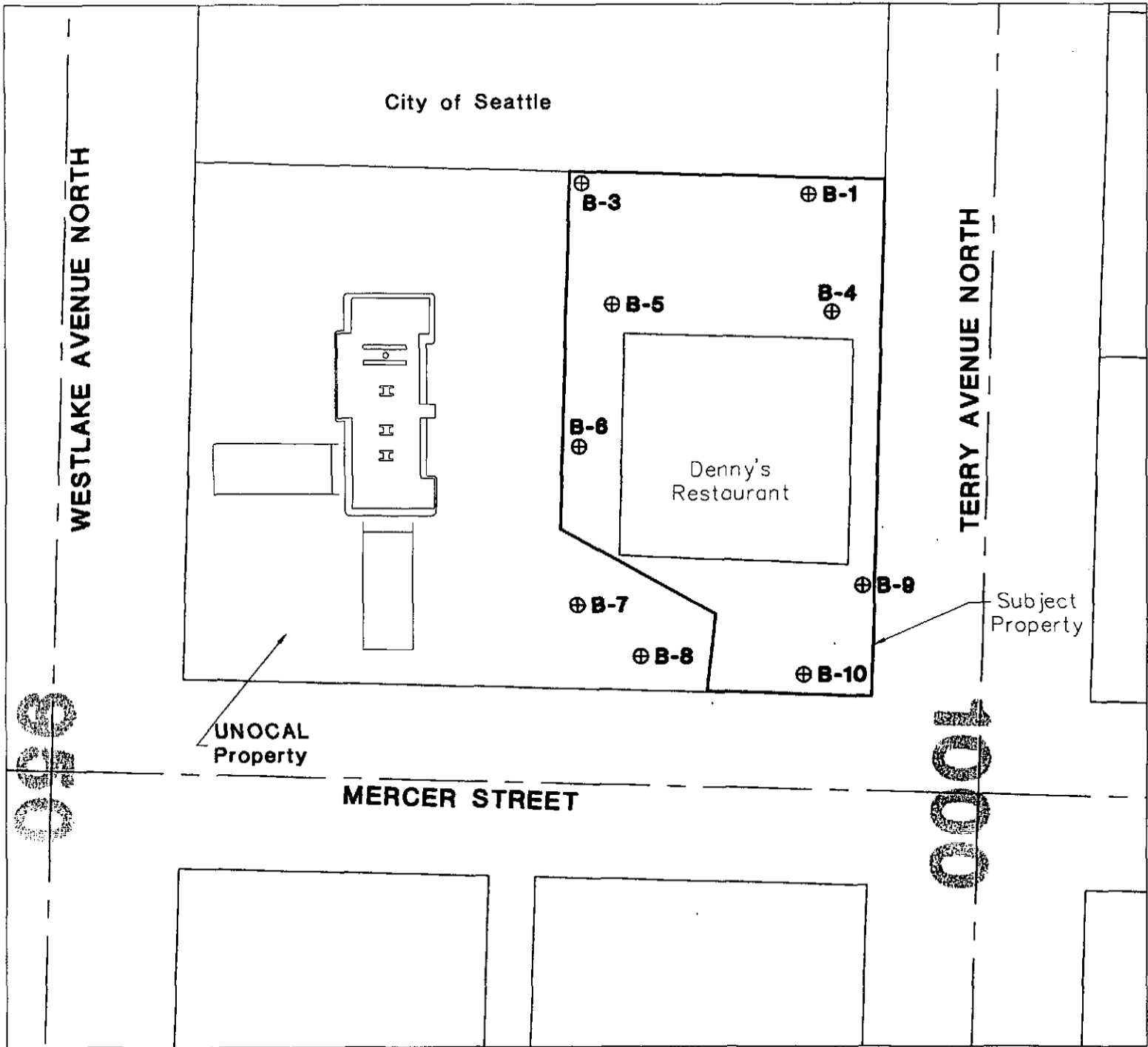
Description	Unit	Unit Cost	Quantity	Extended Cost	
<b>REMOVAL OF TPH-IMPACTED SOIL</b>					
Dewatering and disposal of contaminated groundwater	gal	\$ 0.20	40,000	\$ 8,000	
Load/haul contaminated soil	ton	\$ 6.00	2,432	\$ 14,592	
Disposal of contaminated soil	ton	\$ 25.00	2,432	\$ 60,800	
Load/haul marginally contaminated soil (below MTCA Method A)	ton	\$ 6.00	1,459	\$ 8,755	
Disposal of marginally contaminated soil (below MTCA Method A)	ton	\$ 10.00	1,459	\$ 14,592	
<b>Subtotal</b>					<b>\$ 106,739</b>
<b>FIELD AND ENGINEERING SUPPORT</b>					
Field observation, sampling, lab analysis					<b>\$ 8,000</b>
Management, design and reporting					<b>\$ 10,000</b>
<b>GROUNDWATER REMEDIATION</b>					
Groundwater extraction and treatment - capital cost	LS	\$ 150,000.00	1	\$ 150,000	
Engineering services (20% of capital cost)				\$ 30,000	
					<b>\$ 180,000</b>
<b>ANNUAL COSTS</b>					
O&M	1000 gal	\$ 5.00	5000	\$ 25,000	
Monitoring and reporting	LS	\$ 20,000.00	1	\$ 20,000	
<b>Subtotal</b>				<b>\$ 45,000</b>	
Present value, 20-year lifetime (assume 8% discount rate)					<b>\$ 441,817</b>
<b>Based on Contingency (20%)</b>					<b>\$ 149,320</b>
<b>TOTAL COST</b>					<b>\$ 895,900</b>

Notes:

- The costs shown have a nominal accuracy of roughly +50%/-30% due to uncertainties such as the extent of excavation required, and the duration of operation and monitoring required.
- Other construction costs, including excavation and backfilling, are not included.
- Assumes depth to water 11 feet; excavation depth 12 feet.
- Groundwater remediation assumes SVE system operating on adjacent property.
- O&M costs include carbon treatment followed by discharge to the sanitary sewer.
- Groundwater remediation assumes 10 gpm flowrate.
- Assumes 20% of soil above 9 feet above impacted smear zone will be unacceptable as clean fill.



# Site and Exploration Plan



UNOCAL  
Property

Subject  
Property

MERCER STREET

B-1 ⊕ Boring Location and Number

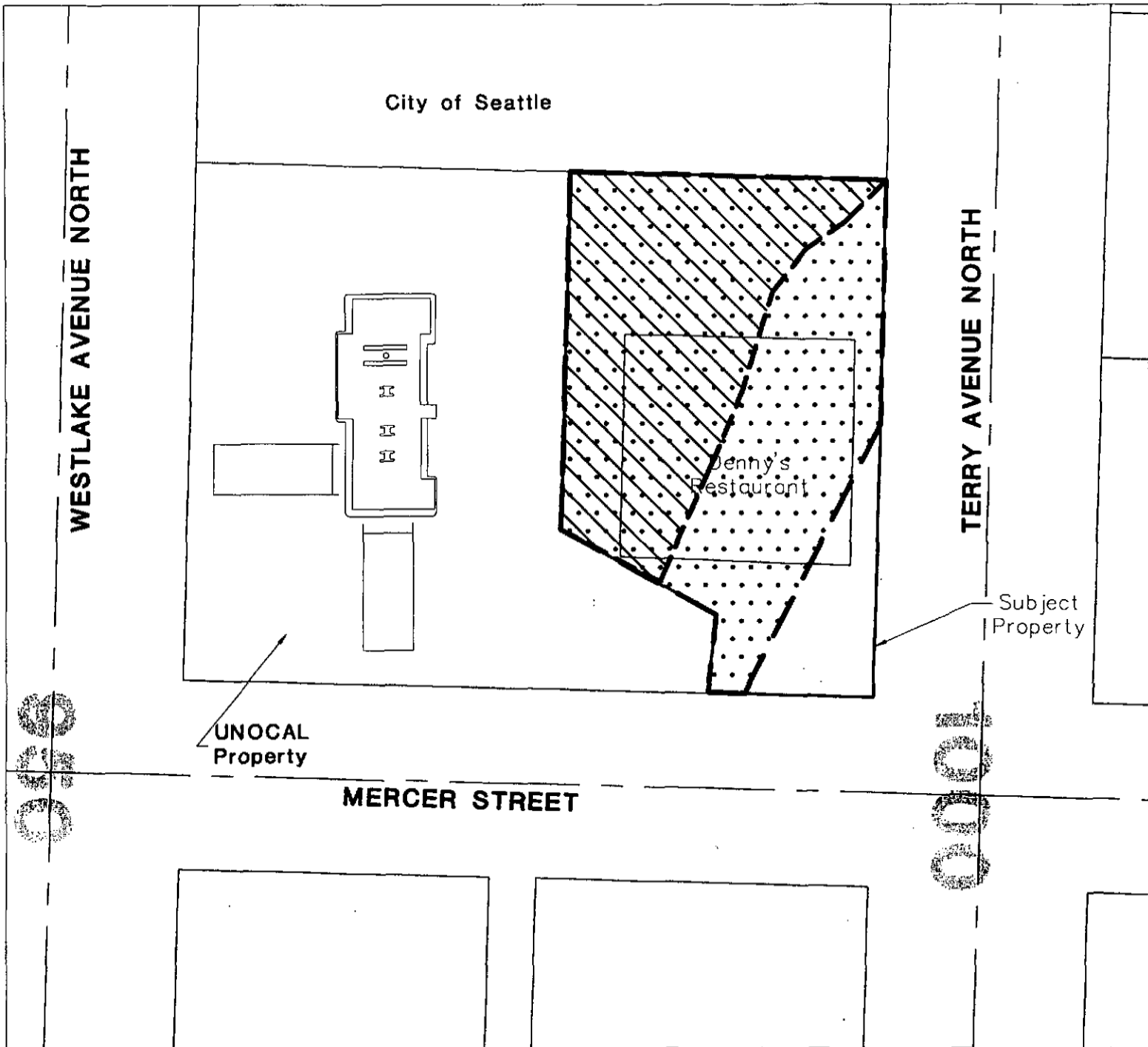
0 50 100  
Scale in Feet

D:\N 9/25/00 1=100 charlie.pc2  
74360102



  
**HARTCROWSER**  
J-7436 9/00  
Figure 2

# TPH-G Occurrence in the Subsurface



Boring Location and Number



Estimated area of soil on subject property with a TPH-G concentration above 100 mg/kg in groundwater smear zone. (approximately 9 to 12 feet deep)



Estimated area of groundwater on subject property with a TPH-G concentration above 1 mg/L.

D:\N 10/25/00 1=100 charlie.pc2  
74360101



0 50 100  
Scale in Feet

**HARTCROWSER**  
J-7436 9/00  
Figure 3



**APPENDIX A**  
**STRATAPROBE BORING LOGS**

# Key to Exploration Logs

## Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:

Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

### Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.

Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Density		Consistency		
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

### Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

### Minor Constituents

Estimated Percentage

Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

## Legends

### Sampling Test Symbols

#### BORING SAMPLES

- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- \* No Sample Recovery
- P Tube Pushed, Not Driven

#### TEST PIT SAMPLES

- Grab (Jar)
- Bag
- Shelby Tube

### Test Symbols

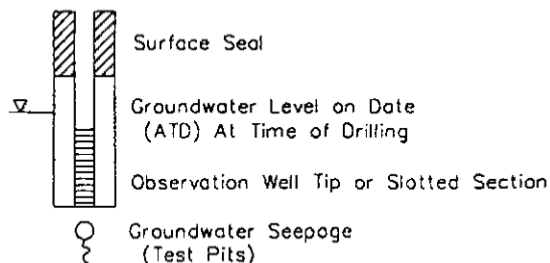
- GS Grain Size Classification
  - CN Consolidation
  - JU Unconsolidated Undrained Triaxial
  - CU Consolidated Undrained Triaxial
  - CD Consolidated Drained Triaxial
  - QU Unconfined Compression
  - DS Direct Shear
  - K Permeability
  - PP Pocket Penetrometer  
Approximate Compressive Strength in TSF
  - TV Torvane  
Approximate Shear Strength in TSF
  - CBR California Bearing Ratio
  - MD Moisture Density Relationship
  - AL Atterberg Limits
- Water Content in Percent

Liquid Limit

Natural

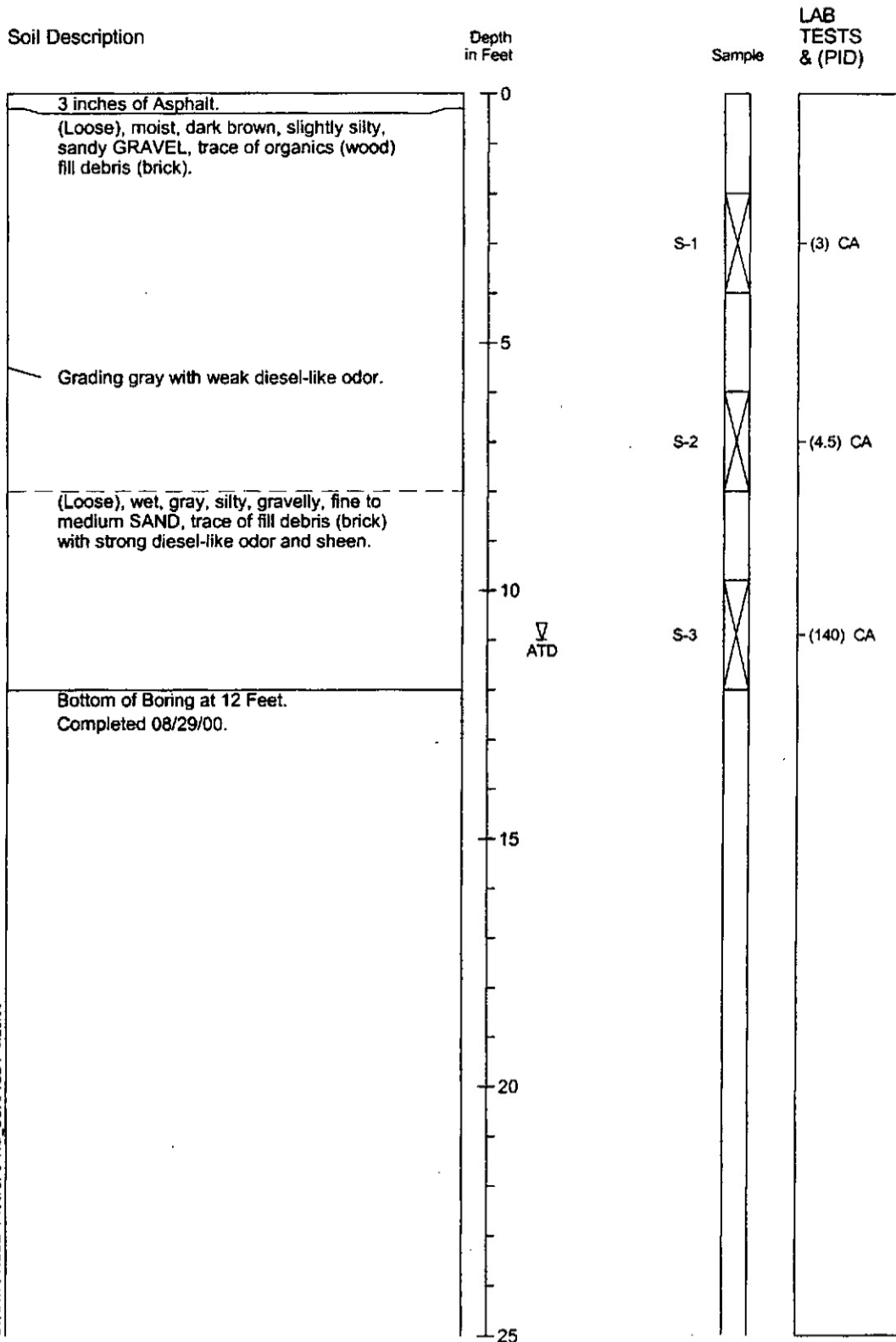
Plastic Limit
- PID Photoionization Detector Reading
  - CA Chemical Analysis
  - DT In Situ Density Test

### Groundwater Observations



1=1 BORING1.DWG

# Strataprobe Boring Log B-1



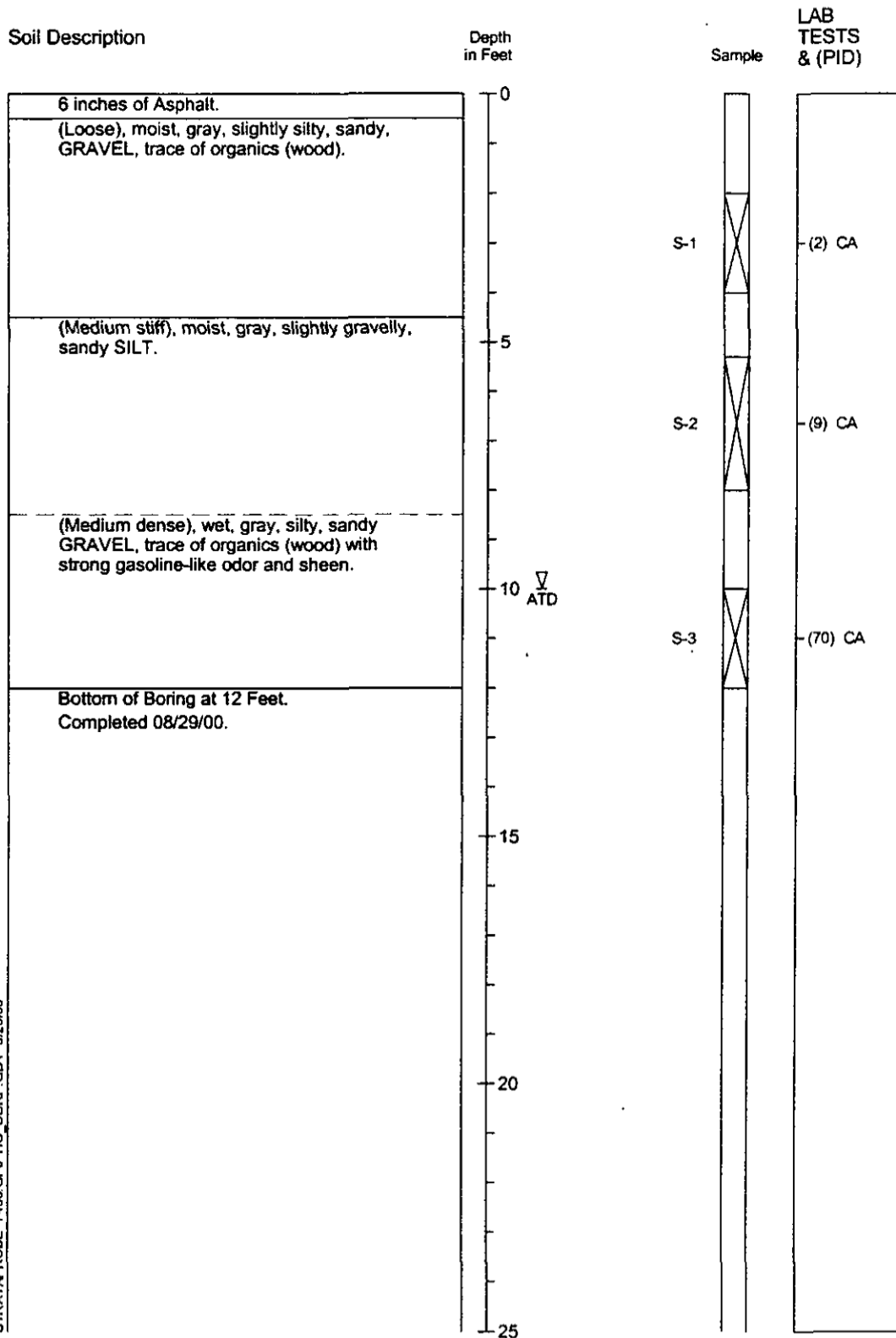
STRATAPROBE 7436 GPJ HC CORP. GDT 9/25/00

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.





# Strataprobe Boring Log B-3



STRATAPROBE 7436.GPJ HC CORP.GDT 8/25/00

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

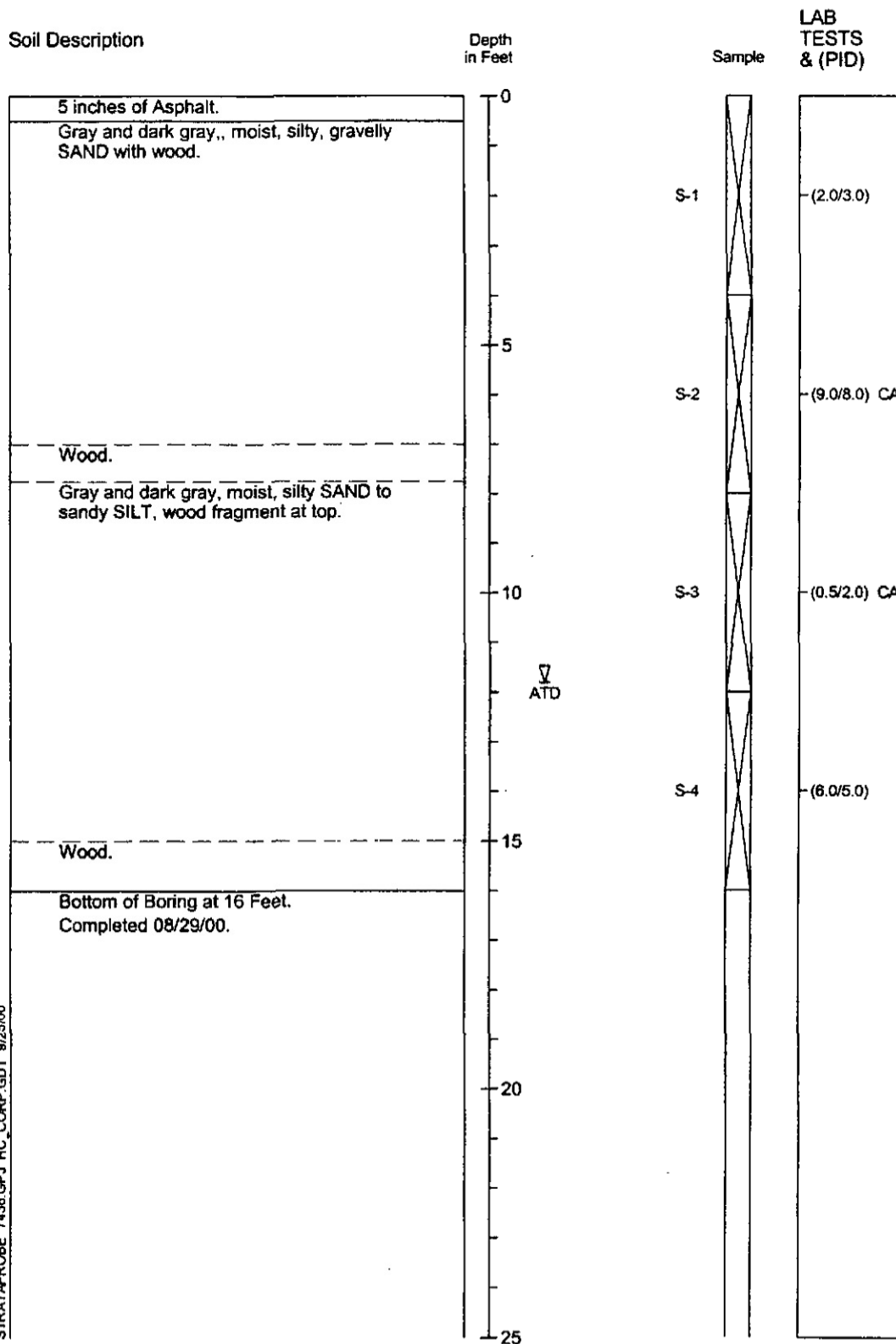


J-7436

08/00

Figure A-3

# Strataprobe Boring Log B-4



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

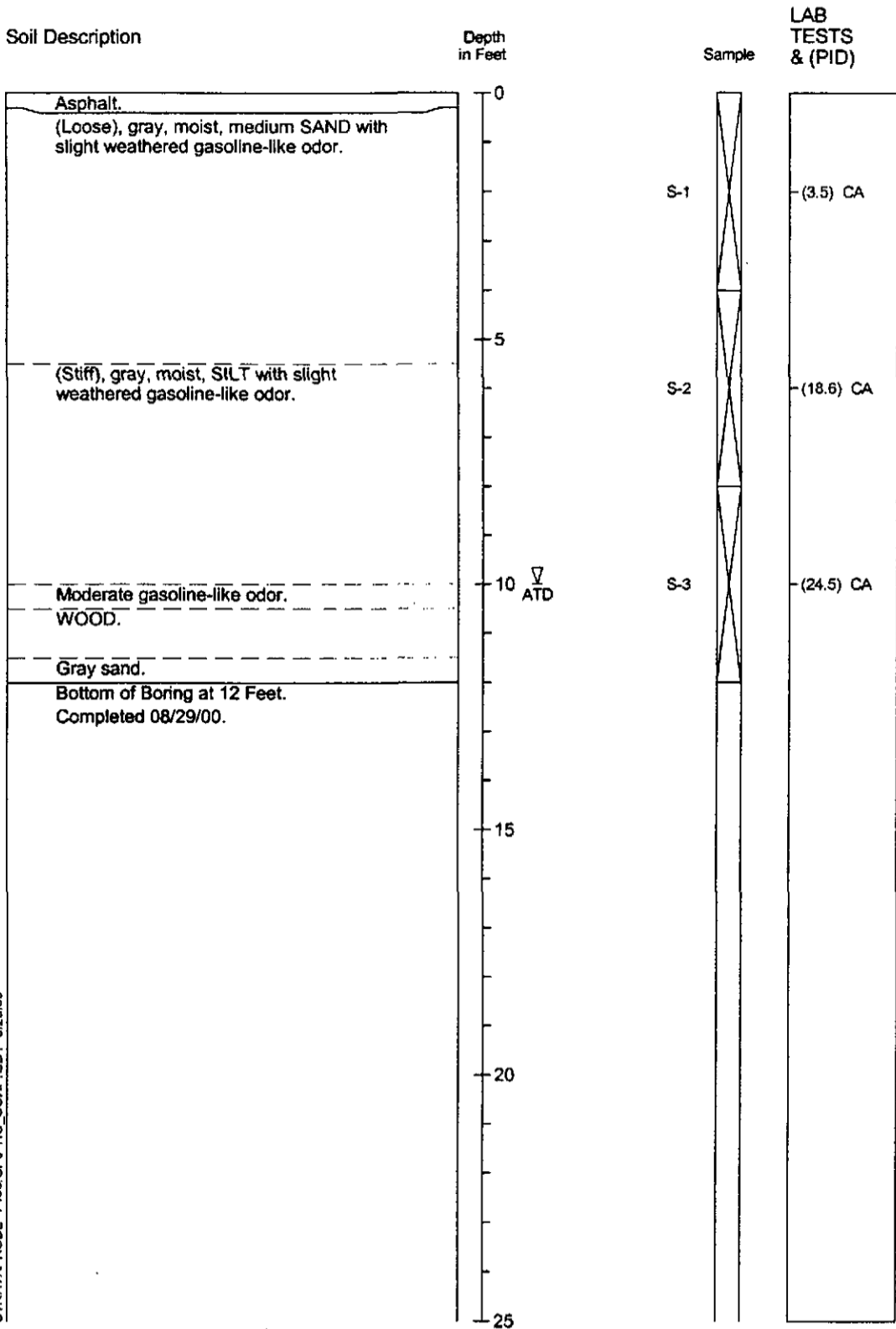
**HARTCROWSER**

J-7436

08/00

Figure A-4

# Strataprobe Boring Log B-5



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

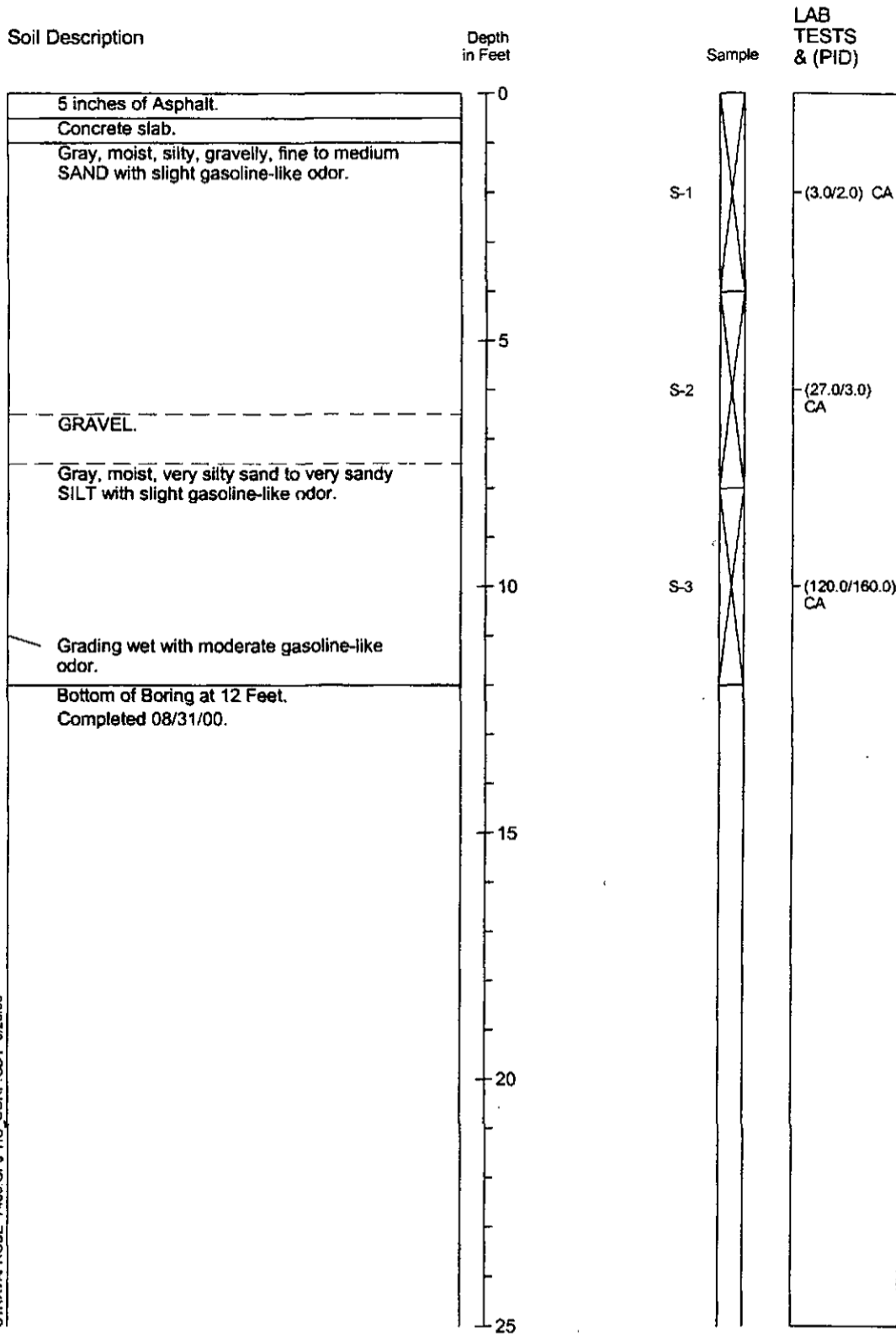


J-7436

08/00

Figure A-5

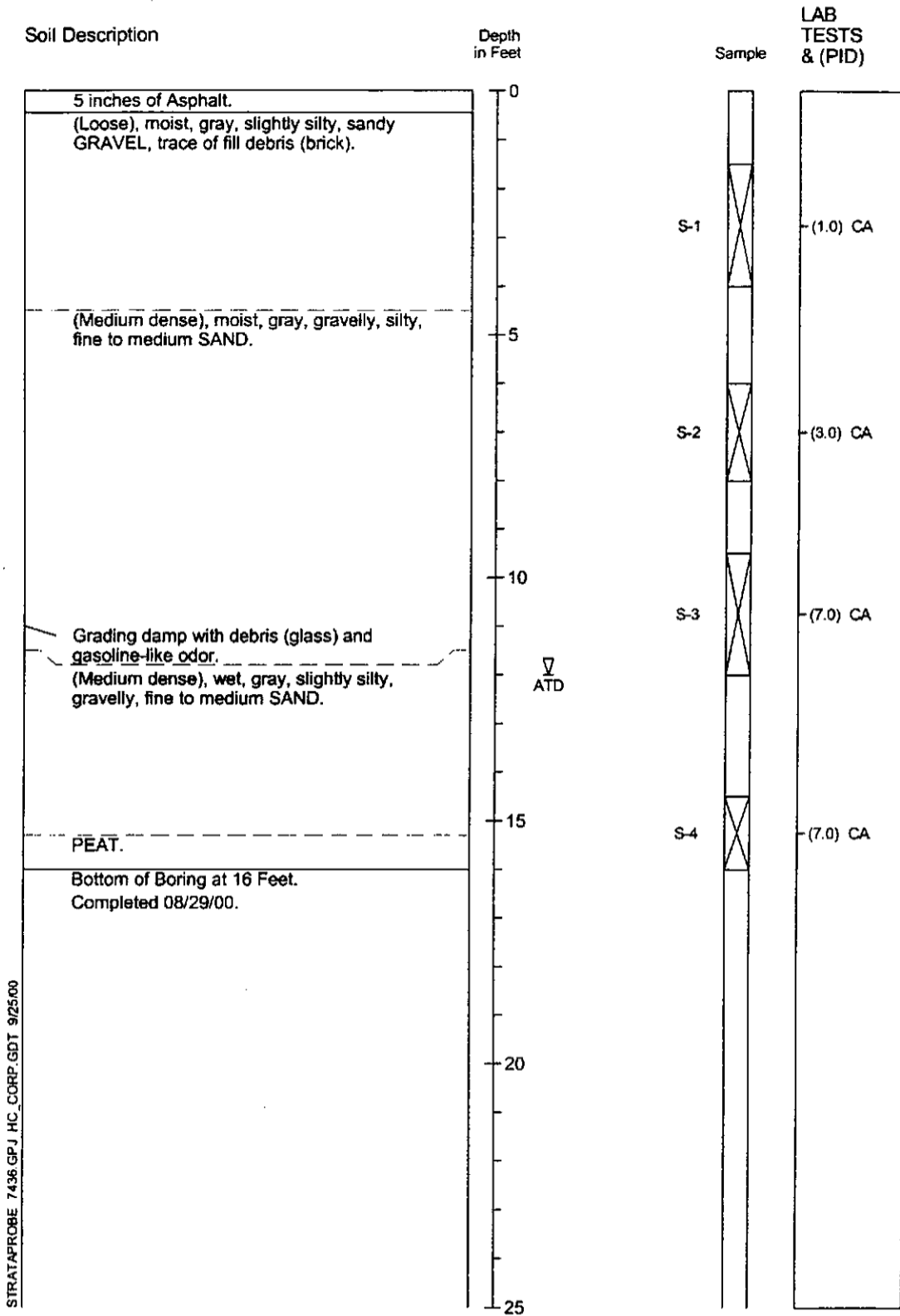
# Strataprobe Boring Log B-6



STRATAPROBE 7436.GPJ HC\_CDRP.GDT 9/25/00

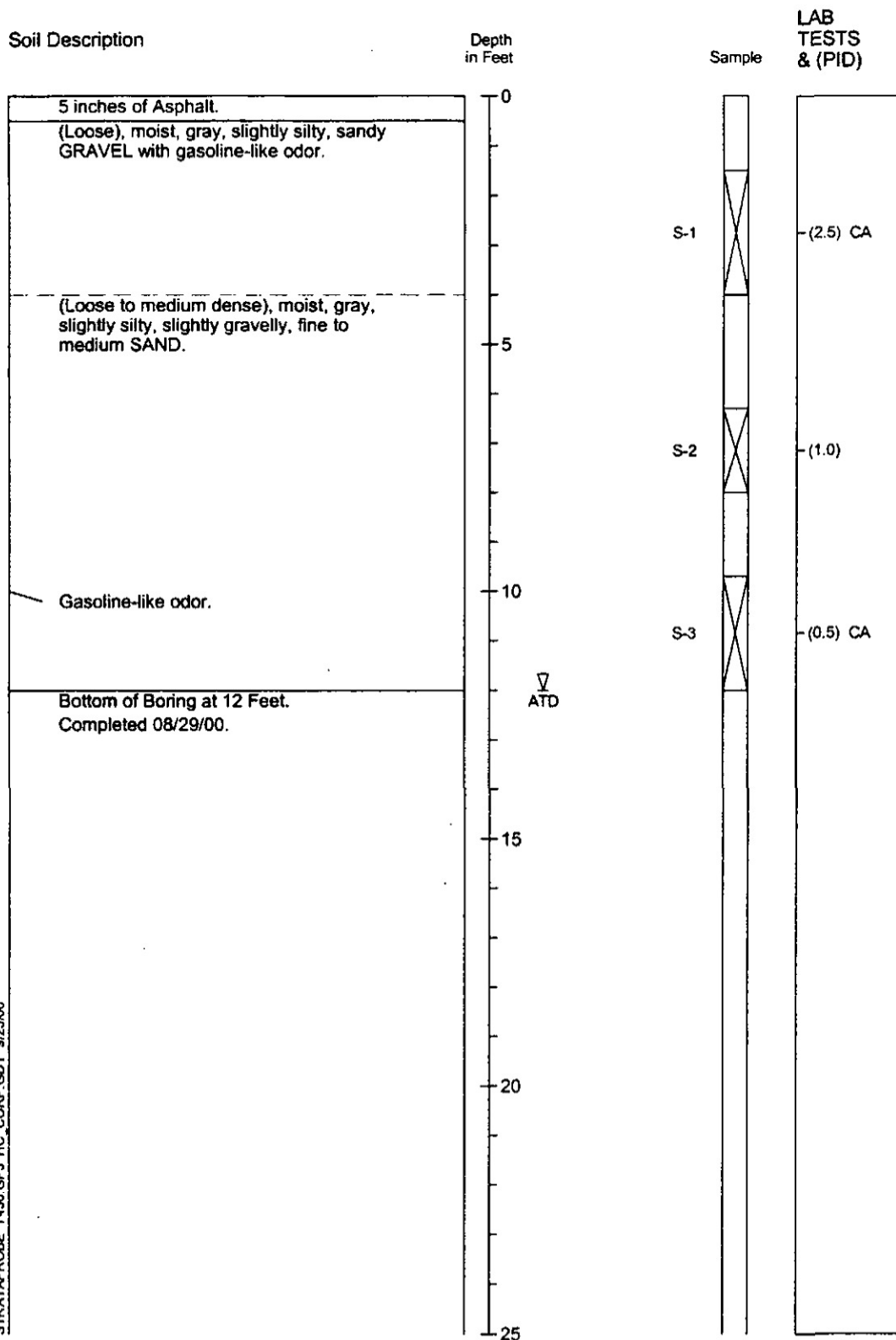
1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

# Strataprobe Boring Log B-7



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

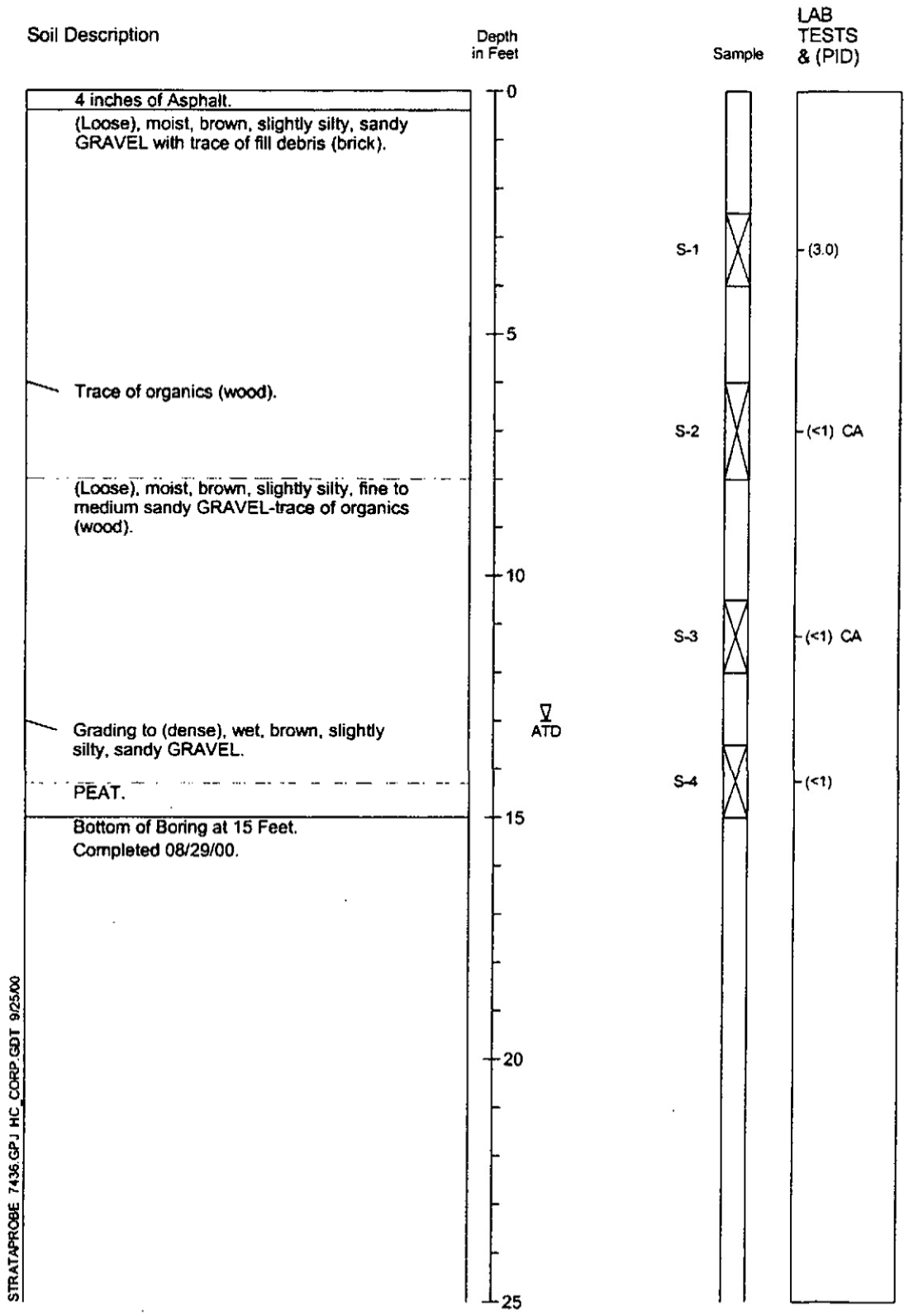
# Strataprobe Boring Log B-8



STRATAPROBE 7436 GPJ HC CORP. GDT 9/25/00

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

# Strataprobe Boring Log B-9

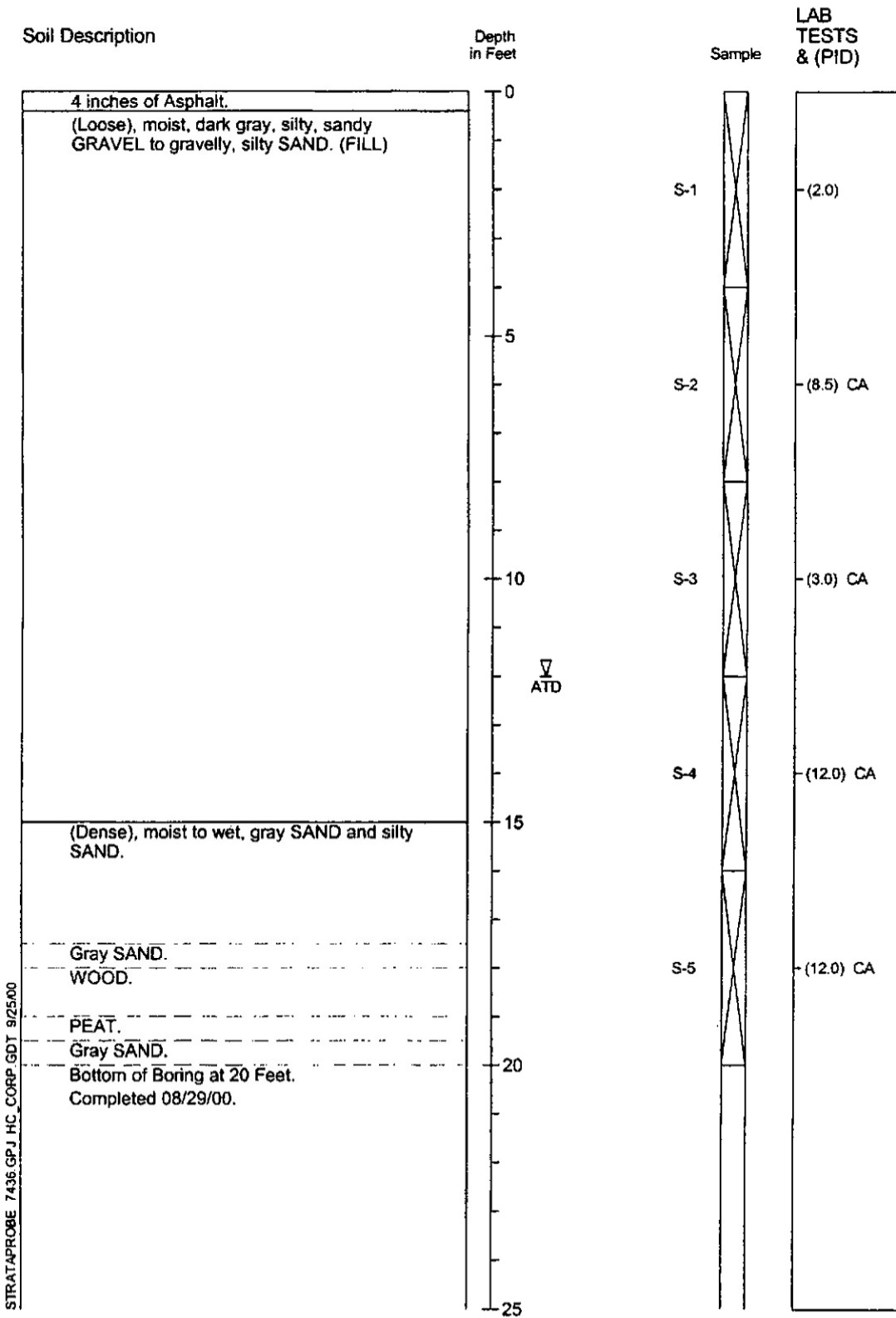


STRATAPROBE 7436.GPJ HC CORP.GDT 9/25/00

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



# Strataprobe Boring Log B-10



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.



**APPENDIX B  
CHEMICAL DATA QUALITY REVIEW  
AND CERTIFICATES OF ANALYSIS**



## APPENDIX B CHEMICAL DATA QUALITY REVIEW AND CERTIFICATES OF ANALYSIS

Twenty-six soil and five groundwater samples were collected on August 29, 2000. The samples were submitted to Transglobal Environmental Geosciences NW, Inc. of Lacey, WA for analysis of the following:

- ▶ Total Metals (EPA Method 7000 Series);
- ▶ NWTPH-G/BTEX;
- ▶ NWTPH-Dx;
- ▶ NWTPH-HCID;
- ▶ Volatile Organics (EPA Method 8021B); and
- ▶ PAHs (EPA Method 8100).

The following criteria were evaluated in the standard data quality review process for the results:

- ▶ Holding Times;
- ▶ Method Blanks;
- ▶ Surrogate Recoveries;
- ▶ Blank Spike/Blank Spike Duplicate (BS/BSD) and Laboratory Control Sample Recoveries;
- ▶ Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries;
- ▶ Laboratory Duplicate Relative Percent Differences (RPDs); and
- ▶ Reporting Limits.

### ***Soil Samples***

**Total Metals.** All required holding times were met. No method blank contamination was detected. MS/MSD recoveries were within laboratory control limits. Laboratory duplicate RPDs were also acceptable.

**NWTPH-G/BTEX.** All required holding times were met. No method contamination was detected. Surrogate recovery of bromofluorobenzene coeluted with sample peaks in B1-S3, B6-S3, and B7-S3. No qualifiers were assigned since remaining recovery was acceptable. LCS and MS/MSD recoveries were within laboratory control limits. Laboratory duplicate RPDs were also acceptable.

**NWTPH-Dx/ HCID.** All required holding times were met. No method blank contamination was detected. Surrogate of terphenyl in HCID coeluted with sample peak in B1-S1 and B6-S2. No qualifiers were assigned since remaining recovery was acceptable. Laboratory duplicate RPDs were acceptable.

**Volatile Organics.** All required holding times were met. No method blank contamination was detected. Surrogate, LCS, and MS/MSD recoveries were within laboratory control limits.

**PAHs.** All required holding times were met. No method blank contamination was detected. Surrogate and LCS recoveries were within laboratory control limits.

### **Groundwater Samples**

**Total Metals.** All required holding times were met. No method blank contamination was detected. MS recovery of mercury was below laboratory control limits. Sample results were qualified as estimated (UJ/J). MS recovery of selenium was above control limits. No qualifiers were assigned since MS was not done on project specific samples and BS recovery was acceptable. Laboratory duplicate RPD for mercury was above control limits. The results were already qualified based on MS recovery.

**NWTPH-G/BTEX.** All required holding times were met. No method blank contamination was detected. Surrogate recoveries of bromofluorobenzene coeluted with sample peaks in B-1. No qualifiers were assigned since remaining recovery was acceptable. LCS and MS/MSD recoveries were within laboratory control limits. Laboratory duplicate RPDs were also acceptable.

**NWTPH-Dx/ HCID.** All required holding times were met. No method blank contamination was detected. Laboratory duplicate RPDs were acceptable.

**Volatile Organics.** All required holding times were met. No method blank contamination was detected. Surrogate recovery of bromofluorobenzene coeluted with sample peaks in B-1. No qualifiers were assigned since remaining recovery was acceptable. LCS and MS/MSD recoveries were within laboratory control limits.

**PAHs.** All required holding times were met. No method blank contamination was detected. Surrogate and LCS recoveries were within laboratory control limits.

The data, as qualified, are acceptable for use.

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**CERTIFICATES OF ANALYSIS  
TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.  
AND SOUND ANALYTICAL SERVICES, INC.**

# TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

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

Mobile Environmental Laboratories  
Environmental Sampling Services

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

September 18, 2000

Julie Wukelic  
Hart Crowser, Inc.  
1910 Fairview Ave. E  
Seattle, WA 98102-3699

Dear Ms. Wukelic:

Please find enclosed the analytical data report for the Denny's Project in Seattle, Washington. Soil and water samples were analyzed for Hydrocarbon Identification by NWTPH-HCID, Diesel and Oil by NWTPH-Dx/Dx Extended, Gasoline by NWTPH-Gx, Specific Halogenated Hydrocarbons & BTEX by Method 8021B, PAH's by Method 8100 and RCRA 8 Metals by Methods 6010/6020 and 7000 series on September 7 - 12, 2000.

The results of these analyses are summarized in the attached tables. All soil values are reported on a dry weight basis. Applicable detection limits and QA/QC data are included. An invoice for this work has been sent to your accounting department.

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

Sincerely,



Michael A. Korosec  
*President*



## QA/QC FOR ANALYTICAL METHODS

### GENERAL

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

When analyses are taking place on-site with the mobile lab, the need for Field Blanks or Travel/Trip Blanks is eliminated. If there is going to be a delay before sample preparation for analysis, the sample is stored at 4<sup>0</sup> C.

### ANALYTICAL METHODS

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

#### **TPH-Gasoline, TPH-Diesel**

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

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

**Purgeable Volatile Aromatics  
(BTEX, EPA 8021B)**

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

**TPH-Hydrocarbon Identification  
(NWTPH-HCID)**

Calibration standards are run at the beginning of the day. The standards must be within 15% of the continuing calibration curve value. Check standards are run at the close of the day. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135%. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

**Purgeable Volatile Halocarbons  
(Chlorinated Hydrocarbons, EPA 601/8021B)**

A calibration standard is run at the beginning of the day. The standard must be within 15% of the continuing calibration curve value. The standard is rerun at the end of the day. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135%. At least 1 method blank is run per day.

**PAH, Polynuclear Aromatic Hydrocarbons  
(EPA 8100)**

A check standard is run at the beginning of the day. The standard must be within 15% of the continuing calibration curve value. The check standard is run at the end of the day. All samples are prepared with a surrogate spike, and the recovery must be between 65% and 135%. A duplicate sample is run at a rate of 1 per 10 samples. At least 1 method blank is run per 20 samples analyzed.

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

NWTPH-Gx / BTEX		MTH BLK	LCS	B1-S3	B3-S3	B4-S2	B5-S2
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %				15%	15%	15%	

NWTPH-Gx, mg/kg

Mineral spirits/Stoddard solvent	5.0	nd		nd	nd	nd	nd
Gasoline	5.0	nd		3,700	3,400	12	nd

BTEX, ug/kg

Benzene	50	nd	78%	nd	2,700	nd	nd
Toluene	50	nd	83%	1,000	20,000	250	nd
Ethylbenzene	50	nd		17,000	59,000	210	nd
Xylenes	50	nd		99,000	240,000	1,100	nd

Surrogate recoveries:

Trifluorotoluene		84%	97%	102%	93%	93%	88%
Bromofluorobenzene		88%	97%	C	94%	94%	97%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results		MS	MSD	RPD			
NWTPH-Gx / BTEX		B5-S2	B5-S2	B5-S2	B6-S3	B7-S3	B8-S3
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %					15%	15%	

**NWTPH-Gx, mg/kg**

Mineral spirits/Stoddard solvent	5.0				nd	nd	nd
Gasoline	5.0				6,200	1,500	nd

**BTEX, µg/kg**

Benzene	50	82%	74%	10%	2,300	220	nd
Toluene	50	88%	78%	12%	6,900	260	nd
Ethylbenzene	50				21,000	790	nd
Xylenes	50				400,000	74,000	nd

**Surrogate recoveries:**

Trifluorotoluene		87%	70%		119%	98%	86%
Bromofluorobenzene		89%	82%		C	C	87%

**Data Qualifiers and Analytical Comments**

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
(425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
Client: HART CROWSER  
Client Job Name: DENNY'S  
Client Job Number: 7436

Analytical Results		DUPL
<b>NWTPH-Gx / BTEX</b>		<b>B8-S3</b>
Matrix	Soil	Soil
Date extracted	Reporting	09/07/00
Date analyzed	Limits	09/07/00
Moisture, %		

<b>NWTPH-Gx, mg/kg</b>		
Mineral spirits/Stoddard solvent	5.0	nd
Gasoline	5.0	nd

<b>BTEX, µg/kg</b>		
Benzene	50	nd
Toluene	50	nd
Ethylbenzene	50	nd
Xylenes	50	nd

Surrogate recoveries:	
Trifluorotoluene	93%
Bromofluorobenzene	92%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
na - not analyzed  
C - coelution with sample peaks  
M - matrix interference  
J - estimated value  
Results reported on dry-weight basis  
Acceptable Recovery limits: 65% TO 135%  
Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436  
 Printed: 9/14/00 16:23

Analytical Results

NWTPH-Gx / BTEX	MTH BLK	LCS	B-1	B-3	B-7	B-10
Matrix	Water	Water	Water	Water	Water	Water
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00

NWTPH-Gx, mg/L

Mineral spirits/Stoddard solvent	0.10	nd	nd	nd	nd	nd
Gasoline	0.10	nd	80	1.3	21	0.92

BTEX, ug/L

Benzene	1.0	nd	78%
Toluene	1.0	nd	83%
Ethylbenzene	1.0	nd	
Xylenes	1.0	nd	

Surrogate recoveries:

Trifluorotoluene	84%	97%	98%	96%	95%	84%
Bromofluorobenzene	88%	97%	C	113%	92%	100%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - coelution with sample peaks

M - matrix interference

J - estimated value

Acceptable Recovery limits: 65% TO 135%

Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSE  
 Client Job Name: DENNY'S  
 Client Job Number: 7436  
 Printed: 9/14/00 16:23

Analytical Results		DUPL		RPD
NWTPH-Gx / BTEX		B-5	B-5	B-5
Matrix	Water	Water	Water	Water
Date extracted	Reporting	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00

**NWTPH-Gx, mg/L**

Mineral spirits/Stoddard solvent	0.10	nd	nd	
Gasoline	0.10	1.1	1.1	0%

**BTEX, µg/L**

Benzene	1.0	11	10	10%
Toluene	1.0	nd	nd	
Ethylbenzene	1.0	6.8	5.6	19%
Xylenes	1.0	10	10	2%

**Surrogate recoveries:**

Trifluorotoluene	93%	91%
Bromofluorobenzene	85%	82%

**Data Qualifiers and Analytical Comments**

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

NWTPH-Dx, mg/kg		MTH BLK	B1-S3	B3-S3	B4-S2	B5-S2	B7-S3
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Kerosene/Jet fuel	20	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	20	nd	nd	nd	nd	nd	nd
Heavy oil	50	nd	nd	nd	nd	nd	nd

Surrogate recoveries:

Fluorobiphenyl	97%	96%	97%	118%	97%	94%
o-Terphenyl	99%	94%	93%	121%	95%	93%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%



TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results							DUPL
NWTPH-Dx, mg/l		MTH BLK	B-1	B-3	B-5	B-7	B-7
Matrix	Water	Water	Water	Water	Water	Water	Water
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Kerosene/Jet fuel	0.20	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	0.20	nd	nd	nd	nd	nd	nd
Heavy oil	0.50	nd	nd	nd	nd	nd	nd

Surrogate recoveries:							
Fluorobiphenyl		98%	101%	102%	102%	105%	100%
o-Terphenyl		102%	105%	105%	104%	108%	99%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
(425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
Client: HART CROWSER  
Client Job Name: DENNY'S  
Client Job Number: 7436

Analytical Results

NWTPH-Dx, mg/l		B-10
Matrix	Water	Water
Date extracted	Reporting	09/07/00
Date analyzed	Limits	09/07/00
Kerosene/Jet fuel	0.20	nd
Diesel/Fuel oil	0.20	nd
Heavy oil	0.50	nd

Surrogate recoveries:

Fluorobiphenyl	102%
o-Terphenyl	102%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - coelution with sample peaks

M - matrix interference

J - estimated value

Acceptable Recovery limits: 65% TO 135%

Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

DUPL

NWTPH-HCID, mg/kg		MTH BLK	B1-S1	B1-S2	B3-S1	B3-S1	B3-S2
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %					15%	15%	
Gasoline	20	nd	nd	nd	nd	nd	nd
Stoddard solvent/Mineral spirits	20	nd	nd	nd	nd	nd	nd
Kenol	20	nd	nd	nd	nd	nd	nd
Kerosene/Jet fuel	20	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	50	nd	nd	nd	nd	nd	nd
Bunker C	50	nd	nd	nd	nd	nd	nd
Heavy oil	100	nd	nd	nd	100	130	nd
Unidentifiable petroleum products	20	nd	nd	nd	D	D	nd

Surrogate recoveries:

Fluorobiphenyl	97%	96%	96%	95%	95%	96%
o-Terphenyl	99%	C	97%	91%	91%	94%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 D - detected at or above listed reporting limits  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results DUPL

NWTPH-HCID, mg/kg		B4-S3	B5-S1	B5-S3	B6-S1	B6-S2	B6-S2
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %			15%				
Gasoline	20	nd	nd	nd	nd	nd	nd
Stoddard solvent/Mineral spirits	20	nd	nd	nd	nd	nd	nd
Kensol	20	nd	nd	nd	nd	nd	nd
Kerosene/Jet fuel	20	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	50	nd	nd	nd	nd	nd	nd
Bunker C	50	nd	nd	nd	nd	nd	nd
Heavy oil	100	nd	280	nd	nd	nd	nd
Unidentifiable petroleum products	20	nd	nd	nd	nd	nd	nd

Surrogate recoveries:

Fluorobiphenyl	117%	118%	117%	94%	94%	94%
o-Terphenyl	120%	116%	118%	C	93%	93%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 D - detected at or above listed reporting limits  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

NWTPH-HCID, mg/kg		B6-S3	B7-S1	B7-S2	B7-S4	B8-S1	B8-S3
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %							
Gasoline	20	nd	nd	nd	nd	nd	nd
Stoddard solvent/Mineral spirits	20	nd	nd	nd	nd	nd	nd
Kensol	20	nd	nd	nd	nd	nd	nd
Kerosene/Jet fuel	20	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	50	nd	nd	nd	nd	nd	nd
Bunker C	50	nd	nd	nd	nd	nd	nd
Heavy oil	100	nd	nd	nd	nd	nd	nd
Unidentifiable petroleum products	20	nd	nd	nd	nd	nd	nd

Surrogate recoveries:

Fluorobiphenyl	94%	98%	95%	93%	120%	115%
o-Terphenyl	94%	94%	93%	93%	120%	119%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 D - detected at or above listed reporting limits  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results		DUPL					
NWTPH-HCID, mg/kg		B8-S3	B9-S2	B9-S3	B10-S2	B10-S3	B10-S4
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %							
Gasoline	20	nd	nd	nd	nd	nd	nd
Stoddard solvent/Mineral spirits	20	nd	nd	nd	nd	nd	nd
Kensol	20	nd	nd	nd	nd	nd	nd
Kerosene/Jet fuel	20	nd	nd	nd	nd	nd	nd
Diesel/Fuel oil	50	nd	nd	nd	nd	nd	nd
Bunker C	50	nd	nd	nd	nd	nd	nd
Heavy oil	100	nd	nd	nd	nd	nd	nd
Unidentifiable petroleum products	20	nd	nd	nd	nd	nd	nd
Surrogate recoveries:							
Fluorobiphenyl		92%	92%	92%	96%	96%	96%
o-Terphenyl		92%	92%	93%	94%	94%	94%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 D - detected at or above listed reporting limits  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
(425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
Client: HART CROWSER  
Client Job Name: DENNY'S  
Client Job Number: 7436

Analytical Results

NWTPH-HCID, mg/kg		B10-S5
Matrix	Soil	Soil
Date extracted	Reporting	09/07/00
Date analyzed	Limits	09/07/00
Moisture, %		
Gasoline	20	nd
Stoddard solvent/Mineral spirits	20	nd
Kerosol	20	nd
Kerosene/Jet fuel	20	nd
Diesel/Fuel oil	50	nd
Bunker C	50	nd
Heavy oil	100	nd
Unidentifiable petroleum products	20	nd

Surrogate recoveries:

Fluorobiphenyl	98%
o-Terphenyl	95%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
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C - coelution with sample peaks  
M - matrix interference  
J - estimated value  
Results reported on dry-weight basis  
Acceptable Recovery limits: 65% TO 135%  
Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results 8021B, µg/l	MS MSD RPD							
	MTH BLK	LCS	B-1	B-3	B-3	B-3	B-3	
Matrix	Water	Water	Water	Water	Water	Water	Water	
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Chloromethane	5.0	nd		nd	nd			
Bromomethane	5.0	nd		nd	nd			
Vinyl chloride	5.0	nd		nd	nd			
Chloroethane	5.0	nd		nd	nd			
cis-1,2-Dichloroethene	5.0	nd		nd	nd			
1,1-Dichloroethene	5.0	nd		nd	nd			
Methylene Chloride	5.0	nd		nd	nd			
trans-1,2-Dichloroethene	5.0	nd		nd	nd			
1,1-Dichloroethane	5.0	nd		nd	nd			
Chloroform	1.0	nd		nd	nd			
1,1,1-Trichloroethane	1.0	nd		nd	nd			
Carbontetrachloride	1.0	nd		nd	nd			
1,2-Dichloroethane	5.0	nd		nd	nd			
Trichloroethene	1.0	nd	101%	nd	nd	104%	108%	4%
1,2-Dichloropropane	5.0	nd		nd	nd			
Bromodichloromethane	5.0	nd		nd	nd			
cis-1,3-Dichloropropene	5.0	nd		nd	nd			
trans-1,3-Dichloropropene	5.0	nd		nd	nd			
Chlorobenzene	5.0	nd	106%	nd	nd	114%	117%	3%
1,1,2-Trichloroethane	1.0	nd		nd	nd			
Tetrachloroethene	1.0	nd		210	nd			
Dibromochloromethane	5.0	nd		nd	nd			
Bromoform	5.0	nd		nd	nd			
1,1,2,2-Tetrachloroethane	5.0	nd		nd	nd			
1,1,1,2-Tetrachloroethane	5.0	nd		nd	nd			
Bromobenzene	5.0	nd		nd	nd			
1,2,3-Trichloropropane	5.0	nd		nd	nd			
Dibromomethane	5.0	nd		nd	nd			
m-Dichlorobenzene	1.0	nd		nd	nd			
p-Dichlorobenzene	1.0	nd		nd	nd			
o-Dichlorobenzene	1.0	nd		nd	nd			
Benzene	1.0	nd	104%	290	47	104%	109%	5%
Toluene	1.0	nd	104%	2,400	45	102%	104%	2%
Ethylbenzene	1.0	nd		1,700	37			
Xylenes	1.0	nd		13,000	170			

Surrogate recoveries:

Bromochloromethane	86%	92%	94%	84%	80%	88%
1,4-Dichlorobutane	100%	111%	94%	87%	101%	100%
Bromochloropropane	93%	100%	88%	79%	96%	94%
Trifluorotoluene	84%	97%	98%	96%	97%	87%
Bromofluorobenzene	88%	99%	C	113%	98%	92%

B1-, B-7 ANALYZED DILUTED 1:10 (FOR HALOGENATED)

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%



TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

8021B, µg/l	B-7		B-10
Matrix	Water	Water	Water
Date extracted	Reporting	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00
Chloromethane	5.0	nd	nd
Bromomethane	5.0	nd	nd
Vinyl chloride	5.0	nd	nd
Chloroethane	5.0	nd	nd
cis-1,2-Dichloroethene	5.0	nd	nd
1,1-Dichloroethene	5.0	nd	nd
Methylene Chloride	5.0	nd	nd
trans-1,2-Dichloroethene	5.0	nd	nd
1,1-Dichloroethane	5.0	nd	nd
Chloroform	1.0	nd	nd
1,1,1-Trichloroethane	1.0	nd	nd
Carbontetrachloride	1.0	nd	nd
1,2-Dichloroethane	5.0	nd	nd
Trichloroethene	1.0	nd	nd
1,2-Dichloropropane	5.0	nd	nd
Bromodichloromethane	5.0	nd	nd
cis-1,3-Dichloropropene	5.0	nd	nd
trans-1,3-Dichloropropene	5.0	nd	nd
Chlorobenzene	5.0	nd	nd
1,1,2-Trichloroethane	1.0	nd	nd
Tetrachloroethene	1.0	nd	nd
Dibromochloromethane	5.0	nd	nd
Bromoform	5.0	nd	nd
1,1,2,2-Tetrachloroethane	5.0	nd	nd
1,1,1,2-Tetrachloroethane	5.0	nd	nd
Bromobenzene	5.0	nd	nd
1,2,3-Trichloropropane	5.0	nd	nd
Dibromomethane	5.0	nd	nd
m-Dichlorobenzene	1.0	nd	nd
p-Dichlorobenzene	1.0	nd	nd
o-Dichlorobenzene	1.0	nd	nd
Benzene	1.0	1,000	nd
Toluene	1.0	520	nd
Ethylbenzene	1.0	630	nd
Xylenes	1.0	2,400	2.8

Surrogate recoveries:

Bromochloromethane	88%	83%
1,4-Dichlorobutane	99%	99%
Bromochloropropane	88%	96%
Trifluorotoluene	95%	84%
Bromofluorobenzene	92%	100%

B1-, B-7 ANALYZED DILUTED 1:10 (FOR HALOGE

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

PAH(8100), mg/kg		MTH BLK	LCS	B1-S2	B1-S3	B3-S1	B3-S3
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %						15%	

Acenaphthene	0.10	nd	93%	nd	nd	nd	nd
Acenaphthylene	0.10	nd		nd	nd	nd	nd
Anthracene	0.10	nd		nd	nd	nd	nd
Benzo(a)anthracene	0.10	nd		nd	nd	nd	nd
Benzo(a)pyrene	0.10	nd		nd	nd	nd	nd
Benzo(b)fluoranthene	0.10	nd		nd	nd	nd	nd
Benzo(ghi)perylene	0.10	nd		nd	nd	nd	nd
Benzo(k)fluoranthene	0.10	nd		nd	nd	nd	nd
Chrysene	0.10	nd	77%	nd	nd	nd	nd
Dibenzo(ah)anthracene	0.10	nd		nd	nd	nd	nd
Fluorene	0.10	nd	89%	nd	nd	nd	nd
Fluoranthene	0.10	nd		nd	nd	0.98	nd
Indeno(1,2,3-cd)pyrene	0.10	nd		nd	nd	nd	nd
Naphthalene	0.10	nd	98%	nd	nd	nd	nd
Phenanthrene	0.10	nd	82%	nd	nd	1.5	nd
Pyrene	0.10	nd	77%	nd	nd	1.2	nd

Surrogate recoveries:

Fluorobiphenyl	97%	100%	96%	96%	109%	97%
o-Terphenyl	99%	98%	97%	94%	92%	93%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results							DUPL
PAH(8100), mg/kg		B4-S2	B5-S2	B6-S2	B7-S3	B8-S3	B8-S3
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Moisture, %							

Acenaphthene	0.10	nd	nd	nd	nd	nd	nd
Acenaphthylene	0.10	nd	nd	nd	nd	nd	nd
Anthracene	0.10	nd	nd	nd	nd	nd	nd
Benzo(a)anthracene	0.10	nd	nd	nd	nd	nd	nd
Benzo(a)pyrene	0.10	nd	nd	nd	nd	nd	nd
Benzo(b)fluoranthene	0.10	nd	nd	nd	nd	nd	nd
Benzo(ghi)perylene	0.10	nd	nd	nd	nd	nd	nd
Benzo(k)fluoranthene	0.10	nd	nd	nd	nd	nd	nd
Chrysene	0.10	nd	nd	nd	nd	nd	nd
Dibenzo(ah)anthracene	0.10	nd	nd	nd	nd	nd	nd
Fluorene	0.10	nd	nd	nd	nd	nd	nd
Fluoranthene	0.10	nd	nd	nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene	0.10	nd	nd	nd	nd	nd	nd
Naphthalene	0.10	nd	nd	nd	nd	nd	nd
Phenanthrene	0.10	nd	nd	nd	nd	nd	nd
Pyrene	0.10	nd	nd	nd	nd	nd	nd

Surrogate recoveries:

Fluorobiphenyl	118%	97%	94%	94%	115%	92%
o-Terphenyl	121%	95%	93%	93%	119%	92%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

PAH(8100), mg/kg		B9-S2	B10-S3	B10-S5
Matrix	Soil	Soil	Soil	Soil
Date extracted	Reporting	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00
Moisture, %				
Acenaphthene	0.10	nd	nd	nd
Acenaphthylene	0.10	nd	nd	nd
Anthracene	0.10	nd	nd	nd
Benzo(a)anthracene	0.10	nd	nd	nd
Benzo(a)pyrene	0.10	nd	nd	nd
Benzo(b)fluoranthene	0.10	nd	nd	nd
Benzo(ghi)perylene	0.10	nd	nd	nd
Benzo(k)fluoranthene	0.10	nd	nd	nd
Chrysene	0.10	nd	nd	nd
Dibenzo(ah)anthracene	0.10	nd	nd	nd
Fluorene	0.10	nd	nd	nd
Fluoranthene	0.10	nd	nd	nd
Indeno(1,2,3-cd)pyrene	0.10	nd	nd	nd
Naphthalene	0.10	nd	nd	nd
Phenanthrene	0.10	nd	nd	nd
Pyrene	0.10	nd	nd	nd

Surrogate recoveries:

Fluorobiphenyl	92%	96%	98%
o-Terphenyl	92%	94%	96%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits

na - not analyzed

C - coelution with sample peaks

M - matrix interference

J - estimated value

Results reported on dry-weight basis

Acceptable Recovery limits: 65% TO 135%

Acceptable RPD limit: 35%

TEG NW SEATTLE CHEMISTRY LABORATORY  
 (425) 957-9872, fax (425) 957-9904

TEG Job Number: S00906-3  
 Client: HART CROWSER  
 Client Job Name: DENNY'S  
 Client Job Number: 7436

Analytical Results

PAH(8100), ug/L	MTH BLK		LCS	B-1	B-3	B-7	B-10
	Soil	Water	Water	Water	Water	Water	Water
Date extracted	Reporting	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Date analyzed	Limits	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00	09/07/00
Acenaphthene	2.0	nd	93%	nd	nd	nd	nd
Acenaphthylene	2.0	nd		nd	nd	nd	nd
Anthracene	2.0	nd		nd	nd	nd	nd
Benzo(a)anthracene	2.0	nd		nd	nd	nd	nd
Benzo(a)pyrene	2.0	nd		nd	nd	nd	nd
Benzo(b)fluoranthene	2.0	nd		nd	nd	nd	nd
Benzo(ghi)perylene	2.0	nd		nd	nd	nd	nd
Benzo(k)fluoranthene	2.0	nd		nd	nd	nd	nd
Chrysene	2.0	nd	77%	nd	nd	nd	nd
Dibenzo(ah)anthracene	2.0	nd		nd	nd	nd	nd
Fluorene	2.0	nd	89%	nd	nd	nd	nd
Fluoranthene	2.0	nd		nd	nd	nd	nd
Indeno(1,2,3-cd)pyrene	2.0	nd		nd	nd	nd	nd
Naphthalene	2.0	nd	98%	490	nd	nd	nd
Phenanthrene	2.0	nd	82%	nd	nd	nd	nd
Pyrene	2.0	nd	77%	nd	nd	nd	nd

Surrogate recoveries:

Fluorobiphenyl	98%	100%	101%	101%	107%	102%
o-Terphenyl	102%	99%	105%	105%	108%	102%

Data Qualifiers and Analytical Comments

nd - not detected at listed reporting limits  
 na - not analyzed  
 C - coelution with sample peaks  
 M - matrix interference  
 J - estimated value  
 Results reported on dry-weight basis  
 Acceptable Recovery limits: 65% TO 135%  
 Acceptable RPD limit: 35%



TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

Washington  
 Hart Crowser, Inc.  
 Client Project #DENNY'S  
 TEG Project #.

**Heavy Metals in Soil by EPA-7000 Series**

Sample Number	Date Analyzed	Lead (Pb)	Cadmium (Cd)	Chromium (Cr)	Arsenic (As)	Silver (Ag)	Barium (Ba)	Selenium (Se)	Mercury (Hg)
		EPA 7420 (mg/kg)	EPA 7130 (mg/kg)	EPA 7190 (mg/kg)	EPA 7061 (mg/kg)	EPA 7760 (mg/kg)	EPA 7080 (mg/kg)	EPA 7741 (mg/kg)	EPA 7471 (mg/kg)
Method Blank	9/15/00	nd	nd	nd	nd	nd	nd	nd	nd
B1-S3	9/15/00	12	nd	51	nd	nd	nd	nd	nd
B3-S3	9/15/00	25	nd	29	nd	nd	nd	nd	nd
B6-S3	9/15/00	14	nd	33	nd	nd	nd	nd	nd
B7-S3	9/15/00	nd	nd	42	nd	nd	nd	nd	nd
B10-S2	9/15/00	36	nd	42	nd	nd	nd	nd	nd
B10-S2 Dup	9/15/00	30	nd	39	nd	nd	nd	nd	nd
Method Detection Limits		5	1	20	5	20	50	50	0.1

"nd" Indicates not detected at listed detection limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

TRANSGLOBAL ENVIRONMENTAL GEOSCIENCES NORTHWEST, INC.

Washington  
 Hart Crowser, Inc.  
 Client Project #DENNY'S  
 TEG Project #.

QA/QC Data - Total Metals EPA-7000 Series Analyses

Sample Number: W01B							
Matrix Spike			Matrix Spike Duplicate			RPD	
Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	RPD (%)	
Lead	250	290	116	250	280	112	3.51
Cadmium	25	25	100	25	22	88	12.8
Chromium	250	208	83	250	214	86	2.84
Arsenic	63	65	104	63	67	107	3.03

Laboratory Control Sample			
Spiked Conc. (mg/kg)	Measured Conc. (mg/kg)	Spike Recovery (%)	
Lead	250	235	94
Cadmium	25	24	96
Chromium	250	278	111
Arsenic	63	58	93

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 65%-135%  
 ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Sherry Chilcutt

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-1
Lab ID:	92404-01
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	Flags
Barium	6.4	0.005	
Chromium	1.3	0.01	
Lead	3.8	0.01	
Selenium	ND	0.05	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-1
Lab ID:	92404-01
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	PQL	Flags
Arsenic	0.21	0.001	
Cadmium	0.028	0.003	
Silver	0.011	0.0005	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-1
Lab ID:	92404-01
Date Received:	9/7/00
Date Prepared:	9/11/00
Date Analyzed:	9/12/00
Dilution Factor	1

## Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	Flags
Mercury	0.0021 <i>J</i>	0.0002	

*9/24/00  
JHL*



# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-3
Lab ID:	92404-02
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	Flags
Barium	1.2	0.005	
Chromium	0.062	0.01	
Lead	2.7	0.01	
Selenium	ND	0.05	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-3
Lab ID:	92404-02
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	PQL	Flags
Arsenic	0.087	0.001	
Cadmium	0.0082	0.003	
Silver	0.0013	0.0005	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-3
Lab ID:	92404-02
Date Received:	9/7/00
Date Prepared:	9/11/00
Date Analyzed:	9/12/00
Dilution Factor	1

## Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	Flags
Mercury	0.00065 <i>J</i>	0.0002	

*9/22/00  
JHL*

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-7
Lab ID:	92404-05
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	Flags
Barium	6.1	0.005	
Chromium	2	0.01	
Lead	1.7	0.01	
Selenium	ND	0.05	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-7
Lab ID:	92404-05
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	PQL	Flags
Arsenic	0.17	0.001	
Cadmium	0.024	0.003	
Silver	0.01	0.0005	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-7
Lab ID:	92404-05
Date Received:	9/7/00
Date Prepared:	9/11/00
Date Analyzed:	9/12/00
Dilution Factor	1

## Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	Flags
Mercury	0.0046 <i>J</i>	0.0002	

*9/21/00  
JML*

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-10
Lab ID:	92404-06
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	Flags
Barium	0.46	0.005	
Chromium	0.091	0.01	
Lead	0.13	0.01	
Selenium	ND	0.05	

# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-10
Lab ID:	92404-06
Date Received:	9/7/00
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	PQL	Flags
Arsenic	0.033	0.001	
Cadmium	ND	0.003	
Silver	0.0011	0.0005	



# SOUND ANALYTICAL SERVICES, INC.

Client Name	TEG Northwest, Inc.
Client ID:	B-10
Lab ID:	92404-06
Date Received:	9/7/00
Date Prepared:	9/11/00
Date Analyzed:	9/12/00
Dilution Factor	1

## Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	Flags
Mercury	0.0003 <i>J</i>	0.0002	

*9/22/00  
JH*

# SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - T825
Date Received:	-
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor:	1

## Metals by ICP-MS - USEPA Method 6020

Analyte	Result (mg/L)	PQL	Flags
Arsenic	ND	0.001	
Cadmium	ND	0.003	
Silver	ND	0.0005	

# SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - T825
Date Received:	-
Date Prepared:	9/8/00
Date Analyzed:	9/8/00
Dilution Factor	1

## Metals by ICP - USEPA Method 6010

Analyte	Result (mg/L)	PQL	Flags
Barium	ND	0.005	
Chromium	ND	0.01	
Lead	ND	0.01	
Selenium	ND	0.05	

# SOUND ANALYTICAL SERVICES, INC.

Lab ID:	Method Blank - T831
Date Received:	-
Date Prepared:	9/11/00
Date Analyzed:	9/12/00
Dilution Factor:	1

## Mercury by CVAA - USEPA Method 7470

Analyte	Result (mg/L)	PQL	Flags
Mercury	ND	0.0002	

# SOUND ANALYTICAL SERVICES, INC.

## Blank Spike/Blank Spike Duplicate Report

Lab ID: T825  
Date Prepared: 9/8/00  
Date Analyzed: 9/8/00  
QC Batch ID: T825

### Metals by ICP - USEPA Method 6010

Compound Name	Blank Result (mg/L)	Spike Amount (mg/L)	BS Result (mg/L)	BS % Rec.	BSD Result (mg/L)	BSD % Rec.	RPD	Flag
Selenium	0	4	4.16	104	4.11	103	-0.97	

# SOUND ANALYTICAL SERVICES, INC.

## Blank Spike/Blank Spike Duplicate Report

Lab ID: T831  
Date Prepared: 9/11/00  
Date Analyzed: 9/12/00  
QC Batch ID: T831

### Mercury by CVAA - USEPA Method 7470

Compound Name	Blank Result (mg/L)	Spike Amount (mg/L)	BS Result (mg/L)	BS % Rec.	BSD Result (mg/L)	BSD % Rec.	RPD	Flag
Mercury	0	0.002	0.00214	107	0.00216	108	0.93	

# SOUND ANALYTICAL SERVICES, INC.

## Matrix Spike Report

Client Sample ID: MAN-BT-3  
Lab ID: 92417-02  
Date Prepared: 9/8/00  
Date Analyzed: 9/8/00  
QC Batch ID: T825

### Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Barium	0.048	4	3.99	98	
Chromium	0	0.4	0.389	97	
Lead	0.018	1	0.923	91	
Selenium	0	4	5.28	132	X7

# SOUND ANALYTICAL SERVICES, INC.

## Matrix Spike Report

Client Sample ID: MAN-BT-3  
Lab ID: 92417-02  
Date Prepared: 9/8/00  
Date Analyzed: 9/8/00  
QC Batch ID: T825

### Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Arsenic	0.00717	4	4.38	109	
Cadmium	0	0.1	0.0971	97	
Silver	0	0.6	0.619	103	



# SOUND ANALYTICAL SERVICES, INC.

## Matrix Spike Report

Client Sample ID: B-10  
Lab ID: 92404-06  
Date Prepared: 9/11/00  
Date Analyzed: 9/12/00  
QC Batch ID: T831

### Mercury by CVAA - USEPA Method 7470

Parameter Name	Sample Result (mg/L)	Spike Amount (mg/L)	MS Result (mg/L)	MS % Rec.	Flag
Mercury	0.000302	0.002	0.00145	57	x7

# SOUND ANALYTICAL SERVICES, INC.

## Duplicate Report

Client Sample ID: MAN-BT-3  
Lab ID: 92417-02  
Date Prepared: 9/8/00  
Date Analyzed: 9/8/00  
QC Batch ID: T825

### Metals by ICP - USEPA Method 6010

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Barium	0.048	0.05	-4.1	
Chromium	0	0	NC	
Lead	0.018	0.019	-5.4	
Selenium	0	0	NC	

# SOUND ANALYTICAL SERVICES, INC.

## Duplicate Report

Client Sample ID: MAN-BT-3  
Lab ID: 92417-02  
Date Prepared: 9/8/00  
Date Analyzed: 9/8/00  
QC Batch ID: T825

### Metals by ICP-MS - USEPA Method 6020

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Arsenic	0.0072	0.0073	-1.4	
Cadmium	0	0	NC	
Silver	0	0	NC	

# SOUND ANALYTICAL SERVICES, INC.

## Duplicate Report

Client Sample ID: B-10  
Lab ID: 92404-06  
Date Prepared: 9/11/00  
Date Analyzed: 9/12/00  
QC Batch ID: T831

Mercury by CVAA - USEPA Method 7470

Parameter Name	Sample Result (mg/L)	Duplicate Result (mg/L)	RPD %	Flag
Mercury	0.0003	0.0004	-29.0	x4

# 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.



# Sample Custody Record

DATE 9/6/00 PAGE 2 OF 4



## HARTCROWSER

Hart Crowser, Inc.  
1910 Fairview Avenue East  
Seattle, Washington 98102-3699

JOB NUMBER <u>1-7436</u> LAB NUMBER _____ PROJECT MANAGER <u>Wukelic</u> PROJECT NAME <u>Denny's REST</u> SAMPLED BY: <u>Paul Hayes / Jeff Rowlin</u>					<b>TESTING</b>							NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
					TPH - HClD	TPH G	TPH G / C / TEY	TPH D	VOC (SIB)	PP METALS	(Total - Soil This box blank)		
LAB NO.	SAMPLE	TIME	STATION	MATRIX									
B-5	S-1			Soil	X								
	S-2			Soil		X	X					X	
	S-3			Soil	X								
B-6	S-1			Soil	X								
	S-2			Soil	X							X	X
	S-3			Soil	X	X			X				
B-7	S-1			Soil	X								
	S-2			Soil	X								
	S-3			Soil		X	X		X			X	
	S-4			Soil	X								
<b>RELINQUISHED BY</b> SIGNATURE: <u>[Signature]</u> PRINTED NAME: <u>Julie Wukelic</u> COMPANY: <u>Hart Crowser</u>				<b>DATE</b> <u>9/6/00</u> <b>TIME</b> <u>2:30p</u>	<b>RECEIVED BY</b> SIGNATURE: <u>[Signature]</u> PRINTED NAME: <u>VAL FURROW</u> COMPANY: <u>REG</u>				<b>DATE</b> <u>9/6</u> <b>TIME</b> <u>1530</u>	<b>TOTAL NUMBER OF CONTAINERS</b>  <b>SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS</b>		<b>METHOD OF SHIPMENT</b>	
<b>RELINQUISHED BY</b> SIGNATURE: _____ PRINTED NAME: _____ COMPANY: _____				<b>DATE</b> _____ <b>TIME</b> _____	<b>RECEIVED BY</b> SIGNATURE: _____ PRINTED NAME: _____ COMPANY: _____				<b>DATE</b> _____ <b>TIME</b> _____	<b>DISTRIBUTION:</b> 1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY 2. RETURN PINK COPY TO PROJECT MANAGER 3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT 4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER			



# Sample Custody Record

DATE 9/6/00 PAGE 3 OF 4

## HARTCROWSER

JOB NUMBER <u>7434</u> LAB NUMBER _____					TESTING								NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
PROJECT MANAGER <u>WIKERIC</u>					TCH HLD	TCH C	TCH E / STEX	TCH D EXT	VOC (4021B)	PP Metals	(Pb, Cd, Cu, Ni, Cr, Mn, Zn, Fe, Al, Ag, As, Ba, Be, Bi, Br, Ca, Co, Cr, Cs, D, Hg, K, Li, Mg, Mo, Na, Ni, Pb, Se, Si, Sr, Tl, U, V, W, Y, Zn, Zr)	PATE		
PROJECT NAME <u>Dennis Post.</u>														
SAMPLED BY: <u>Hoyes / Brown</u>														
LAB NO.	SAMPLE	TIME	STATION	MATRIX	TCH HLD	TCH C	TCH E / STEX	TCH D EXT	VOC (4021B)	PP Metals	(Pb, Cd, Cu, Ni, Cr, Mn, Zn, Fe, Al, Ag, As, Ba, Be, Bi, Br, Ca, Co, Cr, Cs, D, Hg, K, Li, Mg, Mo, Na, Ni, Pb, Se, Si, Sr, Tl, U, V, W, Y, Zn, Zr)	PATE		
B-9	S-1			SOIL	X									
	S-2			SOIL										
	S-3			SOIL	X	X						X		
B-9	S-1			SOIL	X							X		
	S-2			SOIL	X							X		
	S-3			SOIL	X									
	S-4			SOIL										
B-10	S-1			SOIL	X				X					
	S-2			SOIL	X				X					
	S-3			SOIL	X				X			X		

RELINQUISHED BY	DATE	RECEIVED BY	DATE	TOTAL NUMBER OF CONTAINERS	METHOD OF SHIPMENT
<u>[Signature]</u>	<u>9/6/00</u>	<u>[Signature]</u>	<u>9/6</u>		
SIGNATURE	TIME	SIGNATURE	TIME	SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS	
<u>Julie Wikeric</u>	<u>2:20p</u>	<u>VAL Brown</u>	<u>1530</u>		
PRINTED NAME	COMPANY	PRINTED NAME	COMPANY		
<u>Hart Crowser</u>		<u>VE. G</u>		DISTRIBUTION: 1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY 2. RETURN PINK COPY TO PROJECT MANAGER 3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT 4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER	
RELINQUISHED BY	DATE	RECEIVED BY	DATE		
SIGNATURE	TIME	SIGNATURE	TIME		
PRINTED NAME	COMPANY	PRINTED NAME	COMPANY		



# Sample Custody Record

**HARTCROWSER**

Hart Crowser, Inc.  
1910 Fairview Avenue East  
Seattle, Washington 98102-3699  
Phone: 206-324-9530 FAX: 206-328-5581

Samples Shipped to: \_\_\_\_\_

JOB 7436 LAB NUMBER \_\_\_\_\_

PROJECT NAME Wukovic

HART CROWSER CONTACT Doug's East  
Hays/Brown

SAMPLED BY: \_\_\_\_\_

REQUESTED ANALYSIS

TPH HAP	TPH-G	TPH-G/BTEX	TPH-D	VOC (S210)	P.P. METALS	Total = 50/13 Catalyst = 10/13	DATE
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NO. OF CONTAINERS \_\_\_\_\_

OBSERVATIONS/COMMENTS/  
COMPOSITING INSTRUCTIONS

LAB NO.	SAMPLE ID	DESCRIPTION	DATE	TIME	MATRIX	TPH HAP	TPH-G	TPH-G/BTEX	TPH-D	VOC (S210)	P.P. METALS	Total = 50/13 Catalyst = 10/13	DATE
B-10	S-4				SOIL	X							
	S-5				SOIL	X						X	
B-1					WATER	X	X	X	X	X	X	X	
B-3					WATER	X	X	X	X	X	X	X	
B-4					WATER								
B-7					WATER	X	X	X	X	X	X	X	
B-10					WATER	X	X	X	X	X	X	X	
B-5							X	X					

RELINQUISHED BY <u>[Signature]</u> SIGNATURE <u>JULIE KIMWICK</u> PRINT NAME <u>Hart Crowser</u> COMPANY	DATE <u>9/6/05</u> TIME <u>2:24pm</u>	RECEIVED BY <u>[Signature]</u> SIGNATURE <u>DAVID TRAR</u> PRINT NAME <u>DEB</u> COMPANY	DATE <u>9/6</u> TIME <u>1:50</u>	SPECIAL SHIPMENT HANDLING OR STORAGE REQUIREMENTS:	TOTAL NUMBER OF CONTAINERS
RELINQUISHED BY	DATE	RECEIVED BY	DATE	COOLER NO.:	STORAGE LOCATION:
SIGNATURE	TIME	SIGNATURE	TIME	See Lab Work Order No. _____	TURNAROUND TIME:
PRINT NAME		PRINT NAME		for Other Contract Requirements	<input type="checkbox"/> 24 HOURS <input type="checkbox"/> 1 WEEK
COMPANY		COMPANY			<input type="checkbox"/> 48 HOURS <input type="checkbox"/> STANDARD
					<input type="checkbox"/> 72 HOURS    OTHER _____