

March 5, 1993

Mr. David South, P.E.
Washington State Department of Ecology
3190 - 160th Avenue S.E.
Bellevue, WA 98008-5452

PACCAR Inc

RECEIVED

MAR 08 1993

Dear Dave:

DEPT. OF ECOLOGY

Attached for your review is a report from Hart Crowser dated March 3, 1993 covering additional U-1 Hot Spot borings, monitoring wells and excavations. Based on the report and my field observations, PACCAR plans to take the following actions.

Excavate contaminated soil in the east traffic lane of Garden Avenue North at the entry road south of Building 17. Claus Hackenberger will present a work plan to the City of Renton to obtain the necessary construction authorization. It is intended to remediate soil down to TPH Method A level of 200 ppm for diesel within the city street.

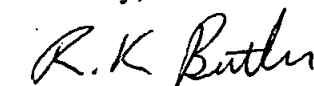
Suspend excavation along the south wall of Building 17 to prevent any structural damage. A geomembrane sheeting and controlled density fill was used to contain the diesel plume under Building 17. The plume under Building 17 will be remediated at a future date if Building 17 is demolished.

Soil excavation will continue along the west edge of Building 17 using both geomembrane sheeting and controlled density fill to contain the diesel plume under the building. Testing to date indicates no contamination has reached the east curb of Garden Avenue north from the south edge of Building 17 north.

Groundwater in the U-1 area will be monitored as part of the confirmational groundwater monitoring program. Recovery sumps have been installed near the west and south sides of Building 17 to recover free product. Free product will be sent offsite to a certified disposal site. Waste groundwater will be sent to the holding tank and discharge to METRO under their permit #292.

Please advise your approval to proceed as discussed above. Please call me at 455-7435 if you have any questions on this work plan.

Sincerely,



R. K. Butler, P.E.

Corporate Environmental Manager

RKB/jk

Attachments (2)

cc: Matt Dalton - w/o attachment
John Finn - w/o attachment
Claus Hackenberger - w/o attachment
Dennis Opacki - w/attachment
Virgil Pound - w/o attachment
Gregg Zimmerman - City of Renton

P.O. Box 1518 Bellevue, Washington 98009 Telephone (206) 455-7400
PACCAR Building 777-106th Avenue N.E. Bellevue, Washington 98004 Facsimile 206-453-4900



HARTCROWSER

Earth and Environmental Technologies

*Report of Findings and Recommendations
Additional U1 Soil Boring, Well Installation,
and Excavation
PACCAR Renton Site
Renton, Washington*

*Prepared for
PACCAR Inc.*

*March 3, 1993
J-1639-27*

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HART CROWSER CHEMISTRY LABORATORY**

**REPORT OF FINDINGS AND RECOMMENDATIONS
ADDITIONAL U1 SOIL BORING, WELL INSTALLATION, AND EXCAVATION
PACCAR RENTON SITE
RENTON, WASHINGTON**

INTRODUCTION

This report presents the findings and recommendations resulting from the additional soil boring, well installation, and excavation work at Hot Spot U1. This work was done as a continuation of the Phase IV cleanup, and in accordance with the work plan for U1 (Hart Crowser, 1983). The previous subsurface investigation at Phase IV hot spot grid location U1 encountered petroleum hydrocarbon contamination in the soil and groundwater, and floating product in groundwater monitoring well U1N. Petroleum contamination was discovered at the western wall of the U1 excavation completed in October 1992 and in the recently installed well U1N. Because the presence of buried utilities, the public sidewalk, and Garden Avenue complicated any further excavation of the western wall of U1, PACCAR chose to investigate the vertical and lateral extent of petroleum hydrocarbon contamination north and west of the present limits of the excavation prior to conducting additional excavation.

The remainder of this report is organized as follows:

- ▶ Soil Borings and Well Installation
 - Soil Results
 - Groundwater Results
- ▶ Additional Excavation
- ▶ Recommendations
- ▶ Limitations

SOIL BORINGS AND WELL INSTALLATIONS

Between January 19 and 20, 1993, Hart Crowser advanced four borings and completed one of these borings as a 4-inch-diameter groundwater monitoring well with a flush-mounted monument. We collected five soil samples from each boring by continuous sampling from a depth of 6 to 16 feet. We developed the well and on January 22, 1993, we collected one groundwater sample, which was analyzed for total petroleum

hydrocarbons (TPH) by Method 8015-Modified in accordance with the analytical procedures used for other PACCAR Renton site cleanup work.

Figure 1 shows the location of the borings and monitoring wells installed at U1. Figure 2 is a cross section of the U1 area. Appendix A provides the sampling procedures followed for this work, and the boring and monitoring well installation logs. Appendix B provides the laboratory analytical reports for this work.

Soil Results

Soils encountered at boring U1B1 coarsened with depth, grading from very silty fine sand at 6 feet below surface to gravelly sand at 16 feet below surface, while boring U1B2 soils varied from very silty fine sand and sandy silt to gravelly sand. TPH contamination encountered at U1B1 and U1B2 was evidenced in the field by odor and sheen and was identified by laboratory analysis as diesel/fuel oil No. 2. Soils encountered at boring U1B3 varied from silty sand to gravelly sand, and no TPH contamination was observed in the field.

Boring/monitoring well U1W soils varied from silty clay to gravelly silty sand. The observed TPH contamination at U1W was evidenced by slight odor and sheen and identified by the laboratory analysis as oil and distinctly different from diesel/fuel oil No. 2.

Table 1 presents the analytical results for the soil samples collected from the borings and well installation.

- ▶ At boring U1B1, TPH was detected in all samples collected between depths of 6 and 16 feet below surface at concentrations ranging from 44 to 470 mg/kg. Two samples collected from a depth of 10 to 12 feet and 12 to 14 feet had TPH concentrations exceeding 200 mg/kg.
- ▶ At boring U1B2, TPH was detected in two samples collected from a depth of 12 to 14 feet and 14 to 16 feet at concentrations of 550 and 45 mg/kg, respectively. The sample with TPH concentrations exceeding 200 mg/kg was collected from a depth of 12 to 14 feet.
- ▶ TPH was not detected in samples collected from boring U1B3.

- At boring/monitoring well U1W, TPH was detected in only one sample at a depth of 10 to 12 feet at a concentration (73 mg/kg oil) well below the CAP MTCA cleanup level of 200 mg/kg for diesel and other fuels.

Groundwater Results

TPH was not detected in the groundwater sample collected from well U1W. As reported in our work plan (Hart Crowser, 1993), TPH was not detected in well U1S. TPH was detected with free-floating product in well U1N. However, this well was abandoned and the surrounding TPH-contaminated soil was excavated, as described below.

ADDITIONAL EXCAVATION

Additional excavation of the U1 area was accomplished during February 1993. The total extent of the U1 excavation is shown on Figure 1. The additional excavation of TPH-contaminated soil in areas east of Garden Avenue North was started in February 1993 and is still underway as of the date of this report.

During excavation adjacent to the Foundry Building (Building 17), we observed seepage of free-floating petroleum product from beneath the building. Several actions were taken to avoid migration of the TPH contamination back into the recently excavated areas. Geomembrane sheeting was placed against the excavation side wall adjacent to the building. The excavation pits were backfilled with controlled-density fill which formed a solid mass with low permeability. Sumps were placed in strategic locations to enable pumping of groundwater and free-floating product. PACCAR is suspending additional excavation immediately adjacent to the south end of the Foundry Building because additional excavation could compromise the structural integrity of the building and could aggravate the migration of TPH contamination present beneath the building. Plans for demolition of the Foundry Building and remediation of the area under the Foundry Building will be addressed at a future date.

Complete documentation of the Phase IV U1 hot spot excavation will be provided in the Phase IV Construction Documentation Report. Preliminary results indicate low TPH concentrations in most samples

taken from the west wall of the excavation, which is immediately adjacent to Garden Avenue North, except for a small portion of the excavation in the vicinity of well U1N.

RECOMMENDATIONS

We recommend limited excavation of TPH-contaminated soils located in the easternmost lane of Garden Avenue North to remove the localized TPH soil contamination in this area. As shown on Figure 1 and Figure 2, utilities—including a high-pressure natural gas pipeline and water main—will complicate this excavation. The excavation will be conducted a minimum of 2 feet east of the natural gas pipeline and 2 feet on either side of the water main. Because of these factors, excavation of TPH-contaminated soils deeper than 8 to 10 feet may not be practicable. Therefore, we recommend continued groundwater monitoring in this area as part of the confirmational groundwater monitoring program for the PACCAR site.

We also recommend pumping water from U1 excavation pit sumps on a weekly basis for four weeks to remove additional TPH contamination. We are preparing a separate plan to address the seepage of free-floating petroleum product from beneath the Foundry Building.

LIMITATIONS

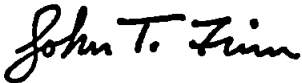
Work for this project was performed, and this letter report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of PACCAR Inc. for specific application to the referenced property. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

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 to the project manager.

We trust that this report meets your needs. If you have any questions or comments regarding these results, please call.

Sincerely,

HART CROWSER, INC.



JOHN T. FINN, P.E.
Associate

JTF/MCK:tml
REPOOFFLfr



MARY CATHERINE KILEY
Senior Staff Environmental Chemist

REFERENCES

Hart Crowser, 1993. Work Plan for U1 Subsurface Investigation.
January 18, 1993.

REPOOFFLfr

Table 1 - Summary of Analytical Results for Soil Samples from Borings and Well Installation

Sample ID	Depth Interval in Feet	Date	TPH Concentration in mg/kg
U1B1-S1	6 to 8	1/20/93	130 Diesel
U1B1-S2	8 to 10	1/20/93	140 Diesel
U1B1-S3	10 to 12	1/20/93	470 Diesel
U1B1-S4	12 to 14	1/20/93	230 Diesel
U1B1-S5	14 to 16	1/20/93	44 Diesel
U1B2-S1	6 to 8	1/20/93	ND
U1B2-S2	8 to 10	1/20/93	ND
U1B2-S3	10 to 12	1/20/93	ND
U1B2-S4	12 to 14	1/20/93	550 Diesel
U1B2-S5	14 to 16	1/20/93	45 Diesel
U1B3-S1	6 to 8	1/19/93	ND
U1B3-S2	8 to 10	1/19/93	ND
U1B3-S3	10 to 12	1/19/93	ND
U1B3-S4	12 to 14	1/19/93	ND
U1B3-S5	14 to 16	1/19/93	ND
U1W-S1	6 to 8	1/19/93	ND
U1W-S2	8 to 10	1/19/93	ND
U1W-S3	10 to 12	1/19/93	73 Oil
U1W-S4	12 to 14	1/19/93	ND
U1W-S5	14 to 16	1/19/93	ND
CAP MTCA Cleanup Level			100 Gasoline 200 Diesel and other fuels
CAP HSAL			2,500

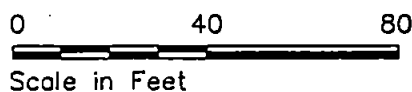
ND = Not detected.

REPOOFFLfr- Tbl 1

3/27/2011 12:40 (base job, 23tp)



- U1S Existing Monitoring Well
 Location and Number
 ■ U1B1 Recent Exploratory Boring
 Location and Number
 ⊞ U1W Recent Monitoring Well
 Location and Number



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Figure 1

Horizontal Scale in Feet
0 20 40
Vertical Scale in Feet
0 5 10
Vertical Exaggeration $\times 4$

APPENDIX A
FIELD SAMPLING AND EXPLORATION METHODS

APPENDIX A

FIELD SAMPLING AND EXPLORATION METHODS

The exploration program for this project included drilling, groundwater monitoring well installation, and groundwater sampling. The sampling and exploration locations are shown on Figure 1. The details regarding the different types of sampling are presented below.

Drilling, Soil Sampling, and Well Installations

Four hollow-stem auger borings, designated U1B1, U1B2, U1B3, and U1W were drilled between January 19 and 20, 1993. The borings were completed to a depth of approximately 16 feet below the ground surface. The borings were advanced with a truck-mounted drill rig under subcontract to Hart Crowser, Inc., using an 8-inch-diameter hollow-stem auger. The drilling was accomplished under the continuous observation of an experienced geologist from our firm. Detailed field logs were prepared for the boring. The exploration logs (Figures A-2 through and A-5) represent our interpretation of the drilling, excavation, sampling, and testing information. The depth where the soils or characteristics of the soils changed is noted. The change may be gradual. Soil samples recovered in the explorations were visually classified in the field in general accordance with the method presented on Figure A-1. A legend for the field log defining symbols and abbreviations utilized is also presented on Figure A-1. Samples were typically obtained at 2-foot-depth intervals using the Standard Penetration Test (SPT) procedures.

Care was taken to thoroughly clean the sampler between each sample. After removal of the soil, the sampler was scrubbed with a brush and then rinsed with tap water.

To minimize contamination between samples, the following procedures were followed. Once the soil was removed from the split-spoon sampler, the sampler was scrubbed and rinsed in tap water. The stainless-steel spoon used to transfer the soil from the sampler to the jars was rinsed thoroughly in deionized water between samples. All wash water generated on-site was discarded on the ground at the site.

An HNU PI-101 photoionization meter with a 10.2 eV lamp was used to monitor levels of volatile organic compounds in the work area around the boring.

One 4-inch-I.D. PVC monitoring wells (U1W) was installed (through the auger center) with a 10-foot screen as shown on the well construction diagrams on Figures A-5. They consisted of a slotted 4-inch-I.D. PVC pipe with a 0.020-inch slot size. A Colorado 10-20 sand pack was installed around the screen and up to 2 feet above the top of the screen. A surface seal consisting of 2 feet of concrete was placed at the wellhead. The top of the well was encased with a flush-mounted tamper-proof steel cap.

Groundwater Sampling

A samples was collected from the monitoring well after well development. Well U1W was bailed with a Teflon bailer using polypropylene line.

The groundwater at the well was collected after a minimum of three casing volumes of water was purged from the well. Purge water was barreled. A measurement of depth of groundwater was taken at the monitoring well using an electric well sounder. The reference measuring point for the readings was the top of the casing.

The samples were placed on ice upon collection and kept cool until delivered to the receiving laboratory under chain of custody procedures.

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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 perceptable moisture
Damp	Some perceptable moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptable 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

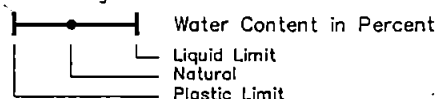
Sampling Test Symbols

BORING SAMPLES

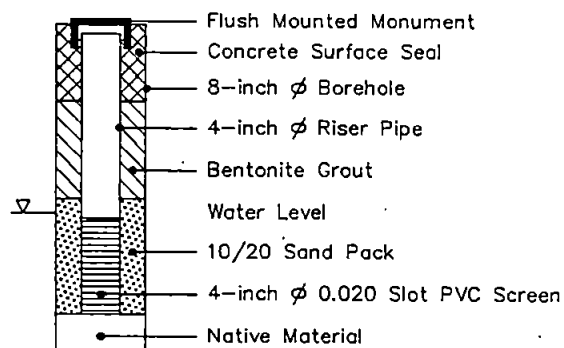
	Split Spoon
	Shelby Tube
	Cuttings
	Core Run
*	No Sample Recovery
P	Tube Pushed, Not Driven

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	QU
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



Monitoring Well Observations



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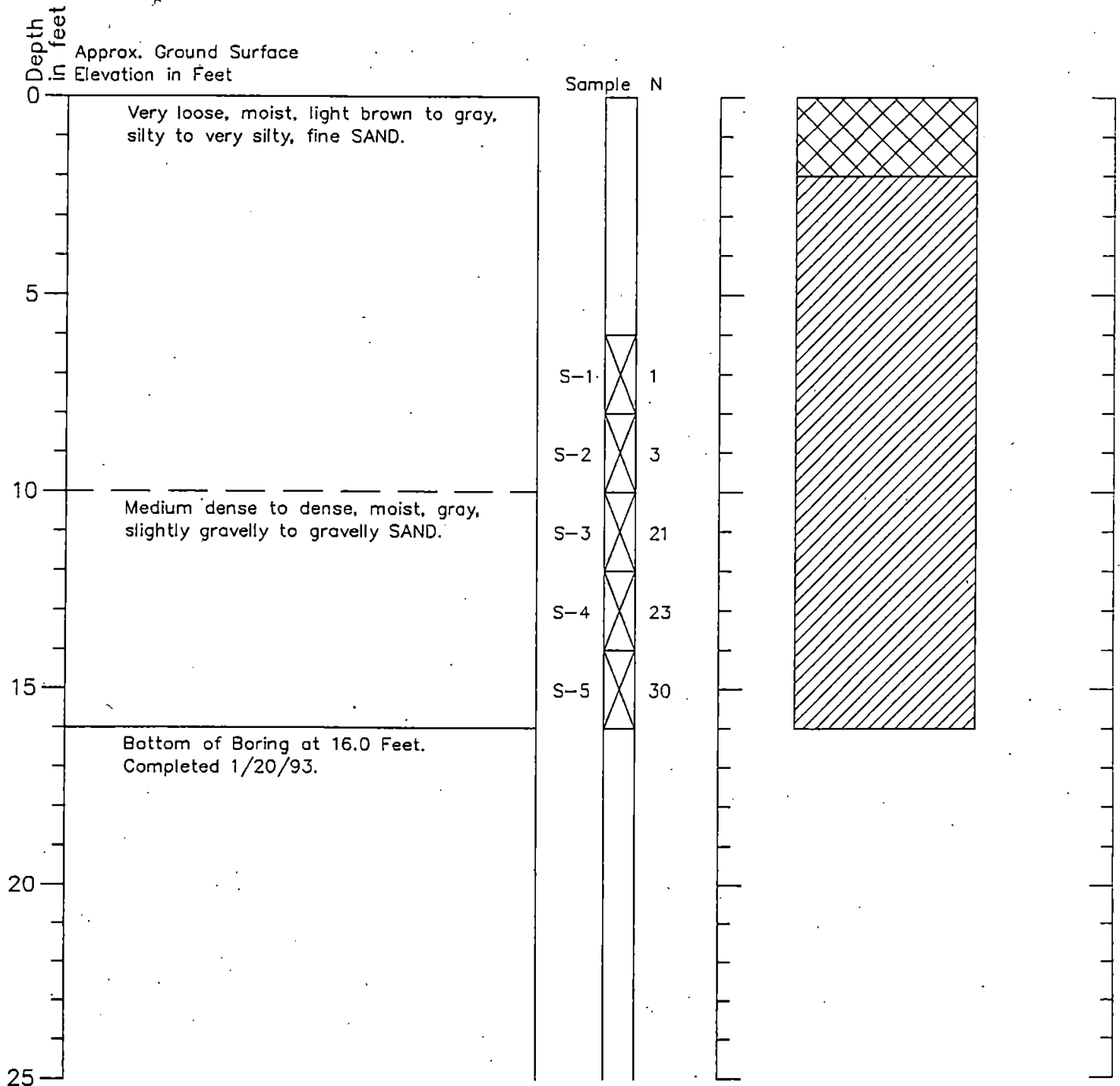
J-1639-27 2/93

Figure A-1

Boring Log U1B1

Geologic Log

Grouted Boring



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.

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J-1639-27

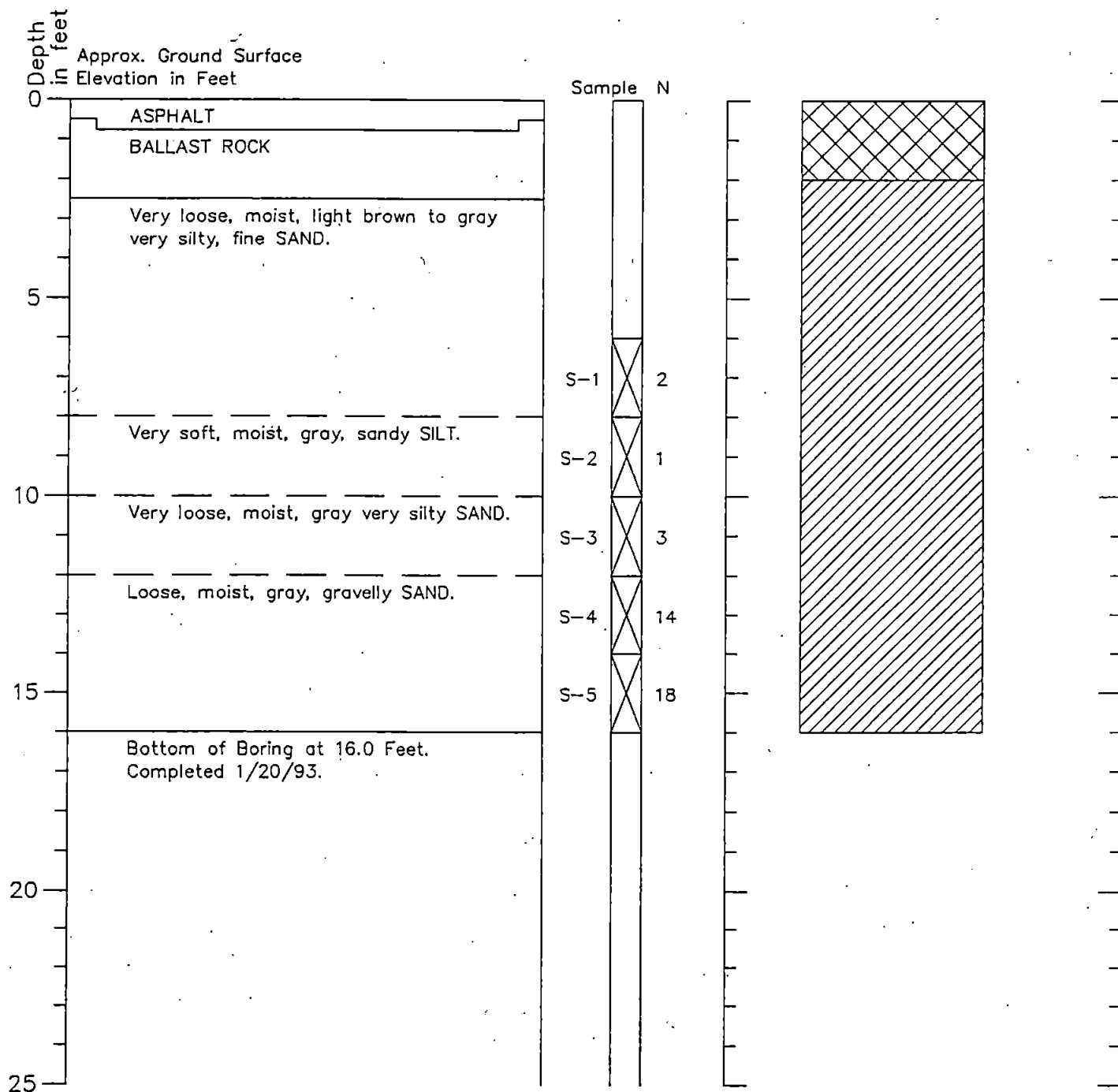
1/93

Figure A-2

Boring Log U1B2

Geologic Log

Grouted Boring



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.

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1/93

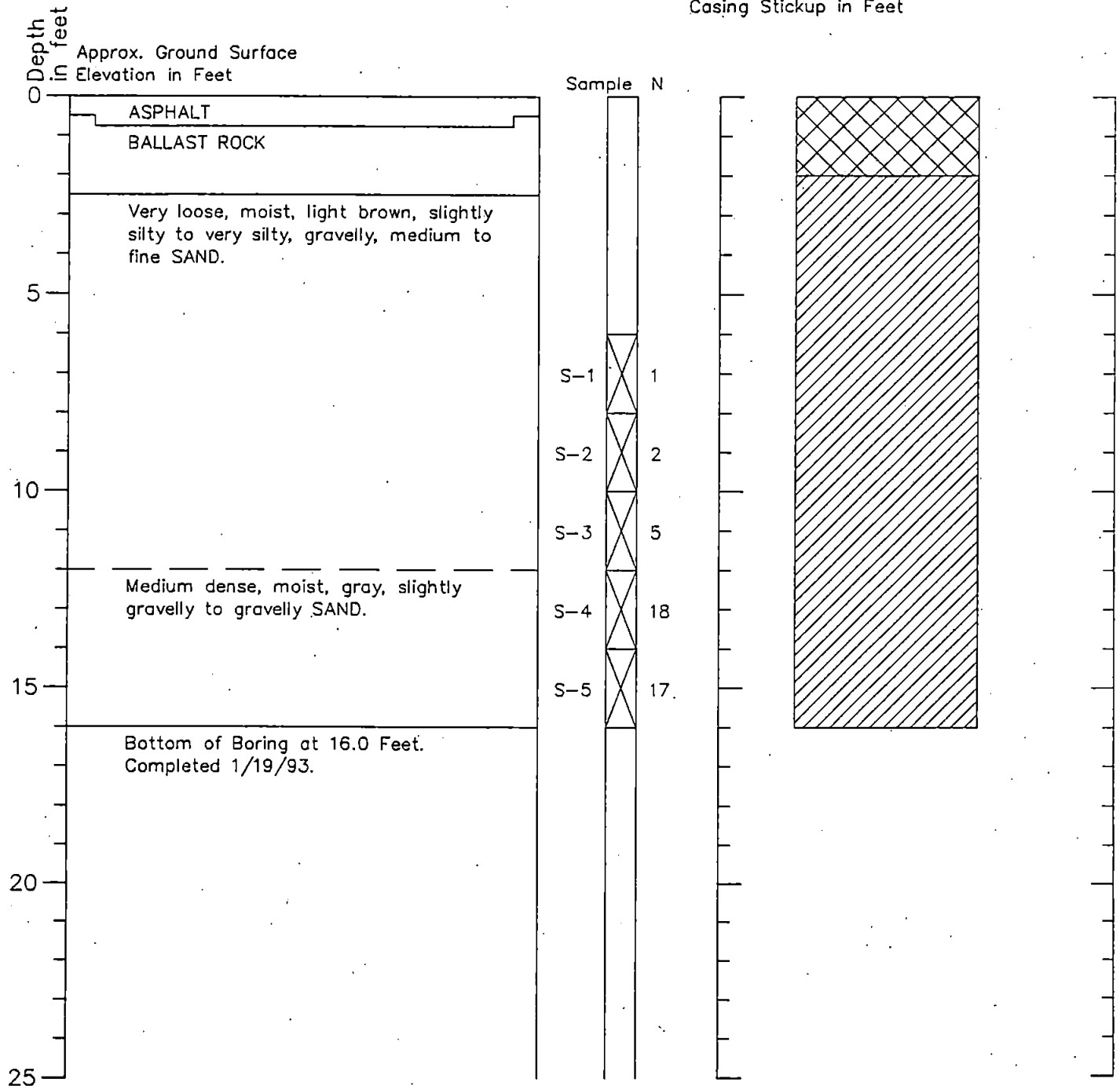
Figure A-3

Boring Log U1B3

Geologic Log

Well Design

Casing Stickup in Feet



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.

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J-1638-27

1/93

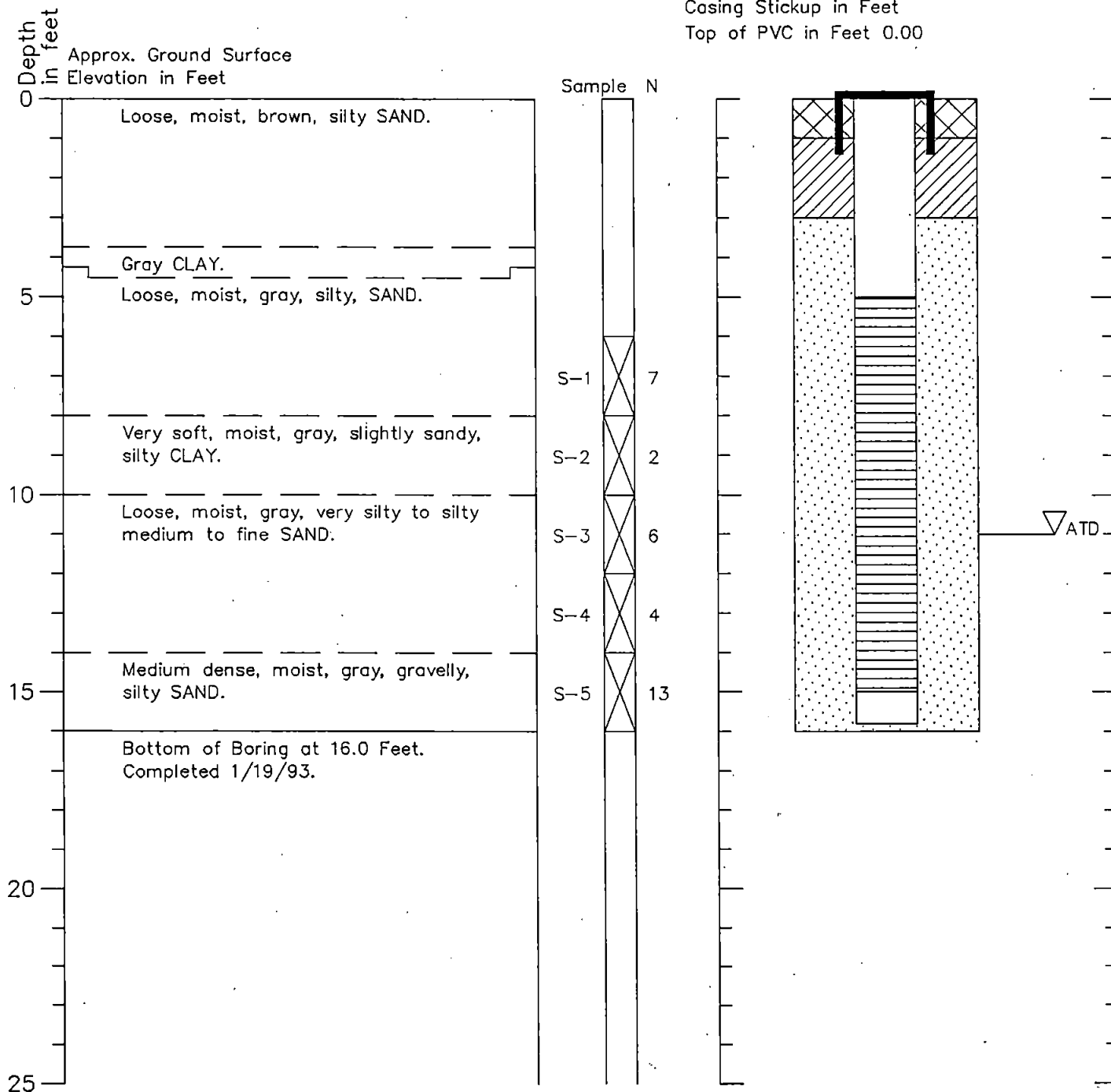
Figure A-4

Boring Log and Construction Data for Monitoring Well U1W

Geologic Log

Monitoring Well Design

Casing Stickup in Feet
Top of PVC in Feet 0.00



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.

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1/93

Figure A-5

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J-1639-27

APPENDIX B
LABORATORY ANALYTICAL REPORTS
HART CROWSER CHEMISTRY LABORATORY



HARTCROWSER

Earth and Environmental Technologies

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102
FAX 206.328.5581
206.324.9530

CHEMISTRY LABORATORY ANALYTICAL REPORT

February 9, 1993

Cathy Kiley, Hart Crowser Sr. Staff Environmental Chemist

RE: Paccar Phase IV, J-1639-27, Sequence BL

Attached are the compiled results from analyses conducted on samples received January 20, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▶ TPH-HCID	Soil	10	1/20/93	1/20/93

This report contains the following:

- ▶ Analytical results for soil samples presented on a dry weight basis.
- ▶ Data qualifiers.
- ▶ Results for method blanks.
- ▶ Recoveries for spiked samples.
- ▶ Differences for duplicate analyses.
- ▶ Recoveries for laboratory control sample.
- ▶ Copies of chain of custody forms.



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J-1639-27

Analytical Comment

TPH-HCID for this sample lot is performed using phenanthrene for quantitation.

HART CROWSER, INC.

JAMES HERNDON
Laboratory Manager
Washington State Department of Ecology
Laboratory Accreditation Number C134



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J-1639-27

Analytical Results

Results in ppm (mg/kg or mg/L)

Compound	U1W-S-1	U1W-S-2	U1W-S-3
Matrix	Soil	Soil	Soil
% Moisture	20%	27%	23%
Gasoline	10 U	10 U	10 U
Kensol	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U
Diesel/Fuel Oil #2	20 U	20 U	20 U
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	73
Unknown	10 U	10 U	10 U
Total TPH Concentration	-	-	73
2-Fluorobiphenyl (surr #1)	99%	101%	105%
o-Terphenyl (surr #2)	100%	100%	105%
Hexacosane - nC26 (surr #3)	100%	101%	113%



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J-1639-27

Analytical Results, continued

Results in ppm (mg/kg or mg/L)

Compound	U1W-S-4	U1W-S-5	U1B3-S-1
Matrix	Soil	Soil	Soil
% Moisture	21%	17%	20%
Gasoline	10 U	10 U	10 U
Kensol	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U
Diesel/Fuel Oil #2	20 U	20 U	20 U
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	50 U
Unknown	10 U	10 U	10 U
=====			
Total TPH Concentration	-	-	-

2-Fluorobiphenyl (surr #1)	101%	99%	100%
o-Terphenyl (surr #2)	99%	98%	101%
Hexacosane - nC26 (surr #3)	101%	100%	101%



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J-1639-27

Analytical Results, continued

Results in ppm (mg/kg or mg/L)

Compound	Duplicate		U1B3-S-3
	U1B3-S-2	U1B3-S-2	
Matrix	Soil	Soil	Soil
% Moisture	26%	26%	27%
Gasoline	10 U	10 U	10 U
Kensol	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U
Diesel/Fuel Oil #2	20 U	20 U	20 U
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	50 U
Unknown	10 U	10 U	10 U
=====			
Total TPH Concentration	-	-	-

2-Fluorobiphenyl (surr #1)	99%	99%	99%
o-Terphenyl (surr #2)	99%	97%	100%
Hexacosane - nC26 (surr #3)	100%	99%	102%



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J-1639-27

Analytical Results, continued

Results in ppm (mg/kg or mg/L)

Compound	U1B3-S-4	U1B3-S-5
-----	-----	-----
Matrix	Soil	Soil
% Moisture	16%	18%
Gasoline	10 U	10 U
Kensol	10 U	10 U
Kerosene/Jet A	10 U	10 U
Stoddard Solvent	10 U	10 U
Diesel/Fuel Oil #2	20 U	20 U
Bunker C	50 U	50 U
Oil	50 U	50 U
Unknown	10 U	10 U
=====	=====	=====
Total TPH Concentration	-	-
-----	-----	-----
2-Fluorobiphenyl (surr #1)	98%	98%
o-Terphenyl (surr #2)	98%	98%
Hexacosane - nC26 (surr #3)	99%	99%
-----	-----	-----

Data Qualifiers

U Not detected at indicated detection limit.
- Below detection limit.
J Estimated value below detection limit.
B Also detected in associated method blank.
M Unable to calculate recovery due to matrix interference.
n/t Test not performed.
n/a Not applicable.
Surr Surrogate compound.



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J-1639-27

Method Blanks

Results in ppm (mg/kg or mg/L)

Compound	01/19/93
-----	-----
Matrix	Soil
Gasoline	10 U
Kensol	10 U
Kerosene/Jet A	10 U
Stoddard Solvent	10 U
Diesel/Fuel Oil #2	20 U
Bunker C	50 U
Oil	50 U
Unknown	10 U
=====	=====
Total TPH Concentration	-
-----	-----
2-Fluorobiphenyl (surr #1)	99%
o-Terphenyl (surr #2)	99%
Hexacosane - nC26 (surr #3)	100%
-----	-----



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Spikes

% Recovery

Compound	MS	MSD
	U1W-S-1	U1W-S-1
Matrix	Soil	Soil
Kerosene/Jet A	67%	72%
2-Fluorobiphenyl (surr #1)	86%	85%
o-Terphenyl (surr #2)	99%	99%
Hexacosane - nC26 (surr #3)	100%	99%

Duplicates

Relative % Difference

Compound	U1W-S-1
Matrix	Soil
Kerosene/Jet A	-7%



Hart Crowser
J-1639-27

Laboratory Control Sample

% Recovery

Compound	01/19/93
-----	-----
Matrix	Soil
Kerosene/Jet A	71%
-----	-----
2-Fluorobiphenyl (surr #1)	146%
o-Terphenyl (surr #2)	102%
Hexacosane - nC26 (surr #3)	100%
-----	-----

Sample Custody Record

DATE 1/19/93

PAGE 1 OF 1



HARTCROWSER

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

JOB NUMBER <u>1639-27</u> LAB NUMBER _____ PROJECT MANAGER <u>J. Finn</u> PROJECT NAME <u>PACCAR Phase IV</u> SAMPLED BY: <u>J. Bromley</u>					TESTING 8015 MODIFIED										NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS		
LAB NO.	SAMPLE	TIME	STATION	MATRIX														
	U1W-5-1		U1W	Soil												1	Quantify Phenethrene	
	U1W-5-2		U1W	↓												1	Certified Analysis	
	U1W-5-3		U1W														1	
	U1W-5-4		U1W														1	
	U1W-5-5		U1W														1	
	U1B3-5-1		U1B3														1	8015 Mod TPH Equivalent
	U1B3-5-2		U1B3	↓												1	to WTPH-ID	
	U1B3-5-3		U1B3														1	
	U1B3-5-4		U1B3														1	
	U1B3-5-5		U1B3	↓												1	24 HR TAT	
RELINQUISHED BY		DATE	RECEIVED BY		DATE	TOTAL NUMBER OF CONTAINERS										METHOD OF SHIPMENT		
SIGNATURE <u>John Bromley</u> PRINTED NAME <u>John Bromley</u> COMPANY <u>Hart Crowser</u>		<u>1/19/93</u> TIME	SIGNATURE <u>Valery Ivanov</u> PRINTED NAME <u>Valery Ivanov</u> COMPANY <u>HC</u>		<u>1/20/93</u> TIME <u>8:30</u>	<u>10</u>										<u>Hand Delivery</u>		
RELINQUISHED BY		DATE	RECEIVED BY		DATE	SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS												
SIGNATURE		TIME	SIGNATURE		TIME	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												
PRINTED NAME			PRINTED NAME															
COMPANY			COMPANY															



HARTCROWSER

Earth and Environmental Technologies

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102
FAX 206.328.5581
206.324.9530

CHEMISTRY LABORATORY ANALYTICAL REPORT

February 9, 1993

Cathy Kiley, Hart Crowser Sr. Staff Environmental Chemist

RE: Paccar Phase IV, J-1639-27, Sequence BN

Attached are the compiled results from analyses conducted on samples received January 20, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▶ TPH-HCID	Soil	10	1/20/93	1/20/93

This report contains the following:

- ▶ Analytical results for soil samples presented on a dry weight basis.
- ▶ Data qualifiers.
- ▶ Results for method blanks.
- ▶ Recoveries for spiked samples.
- ▶ Differences for duplicate analyses.
- ▶ Recoveries for laboratory control sample.
- ▶ Copies of chain of custody forms.



Hart Crowser
J-1639-27

Analytical Comments

TPH-HCID for this sample lot is performed using phenanthrene for quantitation.

Letter designations above sample identifications correspond with associated method blank and laboratory control sample.

HART CROWSER, INC.

JAMES HERNDON

Laboratory Manager

Washington State Department of Ecology

Laboratory Accreditation Number C134



Hart Crowser
J-1639-27

Analytical Results

Results in ppm (mg/kg or mg/L)

Compound	A U1B1-S-1	A U1B1-S-2	A U1B1-S-3
	Soil	Soil	Soil
Matrix % Moisture	34%	26%	20%
Gasoline	10 U	10 U	10 U
Kensol	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U
Diesel/Fuel Oil #2	130	140	470
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	50 U
Unknown	10 U	10 U	10 U
=====			
Total TPH Concentration	130	140	470

2-Fluorobiphenyl (surr #1)	138%	139%	136%
o-Terphenyl (surr #2)	112%	108%	148%
Hexacosane - nC26 (surr #3)	106%	103%	108%



Hart Crowser
J-1639-27

Analytical Results, continued

Results, in ppm (mg/kg or mg/L)

Compound	B	A	B
	U1B1-S-4	U1B1-S-5	U1B2-S-1
Matrix	Soil	Soil	Soil
% Moisture	16%	11%	27%
Gasoline	10 U	10 U	10 U
Kensol	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U
Diesel/Fuel Oil #2	230	44	20 U
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	50 U
Unknown	10 U	10 U	10 U
=====			
Total TPH Concentration	230	44	-

2-Fluorobiphenyl (surr #1)	154%	126%	86%
o-Terphenyl (surr #2)	122%	111%	82%
Hexacosane - nC26 (surr #3)	103%	103%	83%



Hart Crowser
J-1639-27

Analytical Results, continued

Results in ppm (mg/kg or mg/L)

Compound	A	A	A
	U1B2-S-2	U1B2-S-3	U1B2-S-4
Matrix	Soil	Soil	Soil
% Moisture	30%	23%	12%
Gasoline	10 U	10 U	10 U
Kensol	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U
Diesel/Fuel Oil #2	20 U	20 U	550
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	50 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	-	-	550
2-Fluorobiphenyl (surr #1)	105%	101%	139%
o-Terphenyl (surr #2)	105%	104%	112%
Hexacosane - nC26 (surr #3)	102%	101%	107%



Hart Crowser
J-1639-27

Analytical Results, continued

Results in ppm (mg/kg or mg/L)

Compound	A	
	Duplicate U1B2-S-4	A U1B2-S-5
-----	-----	-----
Matrix	Soil	Soil
% Moisture	12%	15%
Gasoline	10 U	10 U
Kensol	10 U	10 U
Kerosene/Jet A	10 U	10 U
Stoddard Solvent	10 U	10 U
Diesel/Fuel Oil #2	720	45
Bunker C	50 U	50 U
Oil	50 U	50 U
Unknown	10 U	10 U
=====	=====	=====
Total TPH Concentration	720	45
-----	-----	-----
2-Fluorobiphenyl (surr #1)	149%	120%
o-Terphenyl (surr #2)	118%	105%
Hexacosane - nC26 (surr #3)	107%	99%
-----	-----	-----

Data Qualifiers

U Not detected at indicated detection limit.
- Below detection limit.
J Estimated value below detection limit.
B Also detected in associated method blank.
M Unable to calculate recovery due to matrix interference.
n/t Test not performed.
n/a Not applicable.
Surr Surrogate compound.



Hart Crowser
J-1639-27

Method Blanks

Results in ppm (mg/kg or mg/L)

Compound	A	B
	01/20/93	01/22/93
Matrix	Soil	Soil
Gasoline	10 U	10 U
Kensol	10 U	10 U
Kerosene/Jet A	10 U	10 U
Stoddard Solvent	10 U	10 U
Diesel/Fuel Oil #2	20 U	20 U
Bunker C	50 U	50 U
Oil	50 U	50 U
Unknown	10 U	10 U
Total TPH Concentration	-	-
2-Fluorobiphenyl (surr #1)	99%	79%
o-Terphenyl (surr #2)	98%	83%
Hexacosane - nC26 (surr #3)	100%	83%



Hart Crowser
J-1639-27

Spikes

% Recovery

Compound	B MS U1B1-S-4	B MSD U1B1-S-4
	Soil	Soil
Matrix		
Kerosene/Jet A	64%	56%
2-Fluorobiphenyl (surr #1)	126%	123%
o-Terphenyl (surr #2)	90%	90%
Hexacosane - nC26 (surr #3)	83%	83%

Duplicates

Relative % Difference

Compound	B U1B1-S-4	A U1B2-S-4
	Soil	Soil
Matrix		
Kerosene/Jet A	14%	
Total TPH Concentration		-27%



Hart Crowser
J-1639-27

Laboratory Control Sample

% Recovery

Compound	A	B
	01/20/93	01/22/93
Matrix	Soil	Soil
Kerosene/Jet A	79%	66%
2-Fluorobiphenyl (surr #1)	148%	107%
o-Terphenyl (surr #2)	75%	76%
Hexacosane - nC26 (surr #3)	76%	77%

Sample Custody Record

DATE 1/20/92 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER	LAB NUMBER																
1639-27																	
PROJECT MANAGER J. Finn																	
PROJECT NAME Paucar Phase IV																	
SAMPLED BY: J. Bromley																	
LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING								NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS			
	U1B1-S-1	1/20/92	U1B1	Soil	X											1	Quantify Phenanthrene
	U1B1-S-2				X											1	Certified Analysis
	U1B1-S-3				X											1	
	U1B1-S-4				X											1	
	U1B1-S-5				X											1	8015 Mod TPH equivalent
	U1B2-S-1		U1B2		X											1	to WTPH-ID
	U1B2-S-2				X											1	
	U1B2-S-3				X											1	
	U1B2-S-4				X											1	24 HR TAT
	U1B2-S-5				X											1	
RELINQUISHED BY		DATE	RECEIVED BY		DATE		TOTAL NUMBER OF CONTAINERS								METHOD OF SHIPMENT		
<i>[Signature]</i>		1/20/92	<i>[Signature]</i>		1/20		10								Hand Deliver		
SIGNATURE		TIME	PRINTED NAME		COMPANY		SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS								S-3		
<i>[Signature]</i>		2:30	Roz Rohlz		Hart Crowder												
DATE		TIME	DATE		TIME		DISTRIBUTION:										
1/20/92		2:30	1/20		2:30		1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY										
1/20/92		2:30	1/20		2:30		2. RETURN PINK COPY TO PROJECT MANAGER										
1/20/92		2:30	1/20		2:30		3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT										
1/20/92		2:30	1/20		2:30		4. LABORATORY TO RETURN WHITE COPY TO HART CROWDER										



HARTCROWSER

Earth and Environmental Technologies

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102
FAX 206.328.5581
206.324.9530

CHEMISTRY LABORATORY ANALYTICAL REPORT

February 26, 1993

Cathy Kiley, Hart Crowser Sr. Staff Environmental Chemist

RE: PACCAR Phase IV, J-1639-27, Sequence BO

Attached are the compiled results from analyses conducted on samples received January 26, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▶ TPH-HCID	Water	1	1/27/93	1/27/93

This report contains the following:

- ▶ Analytical results for soil samples presented on a dry weight basis.
- ▶ Data qualifiers.
- ▶ Results for method blanks.
- ▶ Recoveries for laboratory control sample.
- ▶ Copies of chain of custody forms.



Hart Crowser
J-1639-27

Analytical Comment

TPH-HCID for this sample lot is performed using phenanthrene for quantitation.

HART CROWSER, INC.

JAMES HERNDON

Laboratory Manager

Washington State Department of Ecology

Laboratory Accreditation Number C134



Hart Crowser
J-1639-27

Analytical Results

Results in ppm (mg/kg or mg/L)

Compound	Duplicate	
	U1W	U1W
-----	-----	-----
Matrix	Water	Water
Gasoline	0.2 U	0.2 U
Kensol	0.4 U	0.4 U
Kerosene/Jet A	0.4 U	0.4 U
Stoddard Solvent	0.2 U	0.2 U
Diesel/Fuel Oil #2	0.4 U	0.4 U
Bunker C	0.4 U	0.4 U
Oil	0.4 U	0.4 U
Unknown	0.4 U	0.4 U
=====	=====	=====
Total TPH Concentration	-	-
-----	-----	-----
2-Fluorobiphenyl (surr #1)	95%	95%
o-Terphenyl (surr #2)	97%	96%
Hexacosane - nC26 (surr #3)	108%	109%
-----	-----	-----

Data Qualifiers

U Not detected at indicated detection limit.
- Below detection limit.
J Estimated value below detection limit.
B Also detected in associated method blank.
M Unable to calculate recovery due to matrix interference.
n/t Test not performed.
n/a Not applicable.
Surr Surrogate compound.



Hart Crowser
J-1639-27

Method Blanks

Results in ppm (mg/kg or mg/L)

Compound	01/27/93
-----	-----
Matrix	Water
Gasoline	0.2 U
Kensol	0.4 U
Kerosene/Jet A	0.4 U
Stoddard Solvent	0.2 U
Diesel/Fuel Oil #2	0.4 U
Bunker C	0.4 U
Oil	0.4 U
Unknown	0.4 U
=====	=====
Total TPH Concentration	-
-----	-----
2-Fluorobiphenyl (surr #1)	96%
o-Terphenyl (surr #2)	97%
Hexacosane - nC26 (surr #3)	80%
-----	-----



Hart Crowser
J-1639-27

Laboratory Control Sample

% Recovery

Compound	01/27/93

Matrix	Water
Kerosene/Jet A	84%

2-Fluorobiphenyl (surr #1)	M
o-Terphenyl (surr #2)	97%
Hexacosane - nC26 (surr #3)	97%



DATE 1/22/92 PAGE 1 OF 1

HART CROWSER

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

JOB NUMBER <u>1639-27</u>		LAB NUMBER _____		TESTING												NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
PROJECT MANAGER <u>J. Finn</u>																	
PROJECT NAME <u>PACCAR IV</u>																	
SAMPLED BY: <u>JPR</u>																	
LAB NO.	SAMPLE	TIME	STATION														MATRIX
	UIW	1/22/93	UIW														Water
RELINQUISHED BY		DATE	RECEIVED BY		DATE	TOTAL NUMBER OF CONTAINERS		METHOD OF SHIPMENT									
SIGNATURE <u>John Browley</u>		<u>1/22/93</u>	SIGNATURE <u>Valery Ivanov</u>		<u>1/26/93</u>	1		Hand Deliver									
PRINTED NAME <u>HC</u>		TIME <u>11:30</u>	PRINTED NAME <u>VALERY IVANOV</u>		TIME <u>9:00</u>	SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS											
COMPANY _____			COMPANY _____														
RELINQUISHED BY		DATE	RECEIVED BY		DATE	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											
SIGNATURE			SIGNATURE														
PRINTED NAME		TIME	PRINTED NAME		TIME												
COMPANY			COMPANY														