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HARTCROWSER

Earth and Environmental Technologies

Report of Findings and Recommendations Additional Subsurface Exploration and Engineering at Hot Spot U1 PACCAR Renton Site Renton, Washington

Prepared for
PACCAR Inc

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REPORT OF FINDINGS AND RECOMMENDATIONS ADDITIONAL SUBSURFACE EXPLORATION AND ENGINEERING AT HOT SPOT U1 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 at the above referenced site. This work was conducted as a continuation of the Phase IV cleanup, in accordance with the work plan for U1 (Hart Crowser, 1993a and 1993b).

The Phase IV hot spot excavation at grid location U1, south of Building 17, encountered petroleum hydrocarbon contamination in the soil. This contamination appeared to be present at the western extent of the excavation completed in October 1992. Because of the proximity of this hot spot to Garden Avenue North and associated underground utilities, PACCAR chose to assess the vertical and lateral extent of contamination in a phased approach.

Complete documentation of the Phase IV U1 hot spot excavation will be provided in the Phase IV Construction Documentation Report.

The remainder of this report is organized as follows:

- Executive Summary
- Scope of Work
- U1 Area Background
- Subsurface Conditions
  - Extent and Type of Soil Contamination
  - Extent and Type of Groundwater Contamination
- Potential Remedial Alternatives
  - Scope and Assumptions of Remediation
  - Cutoff Wall Construction Will Facilitate Remediation
  - Four Remediation Schemes Considered
  - *In Situ* Bioremediation
  - Excavation
    - On-site Bioremediation
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- Estimated Costs for Remediation
  - *In Situ* Bioremediation
  - Excavation with On-Site Biotreatment
  - Excavation with Off-Site Disposal
  - Excavation with Thermal Treatment
- Recommendations
- Limitations

EXECUTIVE SUMMARY

As part of the Remedial Investigation conducted at the PACCAR Renton site, several soil borings and monitoring wells were installed along Garden Avenue North between North 4th Street and North 6th Street during 1986 and 1989. Soil boring and well installation logs were presented in the Remedial Investigation Report (Hart Crowser, 1989).

During the most recent testing of Garden Avenue between North 4th Street and North 5th Street, TPH (diesel) was detected in soil samples from several borings and monitoring wells. The TPH (diesel) at the U1 hot spot area along Garden Avenue North appears to be bounded to the northwest by soil borings U1B11, U1B13, U1B15, and U1W3, and to the south by U1W, U1B3, and U1B7. The concentrations of detected TPH are not correlated with a specific geologic unit.

TPH (oil) was only detected in soil samples from five borings—U1W, U1B10, U1B11, U1BF1, and U1BF3. In borings U1B10, U1BF1, and U1BF3, the oil appears to be confined to a slightly sandy clayey silt layer. However, in U1W and U1B11, the oil is confined to distinct sand layers.

TPH (diesel) was detected in the groundwater samples from U1N, U1S, U1W2, and U1W3. TPH was not detected in groundwater samples from U1W. The highest concentration of TPH (50 mg/L) was detected in the groundwater sample from well U1W2, located on the west side of Garden Avenue North.

The two lowest cost remediation options are *in situ* bioremediation and excavation with on-site bioremediation. The rough estimated costs for *in situ* bioremediation are less than excavation and on-site bioremediation. However, *in situ* bioremediation is the less certain approach.

SCOPE OF WORK

This report presents the results of our most recent work for the U1 area including completion of 18 borings and five monitoring wells and the associated soil and groundwater analytical results for total petroleum hydrocarbons. The objective of this work was to further characterize the extent of petroleum-affected soils and to assess the feasibility of various remediation alternatives. This work was accomplished in general accordance with our proposal dated May 10, 1993, and as authorized by your purchase order dated May 12, 1993. We also utilize other information in this report that resulted from other U1 activities; namely, previous explorations and excavation, and associated sampling and analysis.

U1 AREA BACKGROUND

The U1 area was designated a hot spot in the Feasibility Study as a result of the Remedial Investigation. Historical site use in this area consisted of several underground diesel fuel storage tanks and distribution lines into Building 17 (Foundry Building). As part of the interim actions taken by PACCAR, approximately 890 cubic yards of petroleum-affected soil were removed in 1990.

In November 1992, after initial Cleanup Action Plan (CAP) hot spot excavations were completed, two soil borings, designated U1N and U1S, were advanced and completed as groundwater monitoring wells just east of Garden Avenue North. Results of this initial subsurface exploration indicated petroleum hydrocarbon contamination in the soil and groundwater, and floating product in groundwater monitoring well U1N. Because the presence of buried utilities, the public sidewalk, and Garden Avenue North complicated any further excavation of the western wall of U1, PACCAR chose to continue the assessment of the vertical and lateral extent of petroleum hydrocarbon contamination north and west of the limits of the U1 excavation prior to conducting additional excavation.

In January 1993, three soil borings, designated U1B1, U1B2, and U1B3, were advanced and a fourth boring, U1W, was completed as a groundwater monitoring well in Garden Avenue North. Results from these subsurface explorations indicated petroleum hydrocarbon contamination in the soil continued approximately 10 feet west and 40 feet north of the previously excavated area; but, potentially had not contaminated the groundwater, as TPH was not detected in the groundwater sample collected from the west side of Garden Avenue North.

In February and March 1993, PACCAR initiated additional excavation of TPH-affected soil from the U1 hot spot area east of Garden Avenue North on the PACCAR property. During excavation adjacent to the Building 17 (Foundry Building), we observed seepage of petroleum product from beneath the building. Excavations were lined with a 40-ml textured HDPE liner or two layers of Griffloyn liner, then backfilled with control density fill (CDF) to avoid migration of the TPH contamination back into the recently backfilled areas. Analytical results indicated TPH concentrations in most samples taken from the west wall of the excavation, which is immediately adjacent to Garden Avenue North. PACCAR suspended additional excavation to the north in March 1993 pending further exploration of the vertical and lateral extent of TPH contamination in Garden Avenue North.

In April 1993, PACCAR initiated limited excavation of TPH-affected soils located in the easternmost lane of Garden Avenue North to remove the localized TPH soil contamination in this area. Excavation proceeded to a depth of 8 to 12 feet. The excavation was conducted a minimum of 2 feet east of the natural gas pipeline and 2 feet on either side of the water main. A 24-inch storm sewer at a depth of about 7 feet was also encountered in the excavation. Analytical results indicated TPH concentrations in most samples taken from the west wall and north wall of the excavation.

In May and June 1993, fifteen soil borings (U1B4 through U1B13, U1B15, and U1BF1 through U1BF4) were advanced and two monitoring wells (U1W2 and U1W3) were completed in the U1 hot spot area extending from south of Building 17 into Garden Avenue North and north approximately 200 feet. Analytical results indicated TPH (diesel) concentrations in most soil borings and both monitoring wells. The northern and southern bounds of the TPH contamination were estimated based on this exploration program.

SUBSURFACE CONDITIONS

Extent and Type of Soil Contamination

A total of 18 borings and 5 groundwater monitoring wells have been completed at the U1 area. Figure 1 shows the location of the borings and monitoring wells installed at U1 as well as the cross section locations. Figures 2 through 6 show the TPH concentration contours in mg/kg at various depths below ground surface estimated using the TPH data from the soil samples collected at the U1 area. Figures 7 through 11 show the geologic cross sections 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. All soil samples were analyzed for total petroleum hydrocarbons (TPH) by Method 8015-Modified in accordance with the analytical procedures used for other PACCAR Renton site cleanup work. Tables 1 through 3 present the analytical results for the soil samples.

The results of these explorations and excavations indicate that in general the extent of TPH in soil is limited to a depth of 17 feet below the ground surface. As shown on Figures 2 through 6, the majority of the petroleum-affected soils exist at depths of less than 13 feet.

The areal extent of the petroleum-affected soils extends west of and below the southern portion of Building 17 to the west edge of Garden Avenue North, and approximately 200 feet north along Garden Avenue North.

The north-south extent of the petroleum-affected soils is bounded by borings U1B10, U1B11, U1B13, and U1B15 to the north (with relatively low concentrations within about 7 feet of the ground surface) and wells U1W and U1S and boring U1B3 to the south. Note that groundwater sampled from U1S had detectable concentrations of TPH (0.5 mg/L). Borings U1B15, U1S, and U1B3 had no indication of petroleum-affected soils (i.e., analytical results were less than the detection limit). Borings U1B10, U1B11, U1B12, U1B13, and U1W had only relatively low concentrations in isolated samples.

The affected portion of Garden Avenue North therefore covers an area of about 175 feet long with the roadway width of about 40 feet. The affected area beneath the foundry is not yet clear but appears to be a minimum of 130 feet in the north-south direction and 110 feet in the east-west direction emanating from the southwest corner of the foundry.

The primary petroleum constituent in the soils is diesel with oil only indicated in five borings at isolated depths: sample S-3 in U1W, sample S-1 in U1B10, samples S-1 and S-2 in U1B11, sample S-3 in U1BF1, and sample S-3 in U1BF3.

No obvious past pathway for the petroleum through soils is evident, although it appears that in general the silt soils tend to have lower TPH concentrations than the silty sands. Diesel concentrations in the sandy gravel tend to decrease rapidly with depth.

Extent and Type of Groundwater Contamination

TPH was detected in groundwater samples from wells U1N, U1S, U1W2, and U1W3. TPH in groundwater samples and in a product sample from well U1N was identified by laboratory analysis as diesel/fuel oil No. 2. TPH was not detected in the groundwater sample collected from well U1W. The analytical results for groundwater are summarized below. Table 4 presents the analytical results for the groundwater samples.

- Floating product was observed in well U1N at the start of well development in December 1992, prior to recent U1 excavation. After a 24-hour purge recovery period, the product had a thickness of 0.35 foot. Well U1N was abandoned and the surrounding TPH-contaminated soil was excavated during the February 1993 excavation conducted on PACCAR property, east of Garden Avenue North.

- The groundwater sample from well U1N had a TPH concentration of 2 mg/L.

- The groundwater sample from well U1S had a TPH concentration of 0.5 mg/L with no measurable product.

- TPH was detected in groundwater collected from both monitoring wells, U1W2 and U1W3, at concentrations of 50 and 8 mg/L, respectively, with no measurable product.

The groundwater beneath the U1 area, as encountered between depths of 7 and 10 feet below ground surface in these wells, is likely groundwater perched on silt layers or groundwater beneath silt layers or in areas where silt was not present. The near-surface hydrogeology in the U1 area is complex due to varied soil layers and has been further complicated by construction activities. However, based on flow information available from the rest of the site, it is our opinion that groundwater would generally flow to the west except where flow patterns have been altered by construction or other activities.

POTENTIAL REMEDIAL ALTERNATIVES

Scope and Assumptions of Remediation

The remedial alternatives presented in this report are based on several assumptions;

- The primary petroleum constituent in the soil is diesel;
- The natural occurring microbes in the soil successfully degrade the TPH (diesel) as evidenced from the successful land treatment unit (LTU) bioremediation of the TPH-contaminated soils excavated from the U1 hot spot area;
- Building 17 is to remain in place;
- There is sufficient space on site to biotreat excavated soil in the existing LTUs; and
- Costs for excavation along Garden Avenue North will remain consistent with 1993 costs.

Cutoff Wall Construction Will Facilitate Remediation

Since the remediation beneath Garden Avenue will likely occur prior to remediation for soils beneath the foundry, construction of a cutoff wall along the perimeter of the foundry will be useful. The primary purpose of this cutoff wall will be to isolate areas of U1 that are undergoing remediation from potential migration of diesel fuel from soils beneath the foundry. To accomplish this, we suggest construction of a trench with a depth of about 10 to 15 feet and backfilled with lean concrete or controlled density fill. The final depth and extent of this cutoff wall will be determined later but would likely include the southwest corner of the foundry.

During the February and March 1993 excavations along the west and south sides of the foundry, sandy gravel pit run and control density fill were used as backfill and a 40-ml textured HDPE liner or two layers of Griffloyn liner were used to line the wall of the excavation adjacent to the foundry. Since these excavations were completed at a depth of 8 to 10 feet, it may be necessary to modify the existing backfill or construct a cutoff wall adjacent to these areas to a depth of 10 to 15 feet.

A short section of cutoff wall on the west edge of Garden Avenue North may be helpful during excavation. Alternatively, a 40-ml textured HDPE

liner or two layers of Griffloyn liner may be used to line the west edge of the excavations. The costs of both cutoff walls and/or liners are not included in this work.

Four Remediation Schemes Considered

We considered the following four remediation schemes in this report:

- *In Situ* Bioremediation;
- Excavation and On-site Bioremediation;
- Excavation and Off-site Disposal; and
- Excavation and Thermal Treatment.

Descriptions of how these remediation schemes would apply to this U1 area are presented below.

These descriptions focus on the petroleum-affected soils beneath Garden Avenue North or immediately adjacent to it on the PACCAR property. The petroleum-affected soils beneath the foundry are not included in the consideration of the remediation schemes in this report, but could utilize these schemes as well.

For the purposes of this report, we have defined the scope of the remediation in the following four sections. For *in situ* bioremediation, we define the areal extent of the treatment system. For the purpose of comparing the costs of these excavation schemes, we define the cubic yards of soil to be excavated as a range of volumes that can be excavated practicably. It should be noted that these are feasibility estimates and that the actual scope of remediation will be determined during later design work.

In Situ Bioremediation

In situ bioremediation involves stimulating the naturally occurring microbes to degrade a target contaminant. The process relies on the fact that naturally occurring microbes capable of degrading the target contaminant (in this case diesel fuel) are present in soil and are generally limited only by the lack of oxygen, nitrogen, phosphorus and sometimes trace minerals. The degradation process can be initiated and maintained by supplying these nutrients to the subsurface affected area. Therefore, it is not necessary to excavate the impacted soil.

The equipment required to conduct the *in situ* remediation includes wells (or galleries) for injection and extraction of the required nutrients. Additionally, it is often necessary to include an above-ground treatment

system for the extracted water which often contains significant concentrations of the constituents.

Conceptually, we propose to direct the extraction water to an above-ground aqueous bioreactor where the diesel degradation process can be optimized. The effluent from the bioreactor would then be replenished with oxygen and nutrients, and reinjected into the subsurface affected area. In this way, we would minimize the need to dispose of extracted water off site. Figure 12 presents a schematic flow diagram showing the *in situ* biotreatment conceptual approach. Figure 13 presents a projected overview of the *in situ* treatment system along Garden Avenue North.

Several factors affect the success of *in situ* bioremediation including the following: a biodegradable contaminant; a relatively permeable soil matrix; a subsurface geology which allows predictable groundwater flow from injection to extraction; and a soil chemistry that is compatible with the nutrient mix being injected (i.e., no serious precipitation of nutrients or other inorganics). The available data from the ongoing Phase IV land treatment unit bioremediation indicate that the contaminant (diesel) is biodegradable and that there are naturally occurring microbes capable of degrading the hydrocarbons.

For the purpose of this report, we estimate nine injection wells on the west side of Garden Avenue North, assuming a zone of influence for each well of approximately 40 feet. These wells would inject oxygenated water with nutrients along a screened section to a depth of 8 feet (above the silt layer), and/or to a depth of 17 feet (below the silt layer). We anticipate that we will need to conduct pumping tests in this area to provide a final design. Additional wells would need to be installed along the both the west and east edges of Garden Avenue North in order to effectively inject and induce a flow to the recovery gallery. Groundwater flow across Garden Avenue North would be induced by the recovery gallery, which would consist of a series of wells along the west edge of PACCAR's property adjacent to Garden Avenue North. The *in situ* system would operate 24 hours per day and it is estimated that it would need to operate a minimum of six months but most likely would require greater duration of operations.

Some uncertainty exists for this scheme of treatment and represents the primary disadvantage for *in situ* bioremediation. The uncertainty is a results of the complex subsurface conditions. Current data indicate that the silt layer at a depth of approximately 8 feet below ground surface may inhibit the injection and transport of oxygen and nutrients to the affected soils beneath this layer. Additionally, there is indications of TPH directly below this silt layer. It may be difficult to induce the flow of the enriched water from the injection areas to these areas along the silt layer since the

injected water tends to migrate downward. Field pumping tests may reduce the uncertainty or alternatively, a flexible approach to the operation involving additional wells could be used.

Excavation

Excavation along Garden Avenue is complicated by utilities including a storm sewer, water pipe, electrical, gas line, and telephone lines. Deeper excavation may require additional engineering controls. Additionally, the City of Renton would need to approve all work in the street, and may impose strict requirements on street closure.

The amount of soil to be excavated includes the U1 hot spot area extending from south of Building 17 into Garden Avenue North and north approximately 200 feet. Approximately 2,100 to 3,700 cubic yards of excavation are estimated.

On-Site Biotreatment

Assuming that there is room for the soils in the existing on-site LTUs, the excavated soil would be placed in the on-site LTUs for treatment. A minimum of five 18-inch lifts of soil would be required if approximately 2,100 cubic yards are excavated. Based on the performance of the LTUs to date, one 18-inch lift of soil completes biotreatment in 90 days. Consequently, biotreatment of this soil would take about 1½ years or more if placed in a single LTU (wetness of excavated soils may extend the biotreatment period).

A minimum of seven 18-inch lifts of soil would be required if approximately 3,700 cubic yards are excavated. Based on the performance of the LTUs to date, one 18-inch lift of soil completes biotreatment in 90 days. Consequently, biotreatment of this soil would take about 2 years or more if placed in a single LTU (wetness of excavated soils may extend the biotreatment period).

One advantage to using this method is that these treated soils would eventually be available for use as backfill for the excavation of Building 17. Also, Ecology has approved of this method for treatment of TPH-contaminated soils. The major disadvantage to this option is the excavation cost and the time of treatment.

Off-Site Disposal

Alternatively, the excavated soil may be disposed of off site at a landfill, in accordance with the applicable restrictions. To date, PACCAR has handled profiling and off-site disposal of soils. Assuming that the excavated soils would not require an additional profile, and that no disposal restrictions applied, the soil could be disposed of at a number of regional landfills (Roosevelt, Arlington) according to the appropriate waste designation. At the Arlington landfill, the cost for disposal of either solid or dangerous waste is the same, approximately $134 per ton. The advantage to this approach is that the soil is quickly removed from the site. The major disadvantages to this option are that it is not a permanent solution, has high excavation and disposal costs (soils will require on-site stabilization prior to off-site shipment), and contamination is moved (less preferred by Ecology).

Thermal Treatment

Alternatively, provided that the excavated soil contains only petroleum products, and no chlorinated compounds, the excavated soil may be treated at Holnam, Inc. Holnam, Inc., is a cement manufacturer located in Seattle, Washington, certified to treat non-hazardous materials by incineration. The facility accepts only petroleum-affected soils—soils containing PCBs or chlorinated compounds are not accepted. Additional testing for PCBs and metals of concern (arsenic, chromium, and lead) would be required for the disposal profile. Holnam, Inc., additionally tests the soil for cement chemistry analysis and includes the incinerated material in its cement mix. All transportation costs are assumed by Holnam Inc. The advantage to this method is that the soil is quickly removed from the site. The major disadvantage to this option is the excavation and treatment cost.

ESTIMATED COSTS FOR REMEDIATION

This section provides rough cost estimates for the four remediation schemes described above. These costs estimates should be considered as an "order of magnitude" estimate suitable for use in evaluating the feasibility of the potential alternatives. These estimates have been prepared prior to any preliminary or final design and are based on past site experience and other experience. The actual remediation costs will vary depending on many factors such as soil quantities, duration of operations, disposal fees, health and safety regulations, other regulatory requirements, market conditions, and the final project scope. These costs should be

considered applicable within a range of +50 percent to -30 percent. Table 5 presents a summary of estimated costs for the four remedial alternatives.

In Situ Bioremediation

Estimated costs for equipment, installation, and startup is about $300,000. A monthly operating fee of about $6,000 is also estimated. Assuming the treatment system operates for six months, the total cost would be about $504,000, which includes additional engineering and monitoring.

Excavation with On-Site Biotreatment

The estimated cost for excavation of the approximately 2,100 cubic yards of soil is about $420,000. Using the 1993 costs for tilling and nutrient additions, the estimated cost for biotreatment of these soils is about $62,000. The total estimated cost for excavation and biotreatment is about $627,000, which includes additional engineering and monitoring.

The estimated cost for excavation of the approximately 3,700 cubic yards of soil is about $740,000. Using the 1993 costs for tilling and nutrient additions, the estimated cost for biotreatment of these soils is about $86,000. The total estimated cost for excavation and biotreatment is about $1,074,000, which includes additional engineering and monitoring.

Excavation with Off-Site Disposal

The estimated cost for excavation of the approximately 2,100 cubic yards (3,000 tons) of soil is about $420,000. Assuming that the soil will be transported in bulk, the 1993 cost is about $31 per ton. Therefore, the cost to transport the bulk soil is estimated at about $93,000. Using the 1993 costs for off-site disposal of about $134 per ton, the estimated disposal cost is about $402,000. The total estimated cost for excavation, transport, and off-site disposal is about $1,060,000, which includes additional engineering and monitoring.

The estimated cost for excavation of the approximately 3,700 cubic yards (5,200 tons) of soil is about $740,000. Assuming that the soil will be transported in bulk, the 1993 cost is about $31 per ton. Therefore, the cost to transport the bulk soil is estimated at about $162,000. Using the 1993 costs for off-site disposal of about $134 per ton, the estimated disposal cost is about $697,000. The total estimated cost for excavation, transport, and off-site disposal is about $1,840,000, which includes additional engineering and monitoring.

Excavation with Thermal Treatment

The estimated cost for excavation of the approximately 2,100 cubic yards (3,000 tons) of soil is about $420,000. Using the 1993 costs for incineration of about $45 per ton, the estimated incineration cost is about $135,000. The total estimated cost for excavation and incineration is about $694,000, which includes transportation to the treatment facility and additional engineering and monitoring.

The estimated cost for excavation of the approximately 3,700 cubic yards (5,200 tons) of soil is about $740,000. Using the 1993 costs for incineration of about $45 per ton, the estimated incineration cost is about $234,000. The total estimated cost for excavation and incineration is about $1,218,000, which includes transportation to the treatment facility and additional engineering and monitoring.

RECOMMENDATIONS

In situ bioremediation, excavation with on-site biotreatment, and excavation with thermal treatment all result in the destruction of the contamination.

The two lowest cost options are *in situ* bioremediation and excavation with on-site bioremediation. The rough estimated costs for *in situ* bioremediation are significantly less than excavation and on-site bioremediation. However, *in situ* bioremediation is a less certain approach.

We do not recommend *in situ* bioremediation for the Garden Avenue North U1 area unless additional work is done to provide more data to assess the success of *in situ* bioremediation. The recommended alternative without consideration of *in situ* bioremediation is excavation with on-site bioremediation.

If diesel contamination is found in the far west wall of Garden Avenue North, it will be necessary to address such contamination at that time.

LIMITATIONS

Work for this project was performed, and this 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.

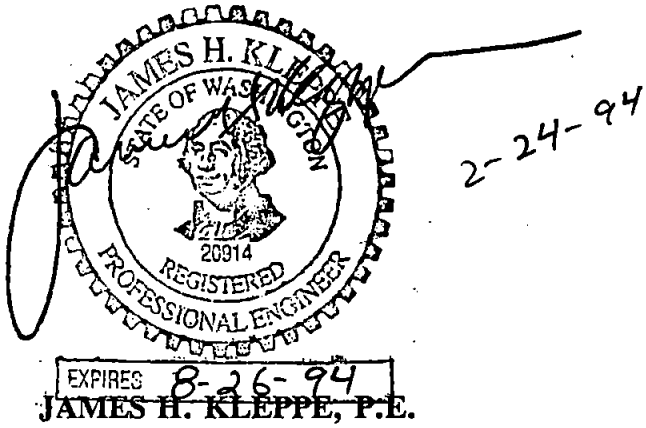
We trust that this report meets your needs. If you have any questions or comments regarding these results, please call.

Sincerely,

HART CROWSER, INC.

Mary Catherine Kiley

MARY CATHERINE KILEY
Project Environmental Chemist



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Hart Crowser, 1989. Remedial Investigation Report. September 1, 1989.

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

Hart Crowser, 1993b. Work Plan for U1 Soil Borings and Well Installation. May 25, 1993.

Table 1 - Summary of Analytical Results for Soil Samples U1N and U1S

Sample ID	Depth Interval in Feet	Date	TPH Concentration in mg/kg
U1N-1	6 to 8	11/18/92	12,000 J Diesel
U1N-2	8 to 8.5	11/18/92	54 Diesel
U1N-3	10 to 12	11/18/92	250 Diesel
U1N-4	12 to 14	11/18/92	230 Diesel
U1N-5	14 to 16	11/18/92	300 Diesel
U1N-6	16 to 18	11/18/92	120 Diesel
U1N-7	18 to 20	11/18/92	24 Diesel
U1S-1	6 to 8	11/19/92	ND
U1S-2	8 to 10	11/19/92	ND
U1S-3	10 to 12	11/19/92	ND
U1S-4	12 to 14	11/19/92	ND
U1S-5	14 to 16	11/19/92	ND
U1S-6	16 to 18	11/19/92	ND
U1S-7	18 to 20	11/19/92	ND

J = Estimated concentration due to surrogate recovery outside of laboratory control limits.
ND = Not detected at laboratory detection limit of 10 mg/kg

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Table 2 - Summary of Analytical Results for Soil Samples U1B1, U1B2, U1B3, and U1W

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

ND = Not detected at the laboratory detection limit of 10 mg/kg.

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Table 3 – Summary of Analytical Results for Soil Samples from Borings and Well Installations U1B4 through U1B13, U1B15, U1BF1 through U1BF4, U1W2, and U1W3

Sample	Date	Depth below Surface in Feet	TPH Concentration in mg/kg
U1-B4-S-1	5/26/93	3 to 5	13,000 J Diesel
U1-B4-S-3	5/26/93	7 to 9	110 Diesel
U1-B4-S-5	5/26/93	11 to 13	5,800 J Diesel
U1-B4-S-7	5/26/93	15 to 17	1,600 Diesel
U1-B4-S-8	5/26/93	17 to 19	ND
U1-B5-S-1	5/26/93	3 to 5	9,200 J Diesel
U1-B5-S-3	5/26/93	7 to 9	22,000 J Diesel
U1-B5-S-4	5/26/93	9 to 11	34 Diesel
U1-B5-S-6	5/26/93	13 to 15	ND
U1-B5-S-7	5/26/93	15 to 17	67 Diesel
U1-B5-S-8	5/26/93	17 to 19	ND
U1-B6-S-1	5/28/93	3 to 5	168 Diesel
U1-B6-S-2	5/28/93	5 to 7	30 Diesel
U1-B6-S-3	5/28/93	7 to 9	430 Diesel
U1-B6-S-5	5/28/93	11 to 13	ND
U1-B6-S-6	5/28/93	13 to 14	ND
U1-B6-S-9	5/28/93	17 to 19	ND
U1-B7-S-1	5/27/93	3 to 5	ND
U1-B7-S-2	5/27/93	5 to 7	ND
U1-B7-S-3	5/27/93	7 to 9	ND
U1-B7-S-4	5/27/93	9 to 11	ND
U1-B7-S-5	5/27/93	11 to 13	2,900 Diesel
U1-B7-S-6	5/27/93	13 to 15	77 Diesel
U1-B7-S-7	5/27/93	15 to 17	21 Diesel
U1-B7-S-8	5/27/93	17 to 19	26 Diesel
U1-B8-S-1	5/27/93	5 to 7	10,000 J Diesel
U1-B8-S-3	5/27/93	9 to 11	70 Diesel
U1-B8-S-4	5/27/93	11 to 13	37,000 J Diesel
U1-B8-S-5	5/27/93	13 to 15	1,300 Diesel
U1-B8-S-6	5/27/93	15 to 17	140 Diesel
U1-B8-S-7	5/27/93	17 to 19	150 Diesel
U1-B9-S-1	5/27/93	3 to 5	14,000 J Diesel
U1-B9-S-2	5/27/93	5 to 7	12,000 J Diesel
U1-B9-S-3	5/27/93	7 to 9	62 Diesel
U1-B9-S-4	5/27/93	9 to 11	ND
U1-B9-S-5	5/27/93	11 to 13	12,000 J Diesel
U1-B9-S-7	5/27/93	15 to 17	80 Diesel
U1-B9-S-8	5/27/93	17 to 19	ND

Table 3 – Summary of Analytical Results for Soil Samples from Borings and Well Installations U1B4 through U1B13, U1B15, U1BF1 through U1BF4, U1W2, and U1W3

Sample	Date	Depth below Surface in Feet	TPH Concentration in mg/kg	
U1-B10-S-1	6/01/93	3 to 5	610	Oil
U1-B10-S-3	6/01/93	7 to 9	ND	
U1-B10-S-4	6/01/93	9 to 11	ND	
U1-B10-S-5	6/01/93	11 to 13	ND	
U1-B10-S-6	6/01/93	13 to 15	ND	
U1-B10-S-8	6/01/93	17 to 19	ND	
U1-B11-S-1	6/01/93	3 to 5	399	Oil and Diesel (1)
U1-B11-S-2	6/01/93	5 to 7	139	Oil and Diesel (1)
U1-B11-S-3	6/01/93	7 to 9	ND	
U1-B11-S-5	6/01/93	11 to 13	ND	
U1-B11-S-6	6/01/93	13 to 15	ND	
U1-B11-S-8	6/01/93	17 to 19	ND	
U1-B12-S-1	6/02/93	3 to 5	270	Diesel
U1-B12-S-2	6/02/93	5 to 7	310	Diesel
U1-B12-S-3	6/02/93	7 to 9	ND	
U1-B12-S-5	6/02/93	11 to 13	ND	
U1-B12-S-7	6/02/93	15 to 17	ND	
U1-B12-S-8	6/02/93	17 to 19	ND	
U1-B13-S-1	6/02/93	3 to 5	ND	
U1-B13-S-2	6/02/93	5 to 7	140	Diesel
U1-B13-S-3	6/02/93	9 to 11	ND	
U1-B13-S-5	6/02/93	13 to 15	ND	
U1-B13-S-7	6/02/93	17 to 19	ND	
U1-B15-S-1	6/08/93	3 to 5	ND	
U1-B15-S-3	6/08/93	7 to 9	ND	
U1-B15-S-5	6/08/93	11 to 13	ND	
U1-B15-S-7	6/08/93	15 to 17	ND	
U1-B15-S-8	6/08/93	17 to 19	ND	
U1-BF1-S-1	6/07/93	3 to 5	820	Diesel
U1-BF1-S-3	6/07/93	7 to 9	580	Diesel and Oil (1)
U1-BF1-S-4	6/07/93	9 to 11	170	Diesel
U1-BF1-S-5	6/07/93	11 to 13	31	Diesel
U1-BF1-S-7	6/07/93	15 to 17	ND	
U1-BF1-S-8	6/07/93	17 to 19	ND	

Table 3 – Summary of Analytical Results for Soil Samples from Borings and Well Installations U1B4 through U1B13, U1B15, U1BF1 through U1BF4, U1W2, and U1W3

Sample	Date	Depth below Surface in Feet	TPH Concentration in mg/kg
U1-BF2-S-1	6/07/93	3 to 5	6,100 J Diesel
U1-BF2-S-3	6/07/93	7 to 9	1,200 Diesel
U1-BF2-S-4	6/07/93	9 to 11	4,100 Diesel
U1-BF2-S-5	6/07/93	11 to 13	1,900 Diesel
U1-BF2-S-7	6/07/93	15 to 17	830 J Diesel
U1-BF2-S-8	6/07/93	17 to 19	450 Diesel
U1-BF3-S-1	6/07/93	3 to 5	1,300 J Diesel
U1-BF3-S-2	6/07/93	5 to 7	4,000 Diesel
U1-BF3-S-3	6/07/93	7 to 9	530 Diesel and Oil (1)
U1-BF3-S-5	6/07/93	11 to 13	7,400 J Diesel
U1-BF3-S-7	6/07/93	15 to 17	200 Diesel
U1-BF3-S-8	6/07/93	17 to 19	ND
U1-BF4-S-1	6/07/93	3 to 5	41,000 J Diesel
U1-BF4-S-3	6/07/93	7 to 9	690 Diesel
U1-BF4-S-4	6/07/93	9 to 11	360 Diesel
U1-BF4-S-5	6/07/93	11 to 13	290 Diesel
U1-BF4-S-6	6/07/93	13 to 15	31 Diesel
U1-BF4-S-7	6/07/93	15 to 17	60 Diesel
U1-BF4-S-8	6/07/93	17 to 19	78 Diesel
U1-W2-S-1	5/28/93	3 to 5	19,000 J Diesel
U1-W2-S-2	5/28/93	5 to 7	8,400 J Diesel
U1-W2-S-3	5/28/93	7 to 9	980 Diesel
U1-W2-S-4	5/28/93	9 to 11	8,800 J Diesel
U1-W2-S-5	5/28/93	11 to 13	55 Diesel
U1-W2-S-6	5/28/93	13 to 15	180 Diesel
U1-W2-S-8	5/28/93	17 to 19	ND
U1-W3-S-1	6/08/93	3 to 5	53 Diesel
U1-W3-S-3	6/08/93	7 to 9	110 Diesel
U1-W3-S-4	6/08/93	9 to 11	ND
U1-W3-S-6	6/08/93	13 to 15	ND
U1-W3-S-7	6/08/93	15 to 17	35 Diesel
U1-W3-S-8	6/08/93	17 to 19	ND

(1) In results showing concentrations of both diesel and oil, the substance of greater concentration is listed first.
J = Estimated concentration due to surrogate recovery outside of laboratory control limits.
ND = Not detected in sample.

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Table 4 - Summary of Analytical Results for Groundwater Samples

Sample ID	Date	TPH Concentration in mg/L
U1N (Product)	12/7/92	76,000
U1N-2	12/8/92	2
U1S	12/7/92	0.5
U1W	1/22/93	ND
U1W2	6/3/93	50
U1W3	6/24/93	8

ND = Not detected at laboratory detection limit of 0.4 mg/L

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Table 5 - Summary of Estimated Costs for Remedial Alternatives Sheet 1 of 2

Treatment	Total Cost
***In Situ* Bioremediation**	
Equipment, Installation, and Startup	$300,000
Monthly Operations - Assume 6 months @ $6,000/month)	36,000
Engineering (Assume 25%)	84,000
Monitoring (Assume 25%)	84,000
Total	$504,000
Excavation with On-Site Biotreatment	
Assumes 2,100 cubic yards and a cost of $200 per cubic yard for excavation in Garden Avenue	$420,000
Biotreatment (in existing LTUs) Assumes 1993 costs for tilling and nutrient additions	62,000
Engineering (Assume 10%)	48,000
Monitoring (Assume 20%)	97,000
Total	$627,000
Assumes 3,700 cubic yards and a cost of $200 per cubic yard for excavation in Garden Avenue	$740,000
Biotreatment (in existing LTUs) Assumes 1993 costs for tilling and nutrient additions	86,000
Engineering (Assume 10%)	83,000
Monitoring (Assume 20%)	165,000
Total	$1,074,000
Excavation with Off-Site Disposal	
Assumes 2,100 cubic yards (3,000 tons) and a cost of $200 per cubic yard for excavation in Garden Avenue	$420,000
Transportation	93,000
Off-site disposal in landfill Assumes 1993 costs for disposal ($134 per ton)	402,000
Engineering (Assume 5%)	46,000
Monitoring (Assume 10%)	92,000
Total	$1,060,000

Table 5 - Summary of Estimated Costs for Remedial Alternatives Sheet 2 of 2

Treatment	Total Cost
Excavation with Off-Site Disposal (Continued)	
Assumes 3,700 cubic yards (5,200 tons) and a cost of $200 per cubic yard for excavation in Garden Avenue	$740,000
Transportation	162,000
Off-site disposal in landfill Assumes 1993 costs for disposal ($134 per ton)	697,000
Engineering (Assume 5%)	80,000
Monitoring (Assume 10%)	160,000
Total	$1,840,000
Excavation with Thermal Treatment	
Assumes 2,100 cubic yards (3,000) tons and a cost of $200 per cubic yard for excavation in Garden Avenue	$420,000
Thermal Treatment Assumes 1993 costs for disposal ($45 per ton)	135,000
Engineering (Assume 10%)	56,000
Monitoring (Assume 15%)	83,000
Total	$694,000
Assumes 3,700 cubic yards (5,200 tons) and a cost of $200 per cubic yard for excavation in Garden Avenue	$740,000
Thermal Treatment Assumes 1993 costs for disposal ($45 per ton)	234,000
Engineering (Assume 10%)	98,000
Monitoring (Assume 15%)	146,000
Total	$1,218,000

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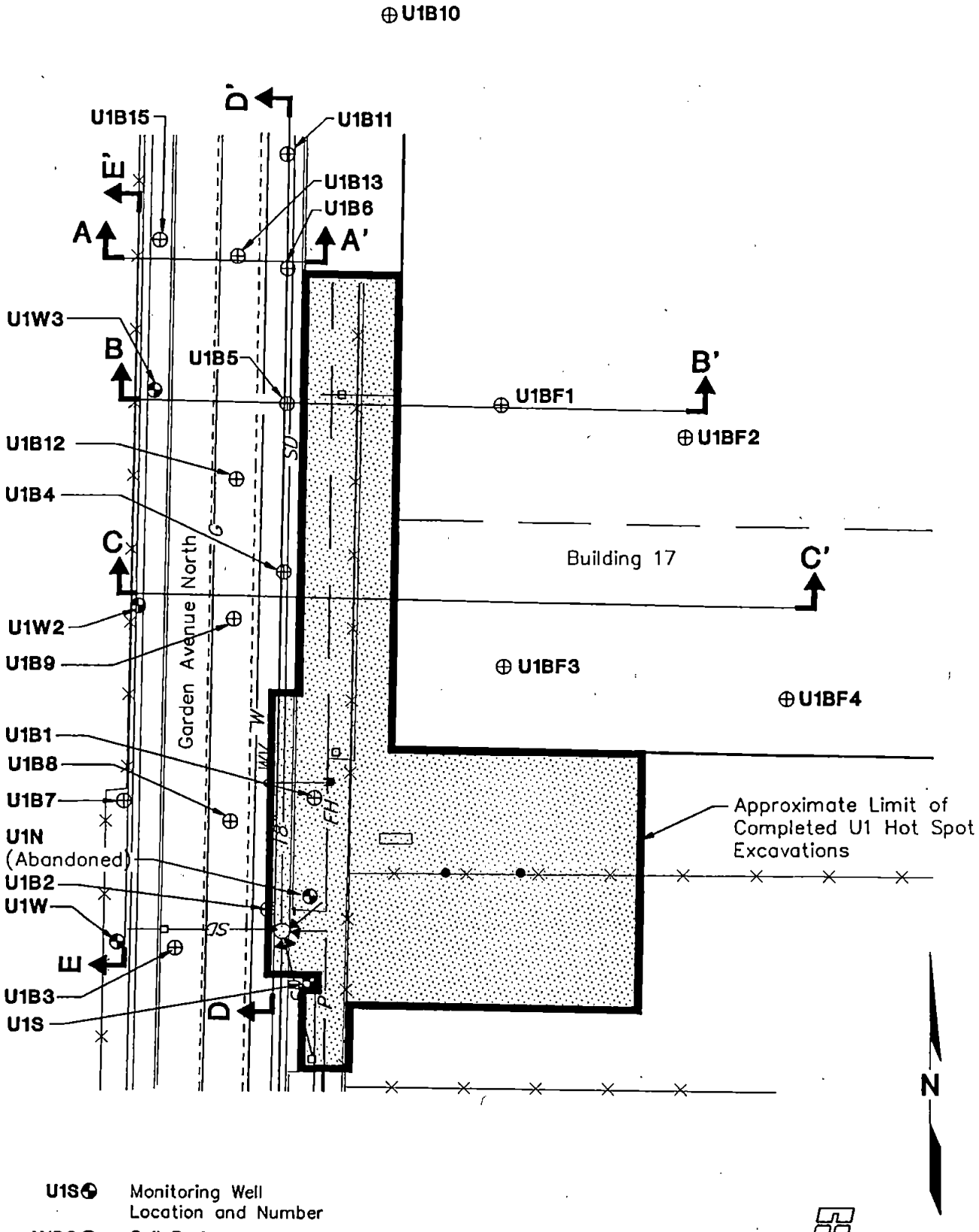
Site and Exploration Location Plan



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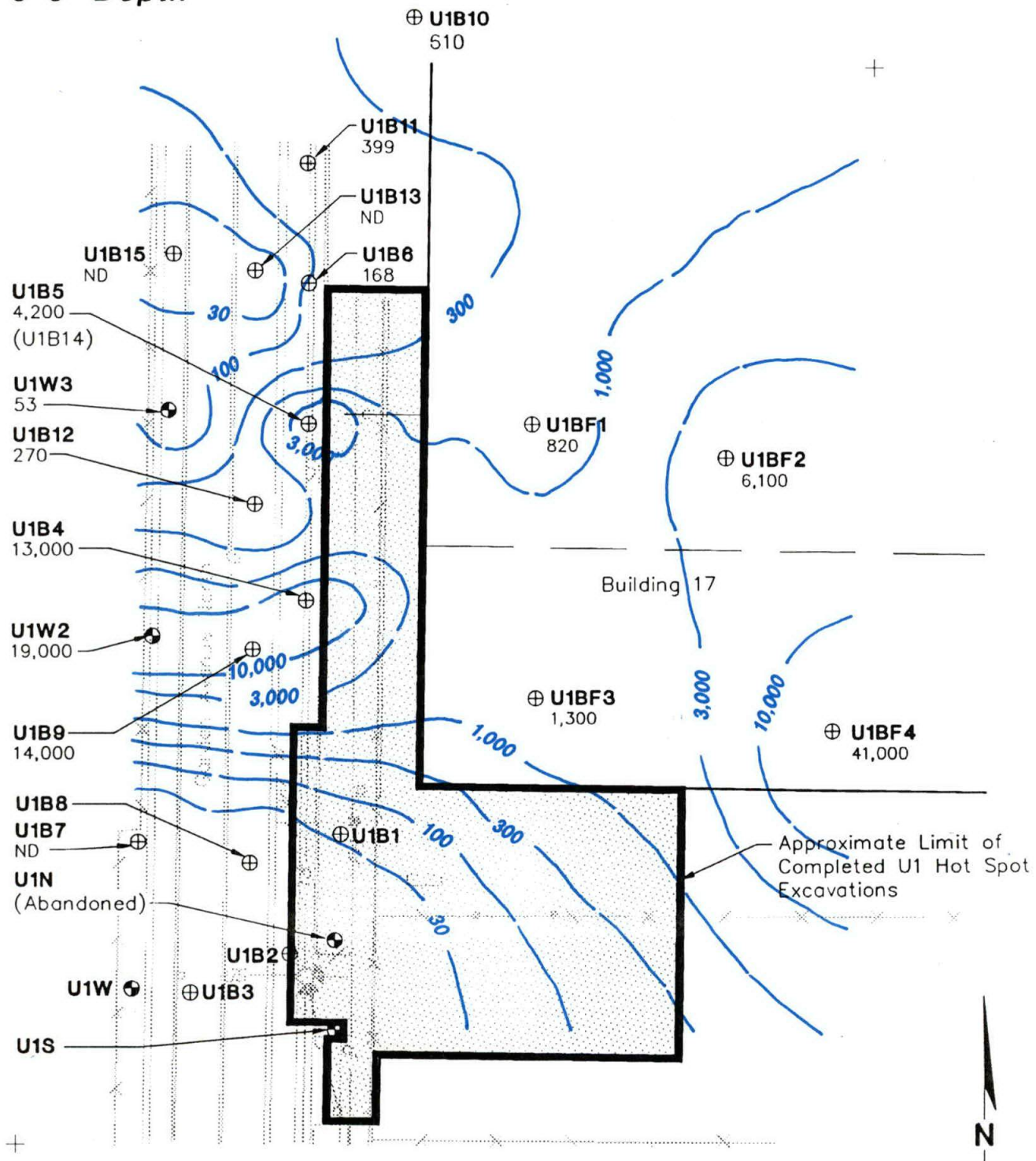
J-1639-27 2/94
Figure 1

TPH Concentration Contour Map

0-5' Depth



100 — TPH Concentration Contour in mg/kg

U1S — Monitoring Well Location and Number

U1BF3 — Soil Boring Location and Number

1,300 — Max TPH Concentration in mg/kg

0 40 80

Approximate Scale in Feet

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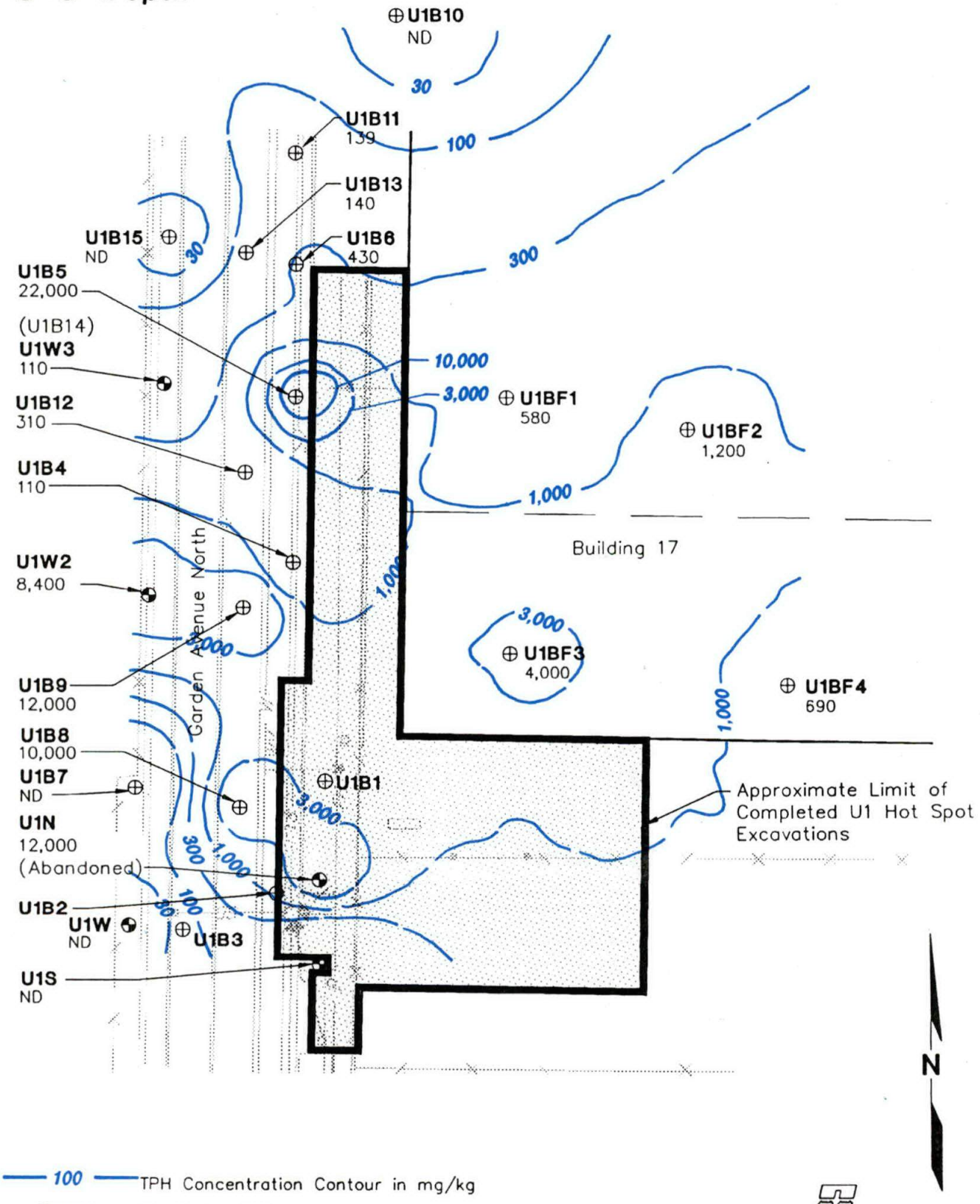
Figure 2

16592753 EJC 1/2/94 1=40 HC.pcp

TPH Concentration Contour Map

5'-9' Depth



100 — TPH Concentration Contour in mg/kg

U1S — Monitoring Well Location and Number

U1BF3 — Soil Boring Location and Number

4,000 — Max TPH Concentration in mg/kg

0 40 80

Approximate Scale in Feet

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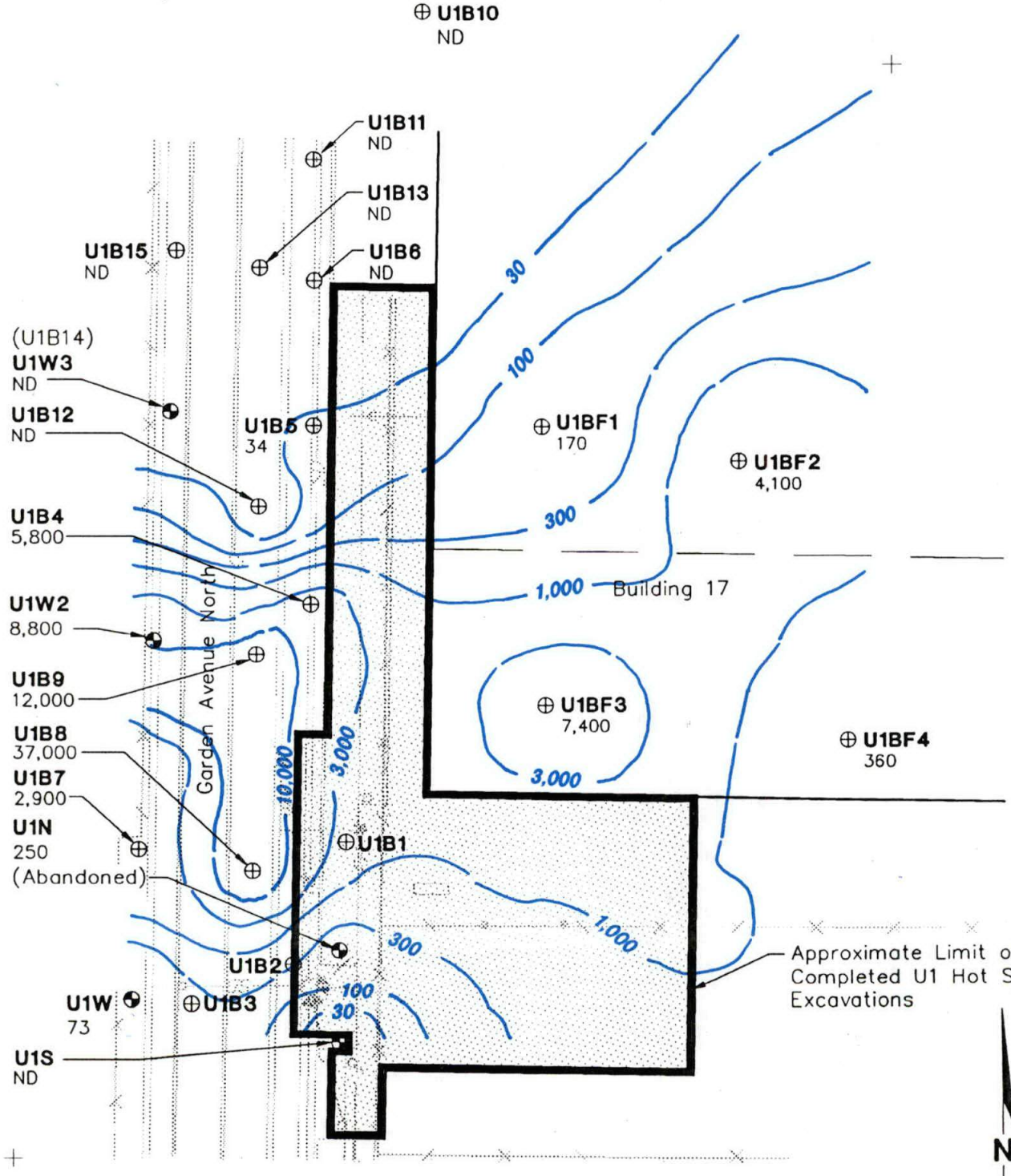
J-1639-27 2/94

Figure 3

16392754 EJC 1/27/94 1=40 HC pcp

TPH Concentration Contour Map

9'-13' Depth



100 — TPH Concentration Contour in mg/kg

U1S ⊕ Monitoring Well Location and Number

U1BF3 ⊕ Soil Boring Location and Number

7,400 Max TPH Concentration in mg/kg

0 40 80

Approximate Scale in Feet

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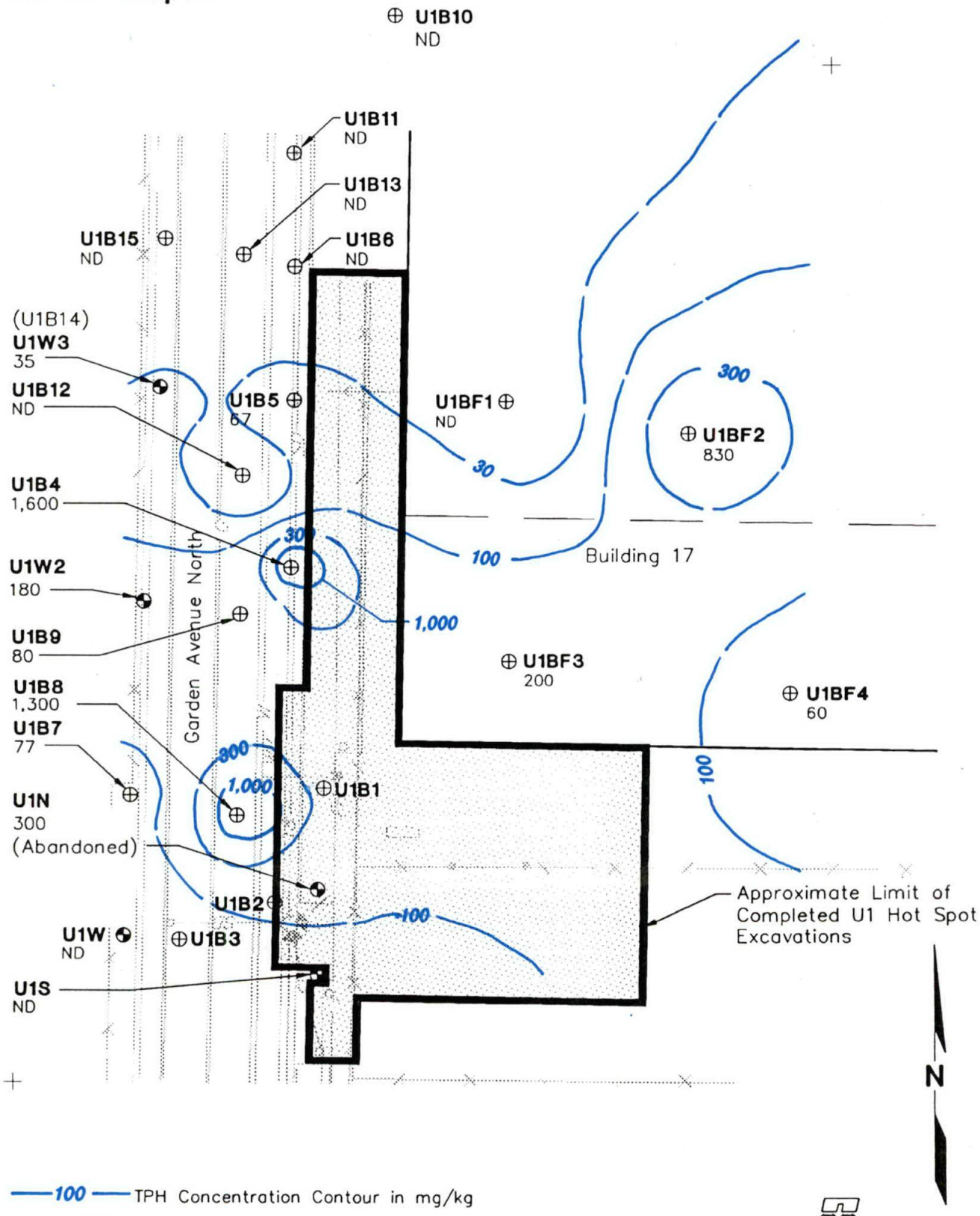
Figure 4

TPH Concentration Contour Map

13'-17' Depth



100 — TPH Concentration Contour in mg/kg

U1S — Monitoring Well Location and Number

U1BF3 — Soil Boring Location and Number

200 — Max TPH Concentration in mg/kg

0 40 80

Approximate Scale in Feet

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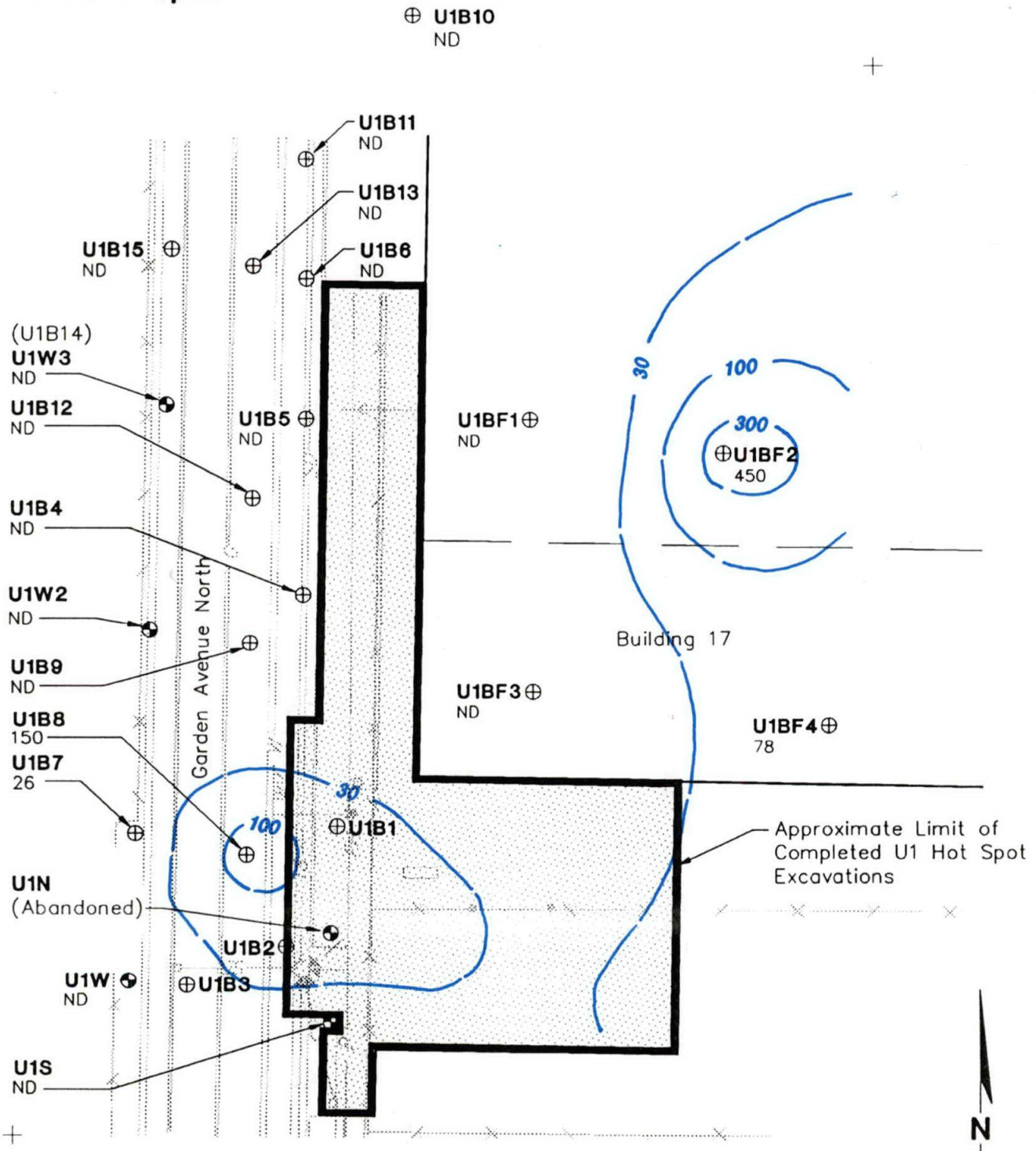
Figure 5

TPH Concentration Contour Map

17'-19' Depth



100 — TPH Concentration Contour in mg/kg

U1S — Monitoring Well Location and Number

U1BF3 — Soil Boring Location and Number

26 — Max TPH Concentration in mg/kg

0 40 80

Approximate Scale in Feet

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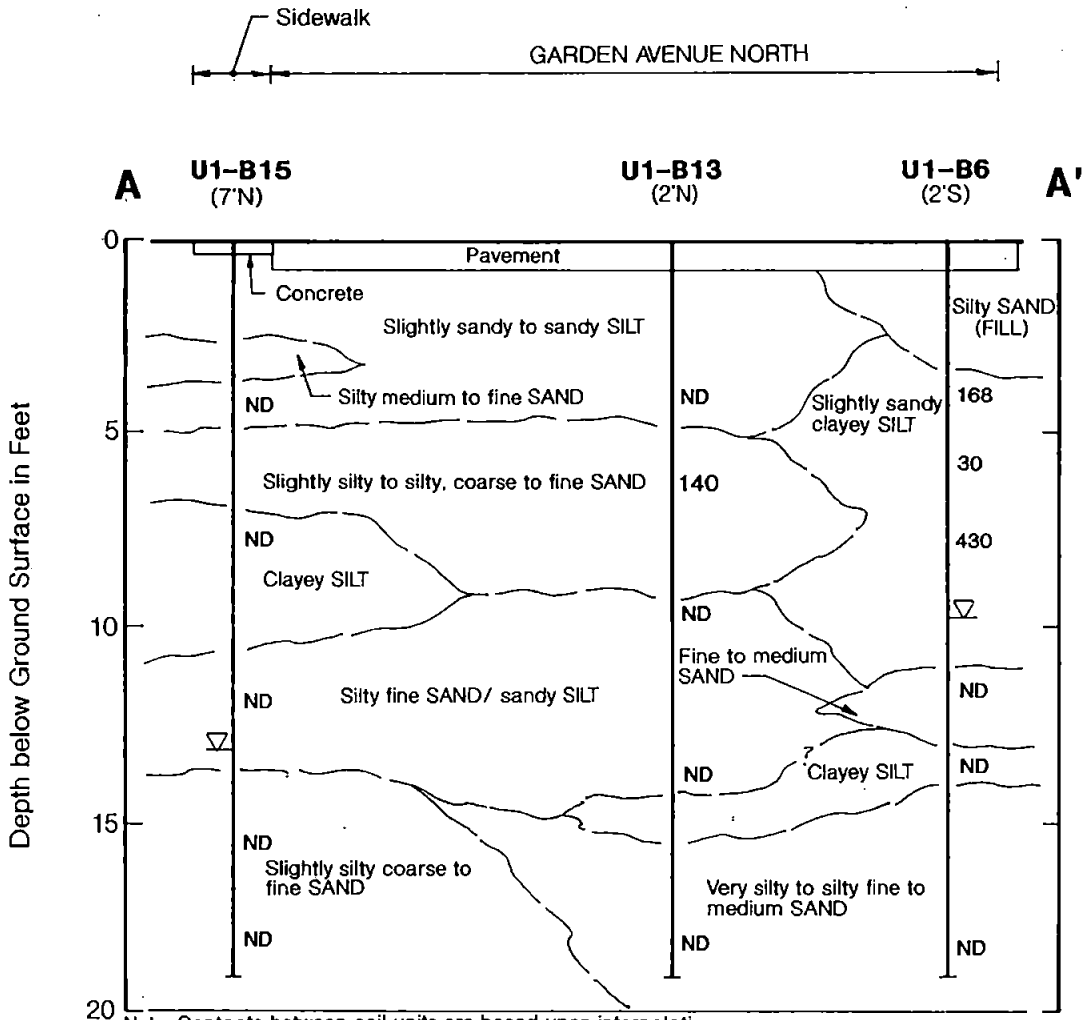
Figure 6

16392757 LJC 1/2/94 1=40 hc.pcp

Generalized Subsurface Cross Section A–A'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently availabel data.

U1–B6 Boring Number

(2'S) Offset Distance and Direction

Boring Location

Groundwater Level At Time of Drilling

168 TPH Concentration in mg/kg

ND Not Detected

Horizontal Scale in Feet

0 10 20

0 5 10

Vertical Scale in Feet

Vertical Exaggeration x 2

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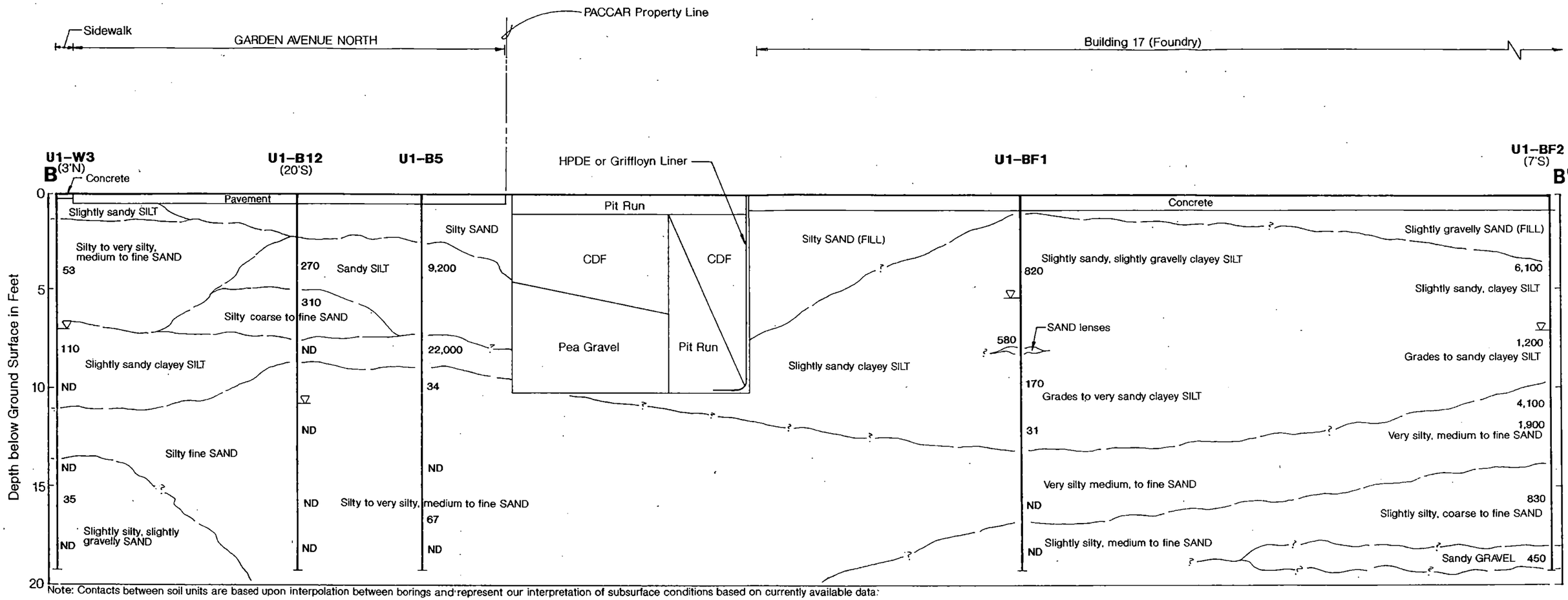
Figure 7

Generalized Subsurface Cross Section B–B'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

U1–B12 Boring Number
(20'S) Offset Distance and Direction
Boring Location
Groundwater Level At Time of Drilling
270 TPH Concentration in mg/kg
ND Not Detected

Horizontal Scale in Feet
0 10 20
0 5 10
Vertical Scale in Feet
Vertical Exaggeration x 2

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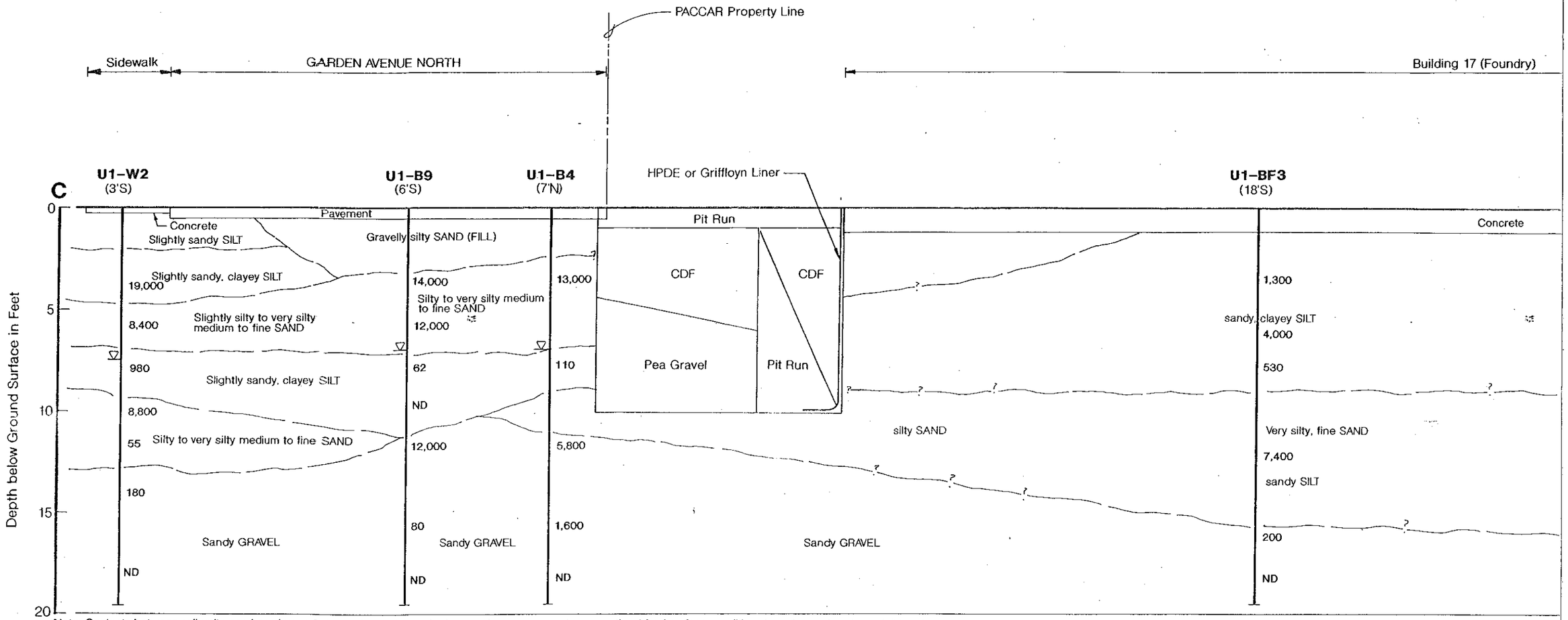
Figure 8

Generalized Subsurface Cross Section C–C'



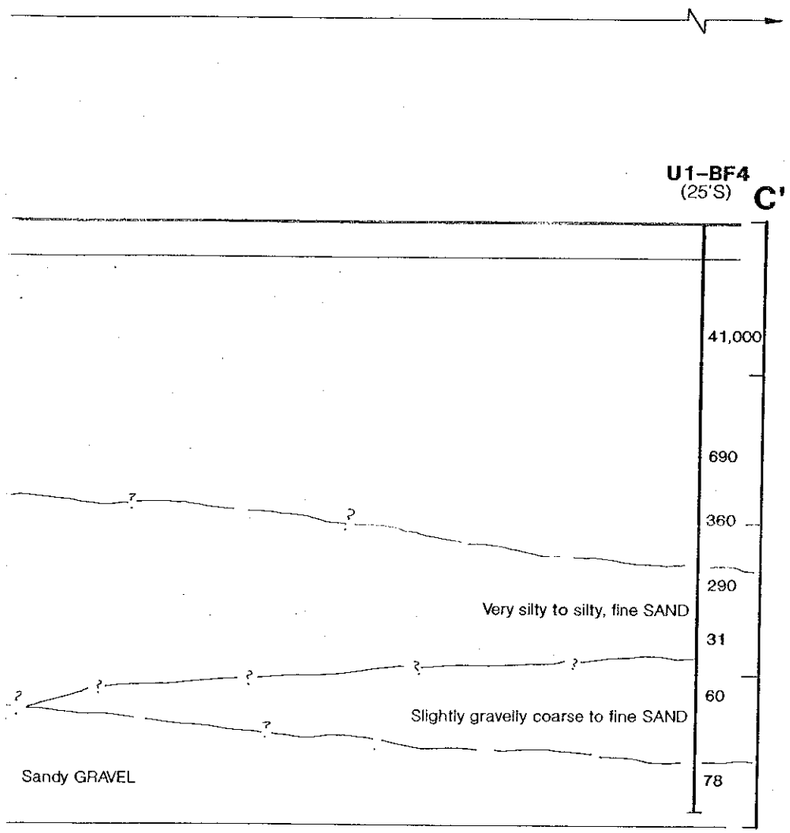
Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

U1–W2 Boring Number
Offset Distance and Di
Boring Location

Groundwater Level
At Time of Drilling

980 TPH Concentration in

ND Not Detected



ection

ng/kg

Horizontal Scale in Feet
0 10 20
0 5 10
Vertical Scale in Feet
Vertical Exaggeration x 2

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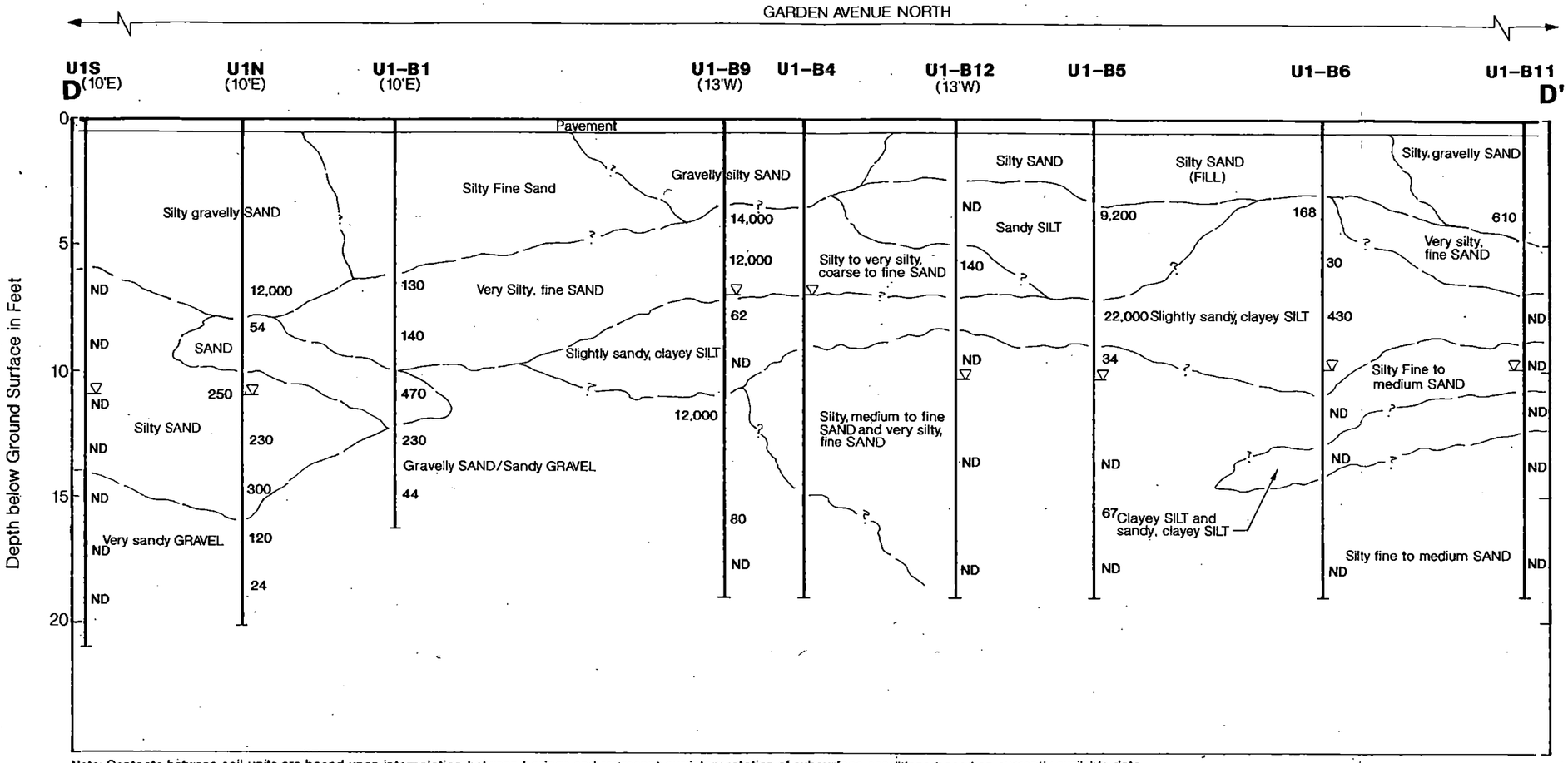
J–1639–27 2/94
Figure 9

Generalized Subsurface Cross Section D–D' along Garden Avenue North (East Side)



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

U1–B1 (10'E) — Boring Number; Offset Distance and Direction

Boring Location

▽ Groundwater Level At Time of Drilling

130 — TPH Concentration in mg/kg

ND — Not Detected

Horizontal Scale in Feet
0 20 40
0 5 10
Vertical Scale in Feet
Vertical Exaggeration x 4

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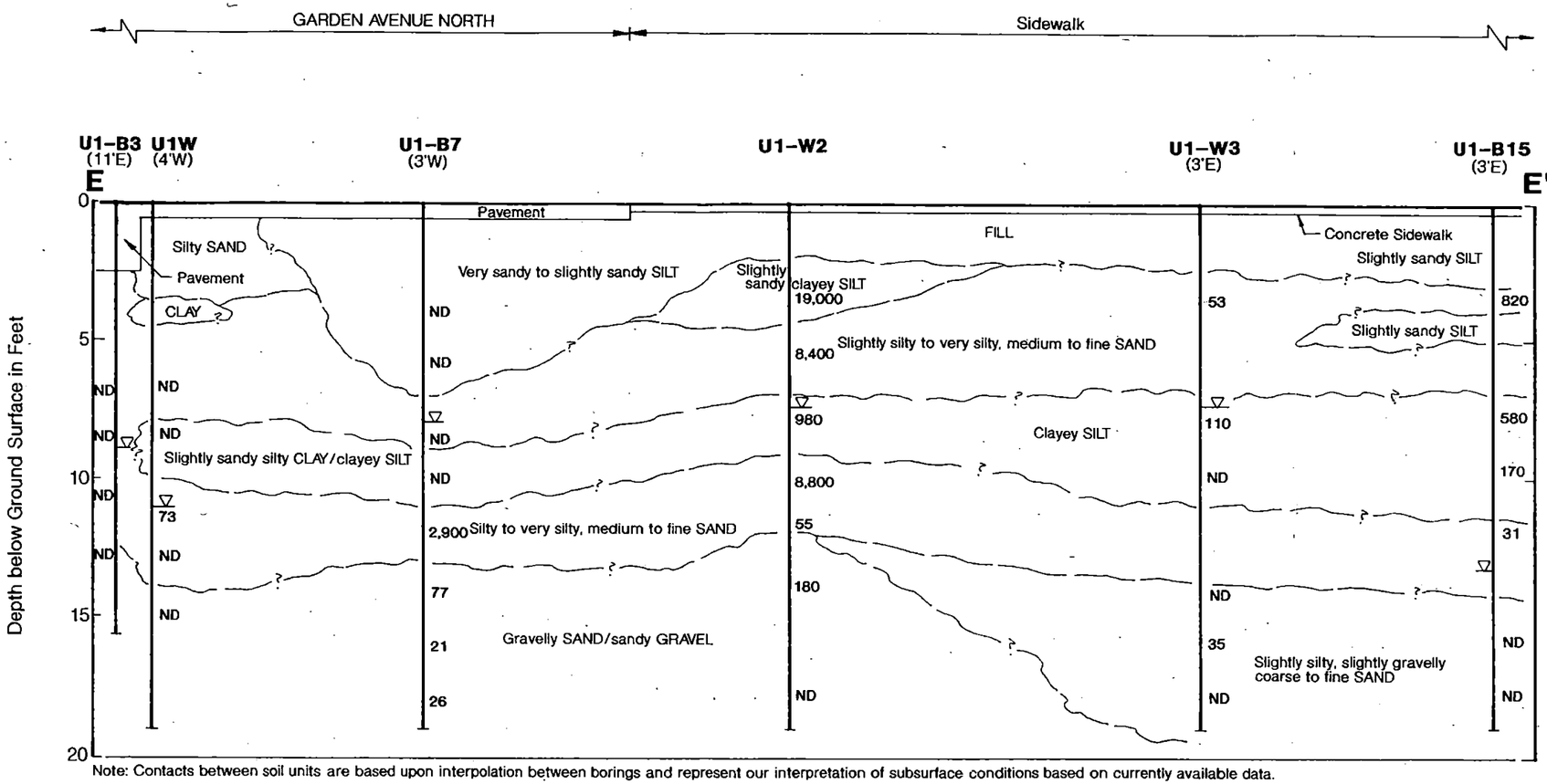
Figure 10

Generalized Subsurface Cross Section E–E' along Garden Avenue North (West Side)



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

U1–B7	Boring Number
(3'W)	Offset Distance and Direction
	Boring Location
▽	Groundwater Level At Time of Drilling
77	TPH Concentration in mg/kg
ND	Not Detected

Horizontal Scale in Feet
0 20 40
0 5 10
Vertical Scale in Feet
Vertical Exaggeration x 4

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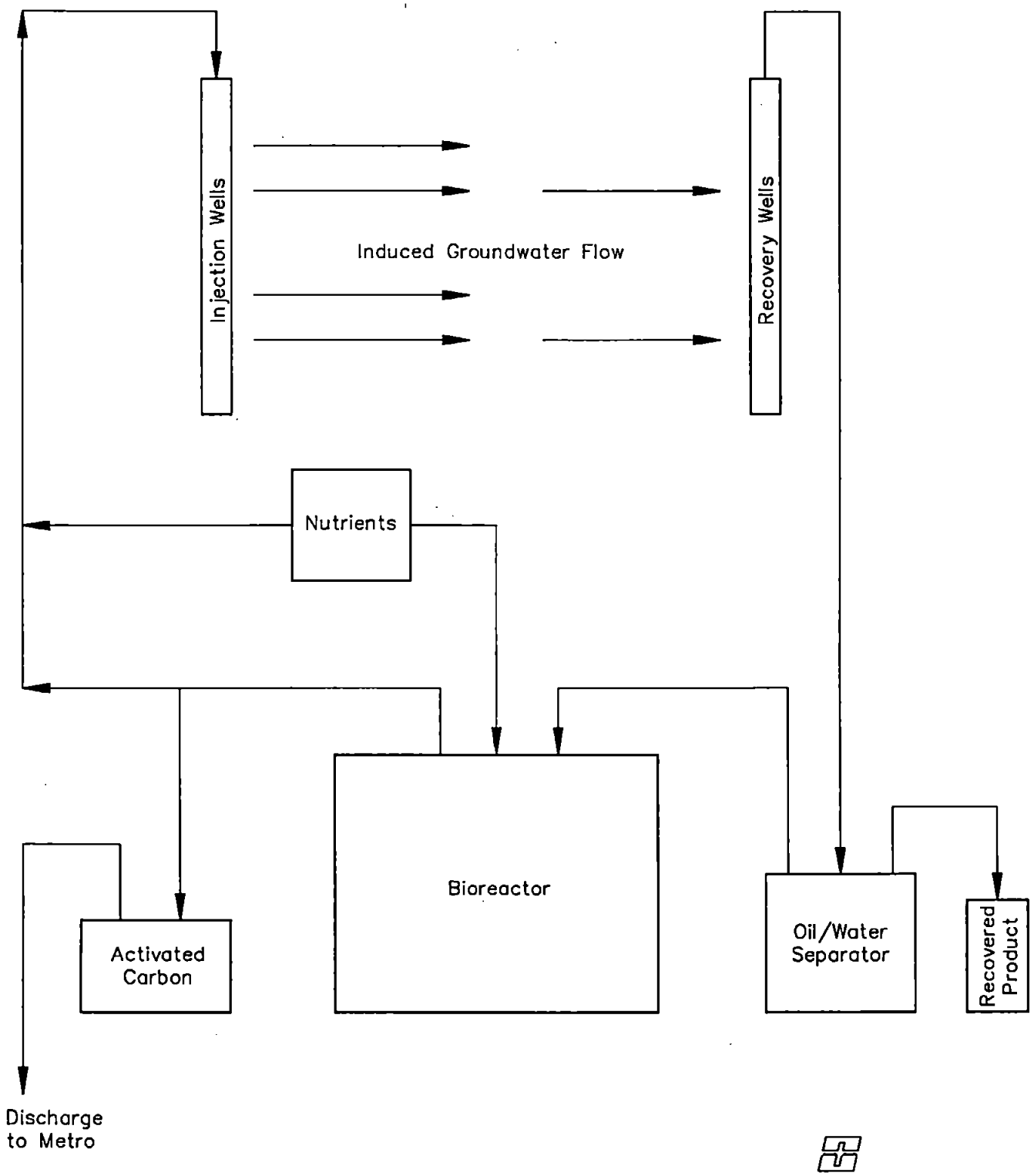
J–1639–27 2/94
Figure 11

Schematic Flow Diagram Showing In Situ Biotreatment Conceptual Approach

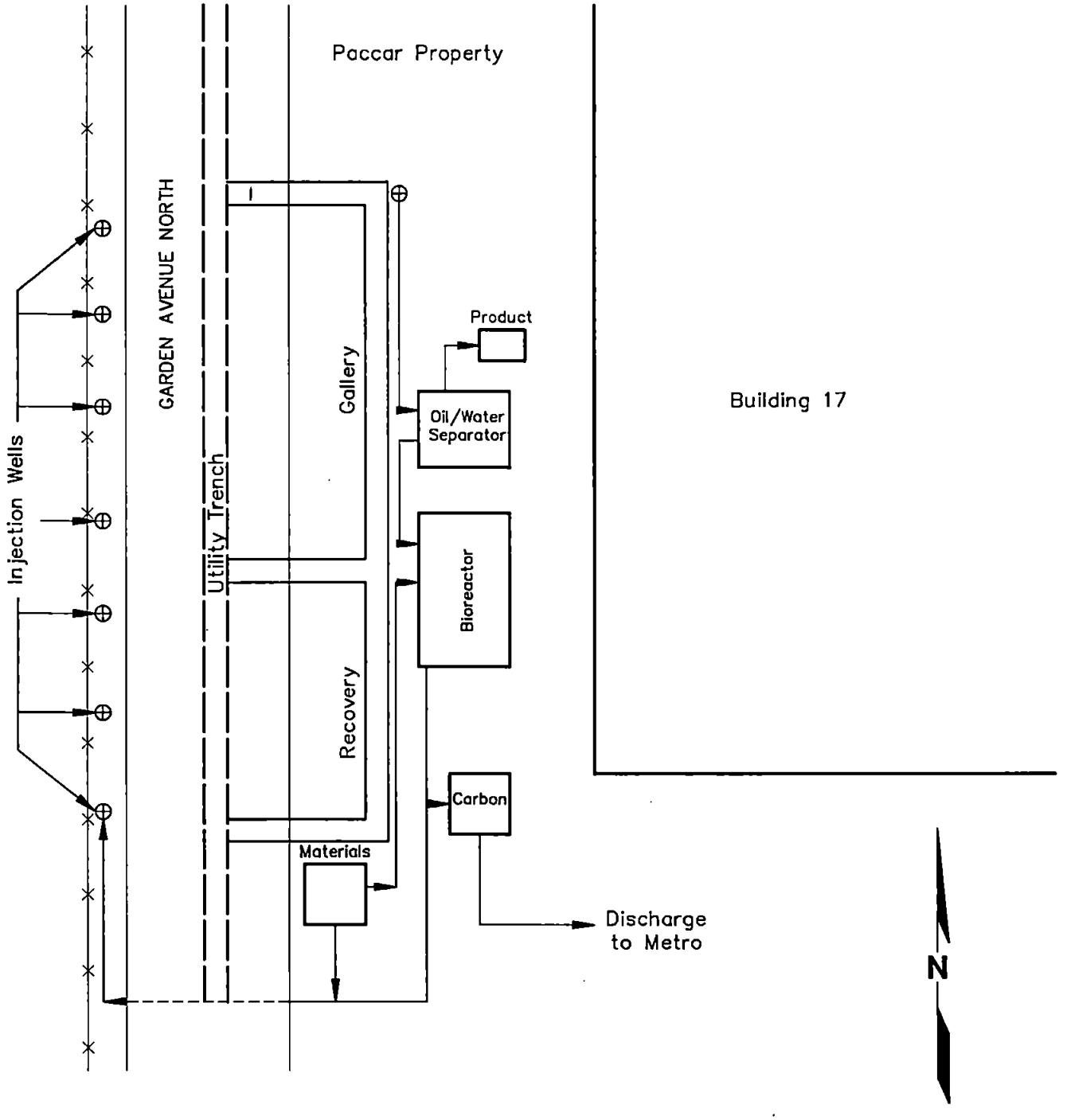


Not to Scale

HARTCROWSER
J-1639-27 2/94
Figure 12

EJC 1/28/94 1=1 HC.pcp
16392759

Overview of In Situ Biotreatment System along Garden Avenue North



Not to Scale

HARTCROWSER
J-1639-27 2/94
Figure 13

EJC 9/2/93 1=1 Default.pcp
16392760

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 soil and groundwater sampling. The exploration locations are shown on Figure 1. The details regarding the different types of sampling are presented below.

Drilling, Soil Sampling, and Well Installations

Two hollow-stem auger borings, designated U1N (North) and U1S (South) were drilled on November 18, 1992. The borings were completed to a depth of approximately 22 and 21 feet below the ground surface, respectively. Four hollow-stem auger borings, designated U1B1, U1B2, U1B3, and U1W, were drilled on January 19 and 20, 1993. The borings were completed to a depth of approximately 16 feet below the ground surface. Fifteen hollow-stem auger borings, designated U1B4 through U1B13, U1B15, and U1BF1 through U1BF4, were drilled between May 26 and June 7, 1993. Monitoring wells U1W2 and U1W3 were installed on May 28 and June 7, 1993, respectively.

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 A-24) 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.

Five 4-inch-I.D. PVC monitoring wells (U1N, U1S, U1W, U1W2, and U1W3) were installed (through the auger center) with 10-foot screens as shown on the well construction diagrams on Figures A-2, A-3, A-7, A-23, and A-24. 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

Samples were collected from the monitoring wells after well development. Well U1S, U1W, U1W2, and U1W3 were bailed with a Teflon bailer using polypropylene line. Well U1N had free floating product; a sample of the groundwater 3 feet below the groundwater surface was collected by advancing a flexible tube through the product and pumping the groundwater using a peristaltic pump.

The groundwater at the wells was collected after a minimum of three casing volumes of water was purged from the wells. 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.

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 Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
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

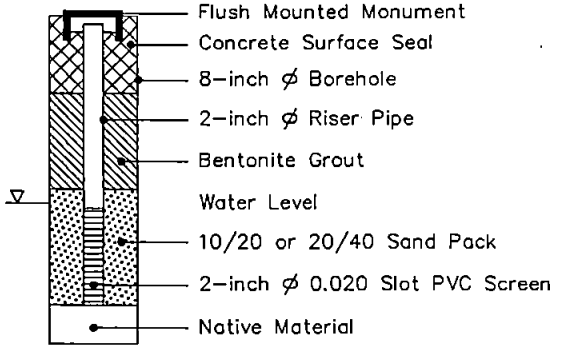
BORING SAMPLES

- ☒ Split Spoon
- ⧅ Shelby Tube
- ▥ Cuttings
- ✳ 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
	Water Content in Percent Liquid Limit Natural Plastic Limit
PID	Photoionization Reading
CA	Chemical Analysis

Groundwater Observations



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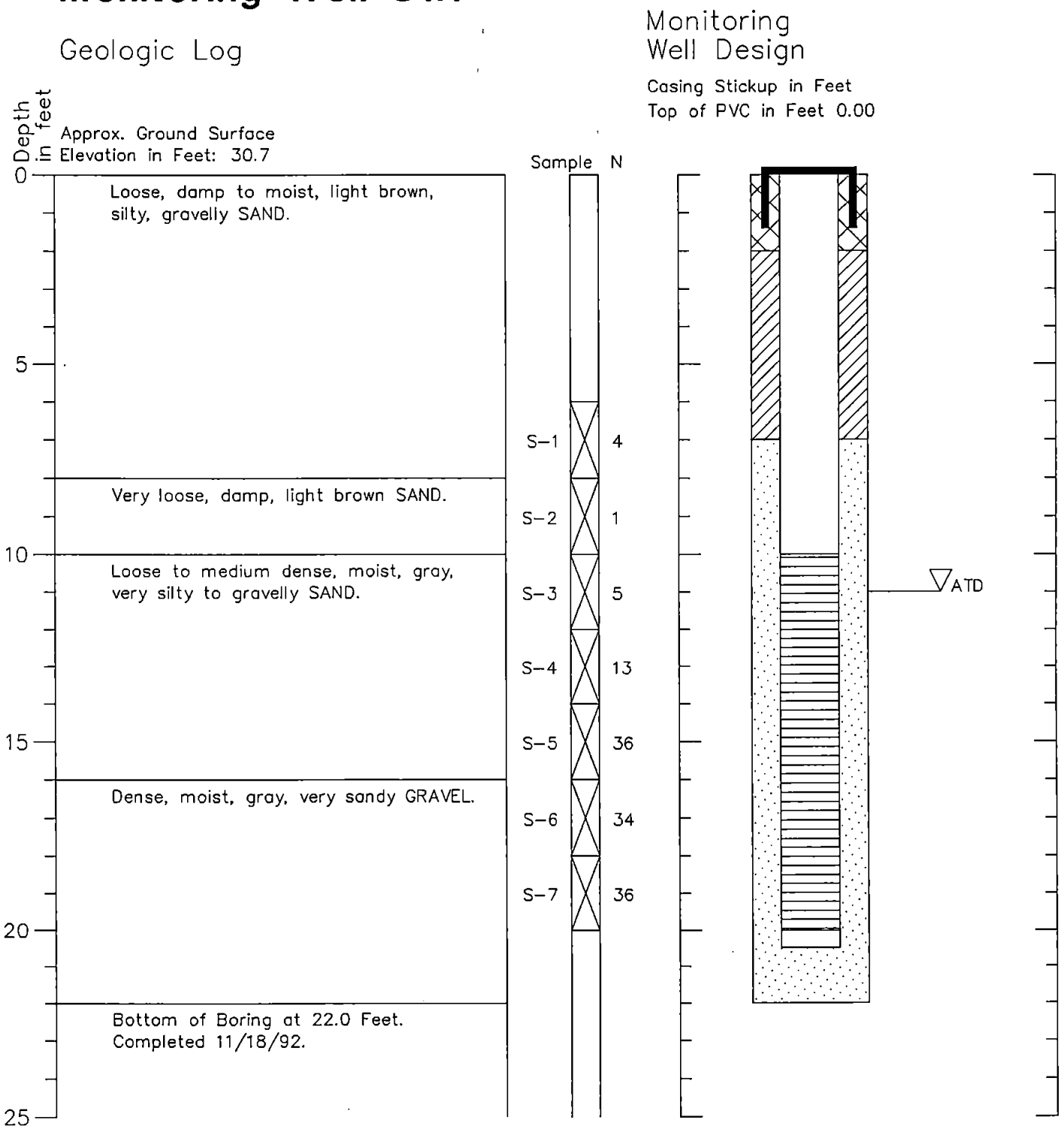
J-1639-27 2/94

Figure A-1

Boring Log and Construction Data for Monitoring Well U1N



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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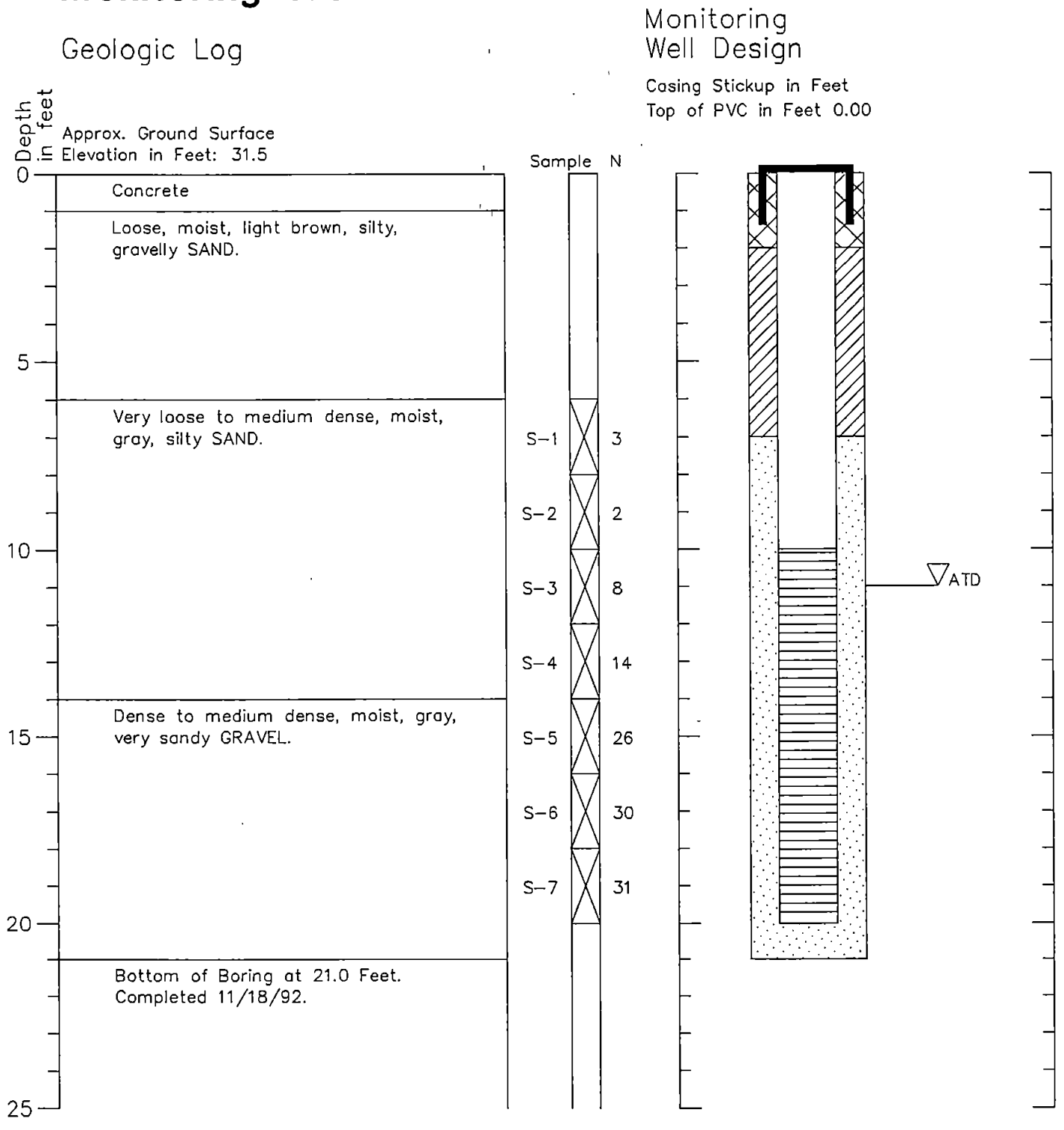
J-1639-27 11/92

Figure A-2

Boring Log and Construction Data for Monitoring Well U1S



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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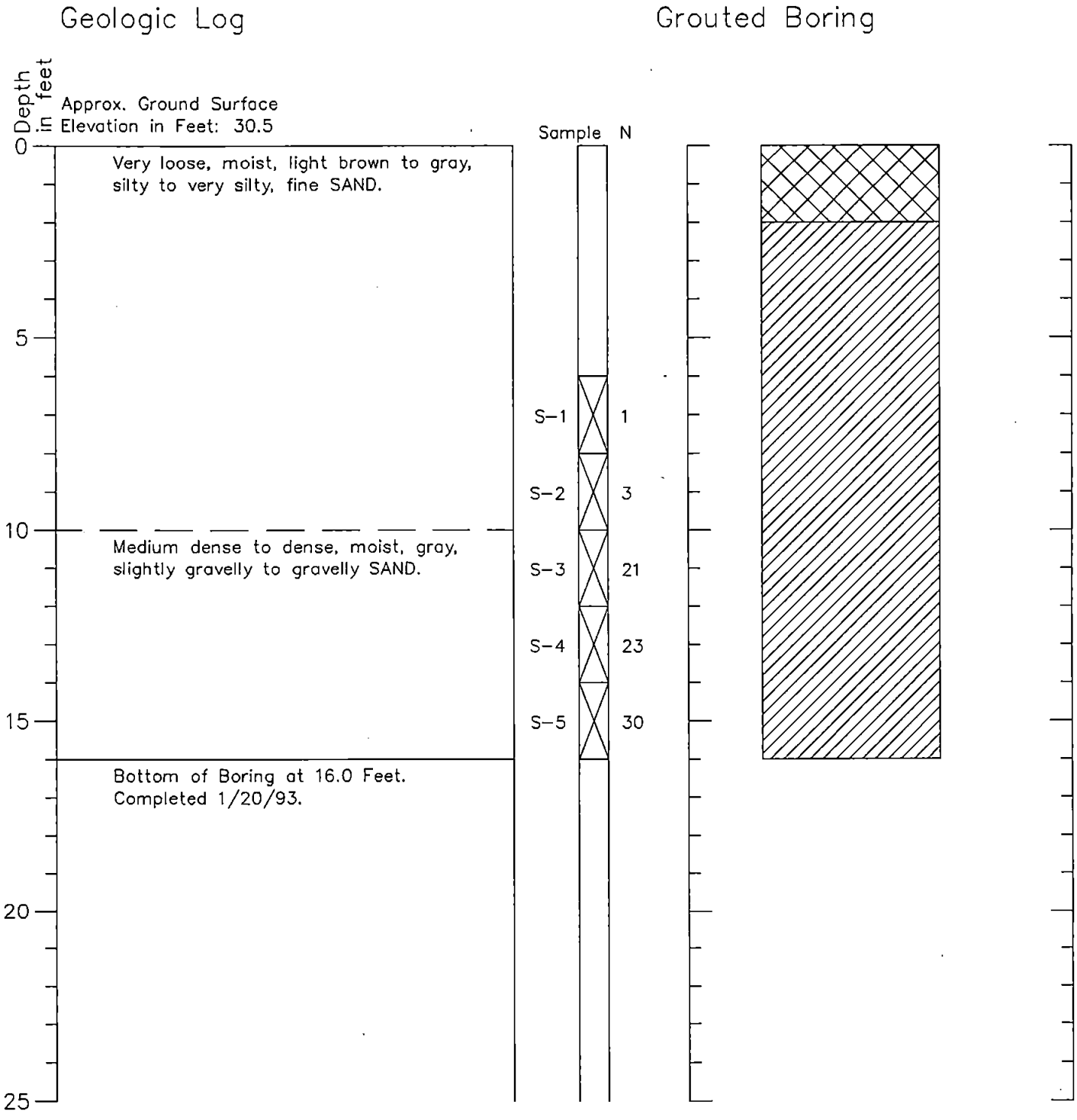
J-1639-27 11/92

Figure A-3

CAD XX/XX/XX 1=1 (xref)XXXX0000/Default.pcp
XXXX0000

Boring Log U1B1



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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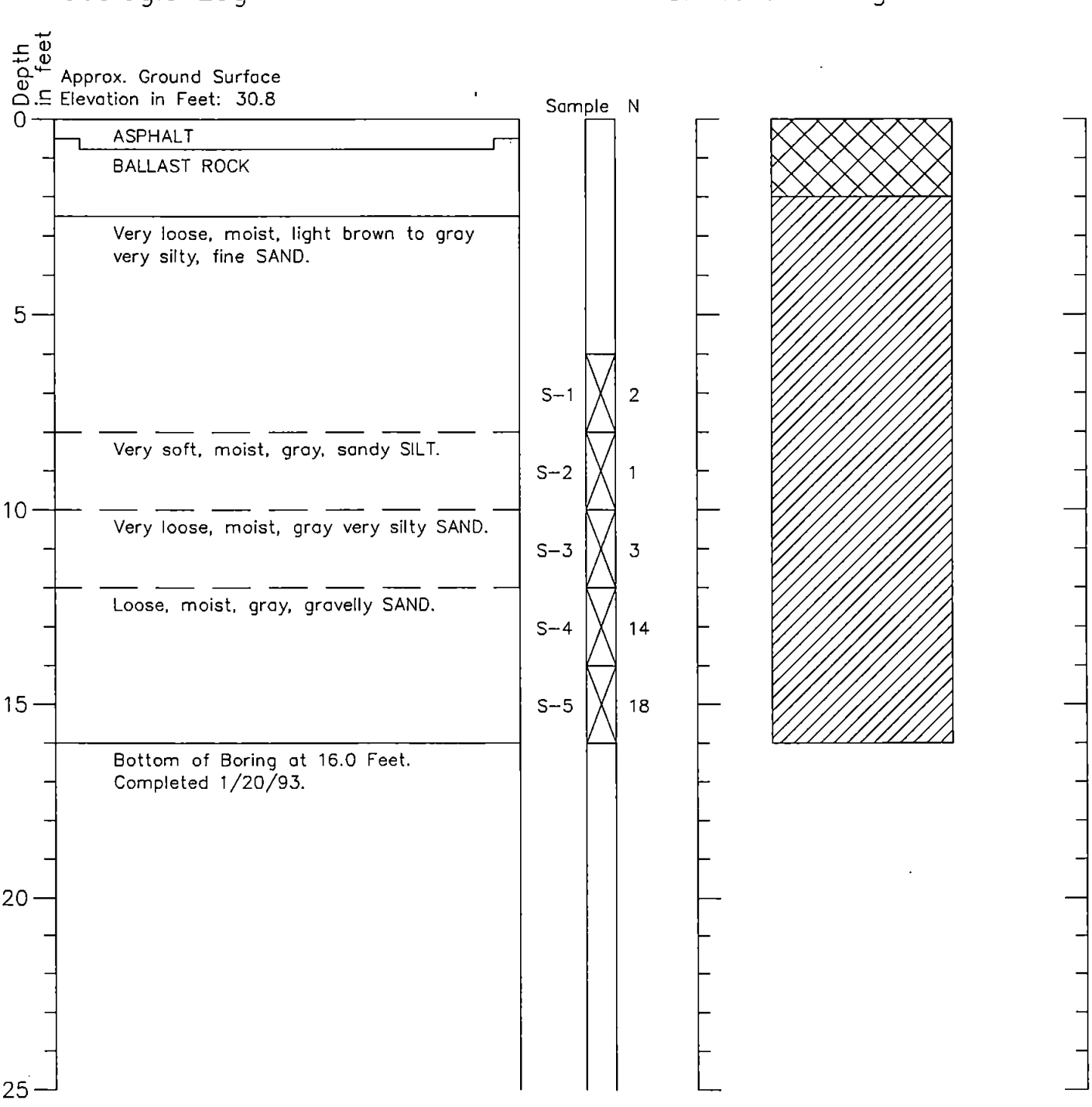
J-1639-27 1/93
Figure A–4

fwk 2//8/94 1=1 hc-pcp
163927u1b1

Boring Log U1B2



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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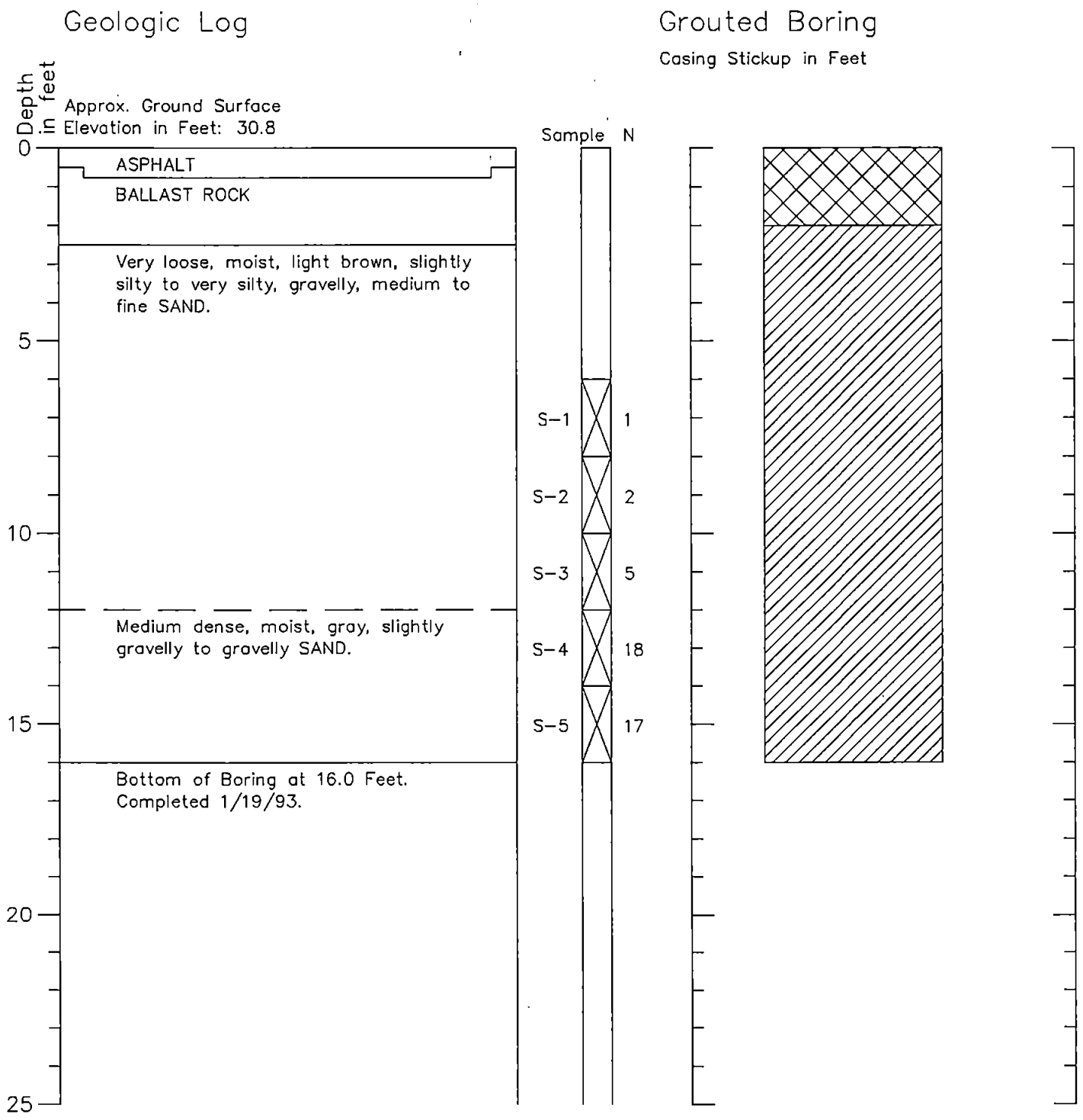
J-1639-27 **1/93**

Figure A–5

Boring Log U1B3



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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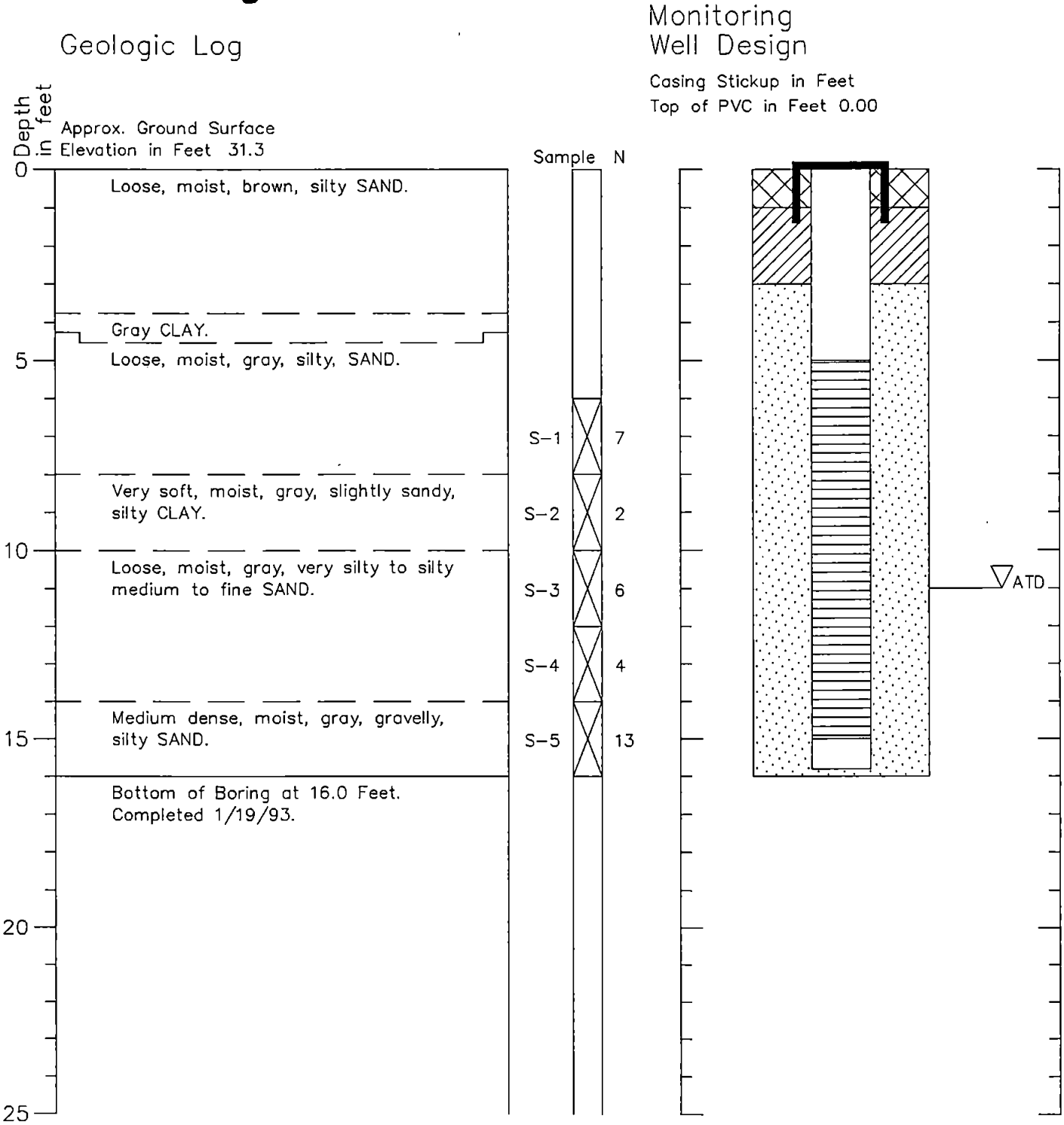
J-1638-27 1/93
Figure A-6

CAD XX/XX/XX 1=1 (xref)XXXX0000/Default.pcp
XXXX0000

Boring Log and Construction Data for Monitoring Well U1W



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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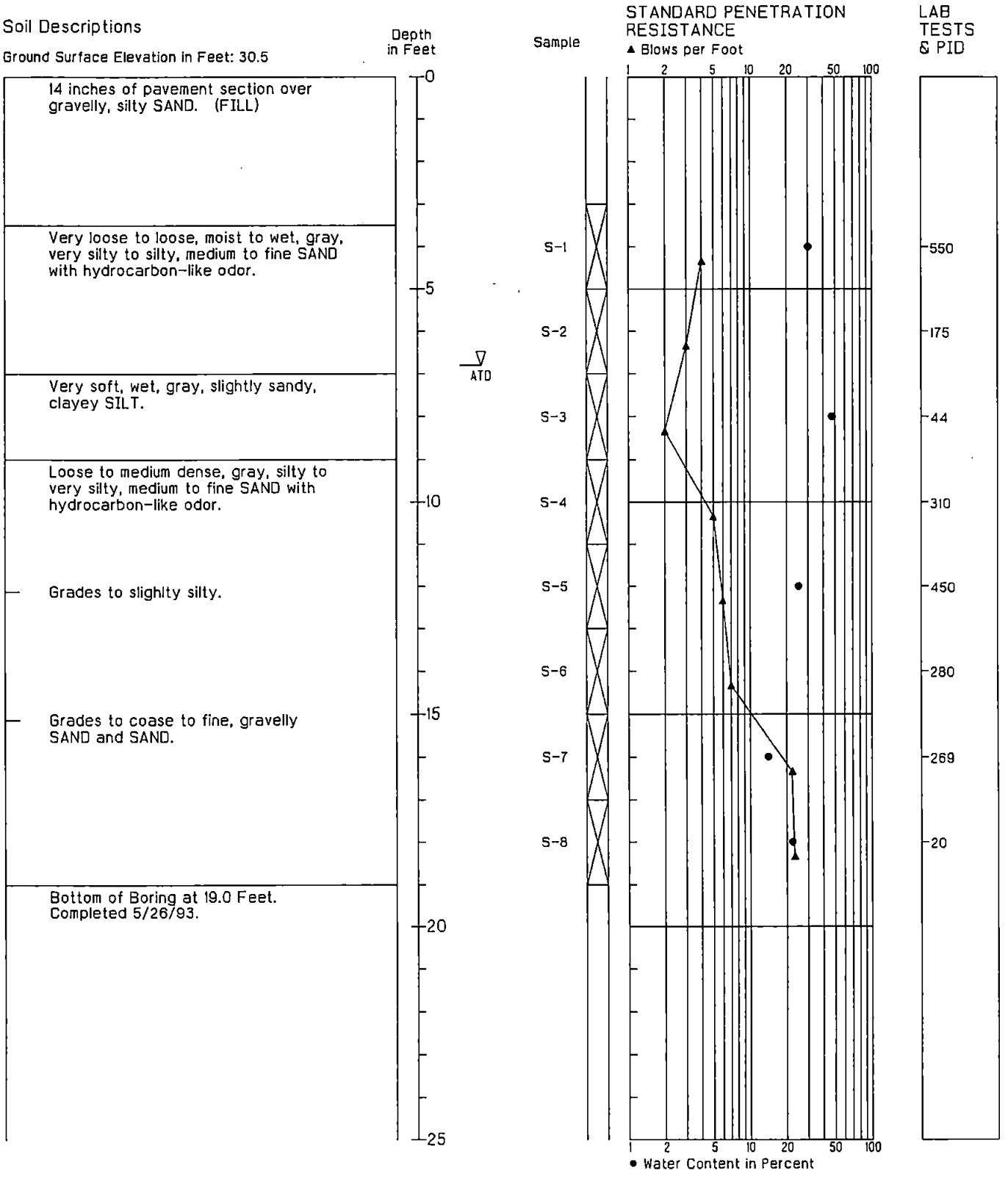
Figure A-7

FWK 1/31/94 1=1 HC.pcp U1W.dwg

Boring Log U-1B4



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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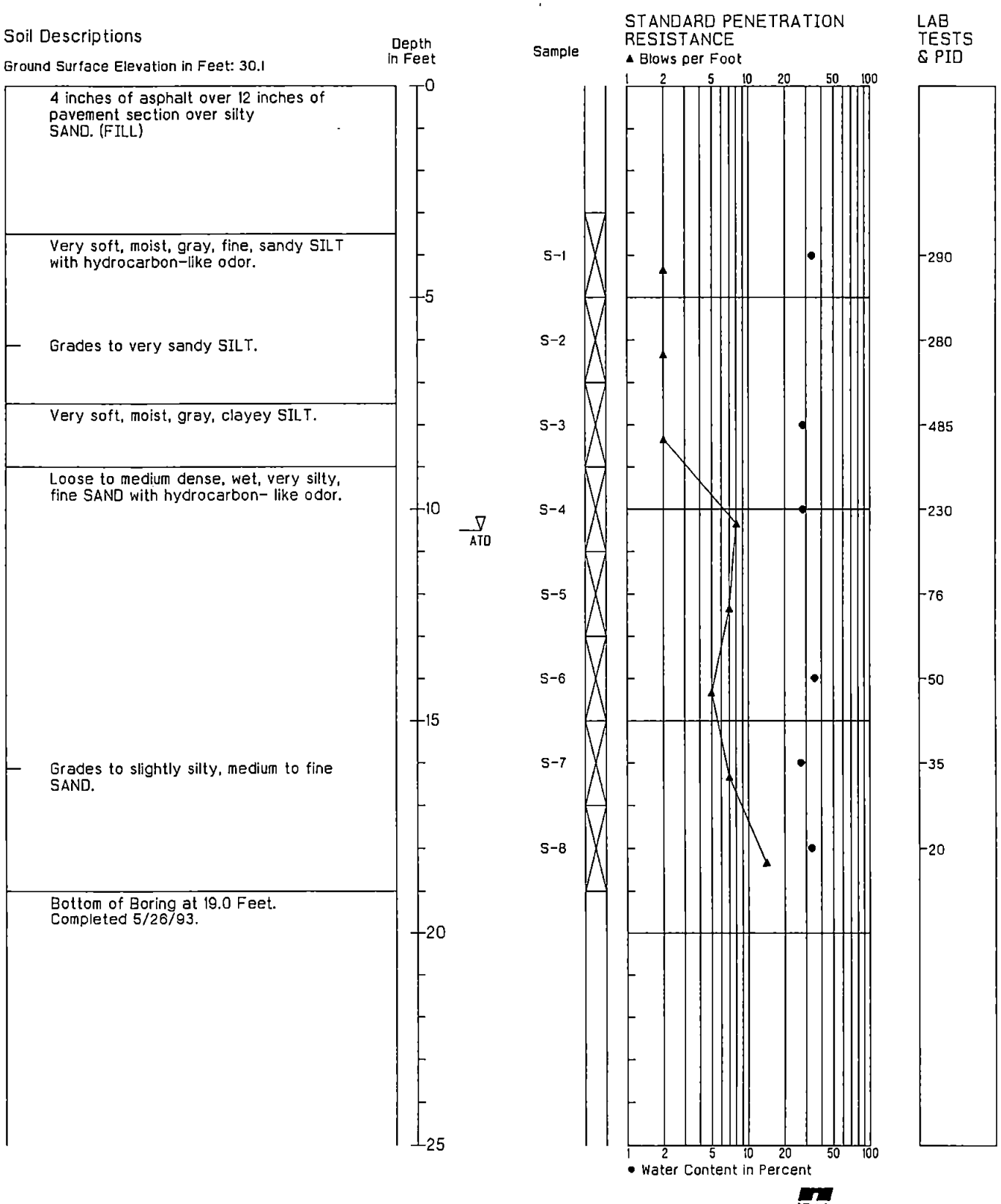
Figure A-8

Boring Log U-1B5



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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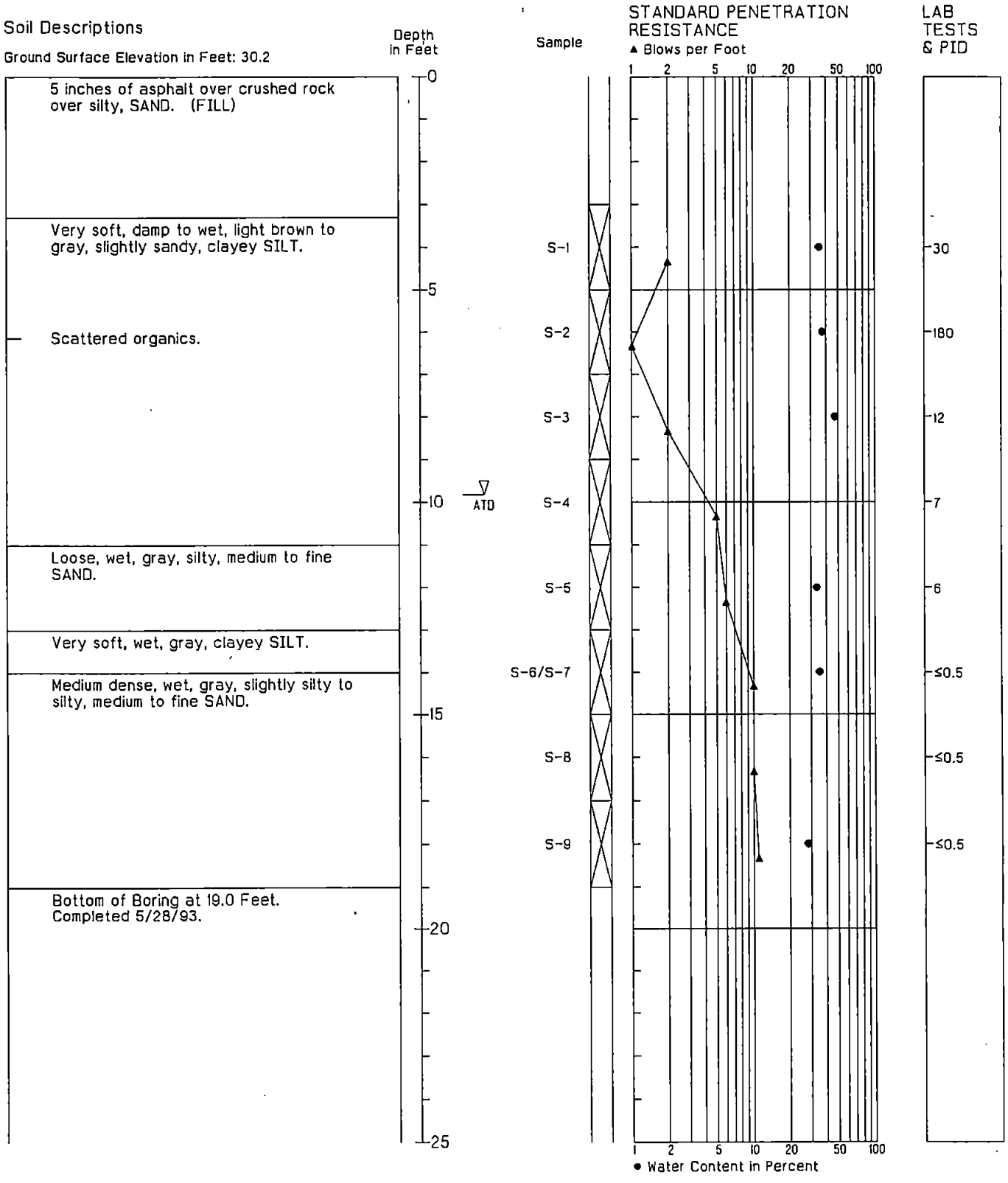
Figure A-9

Boring Log U-1B6



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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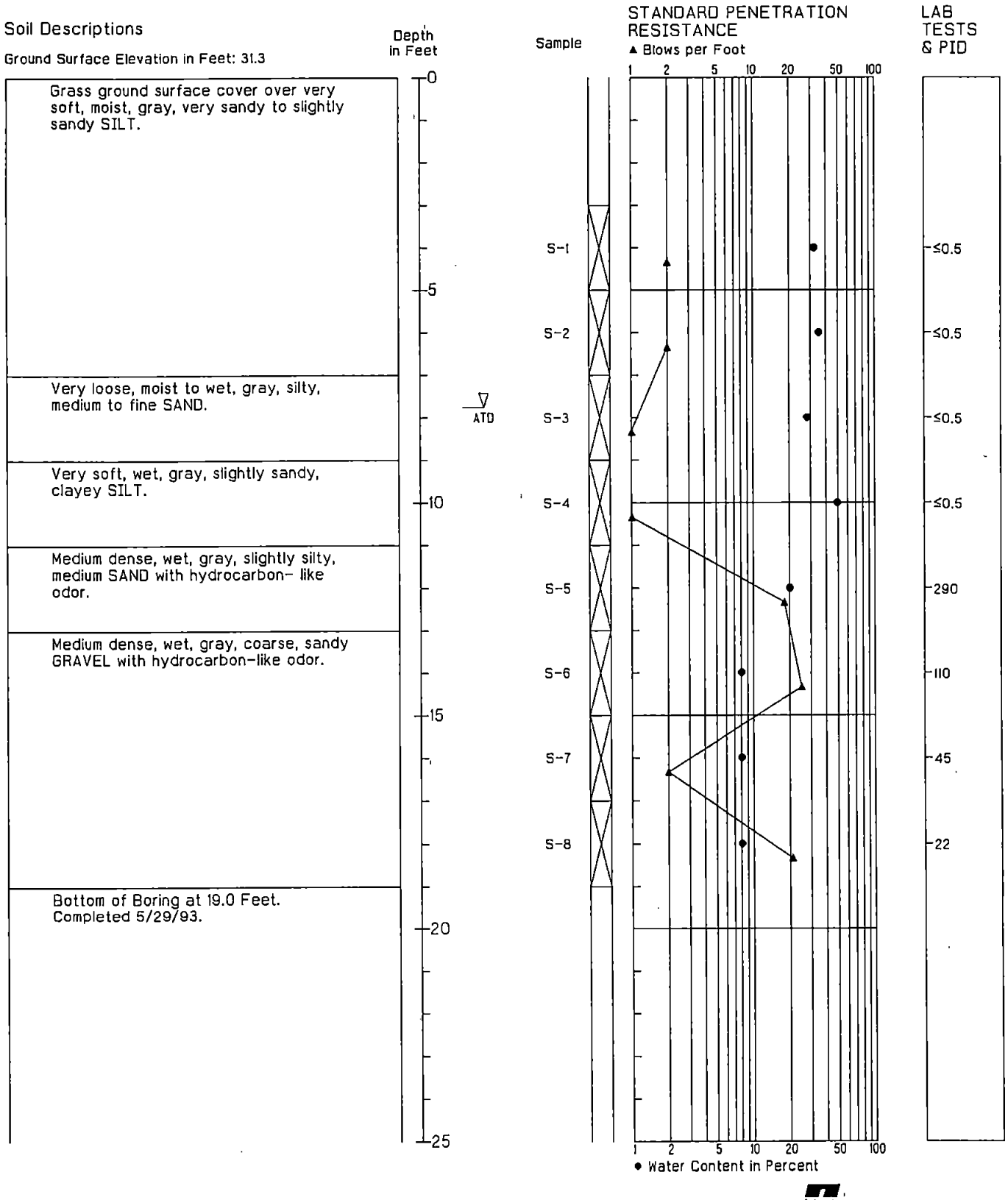
Figure A-10

Boring Log U-1B7



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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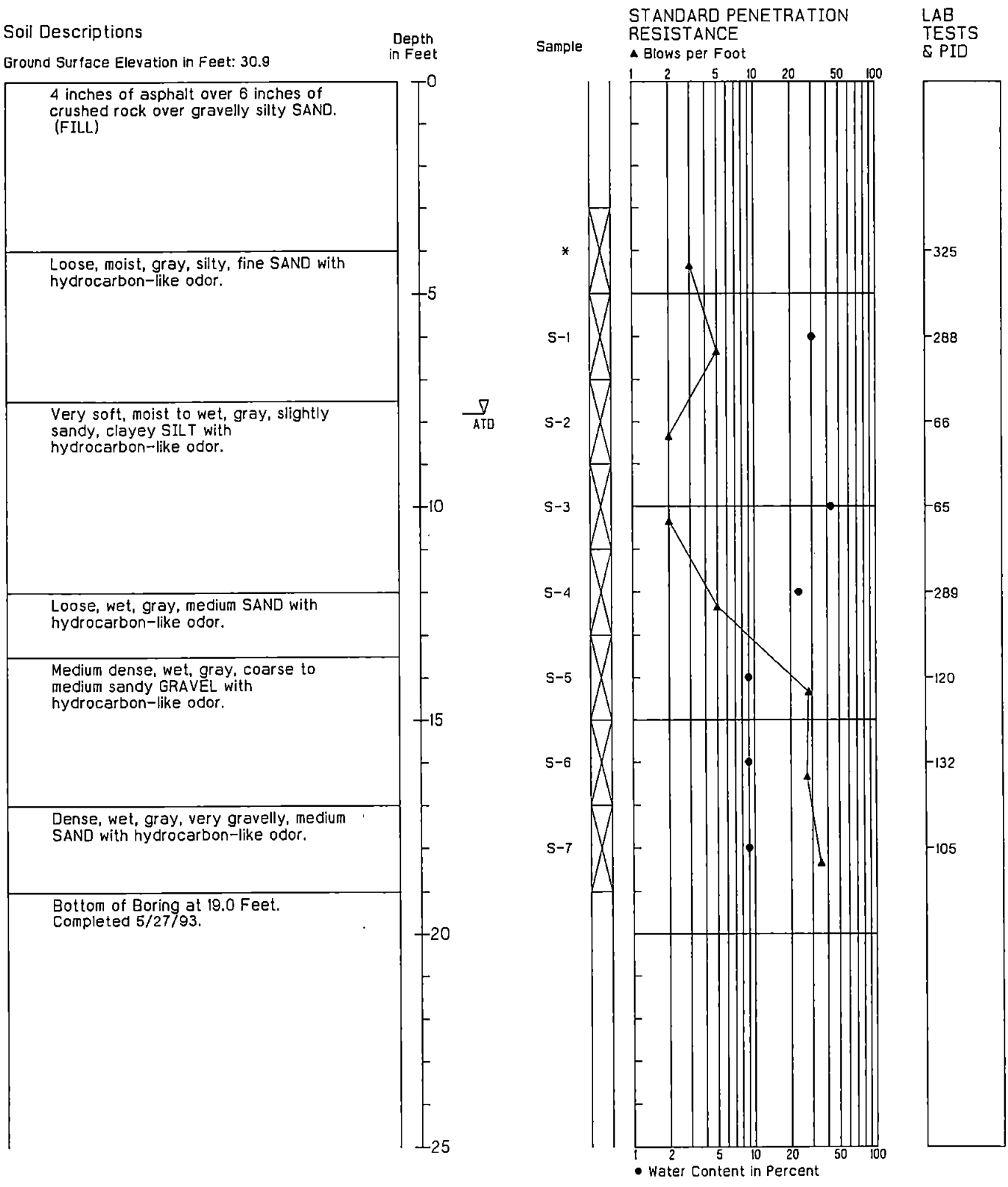
Figure A-11

Boring Log U-1B8



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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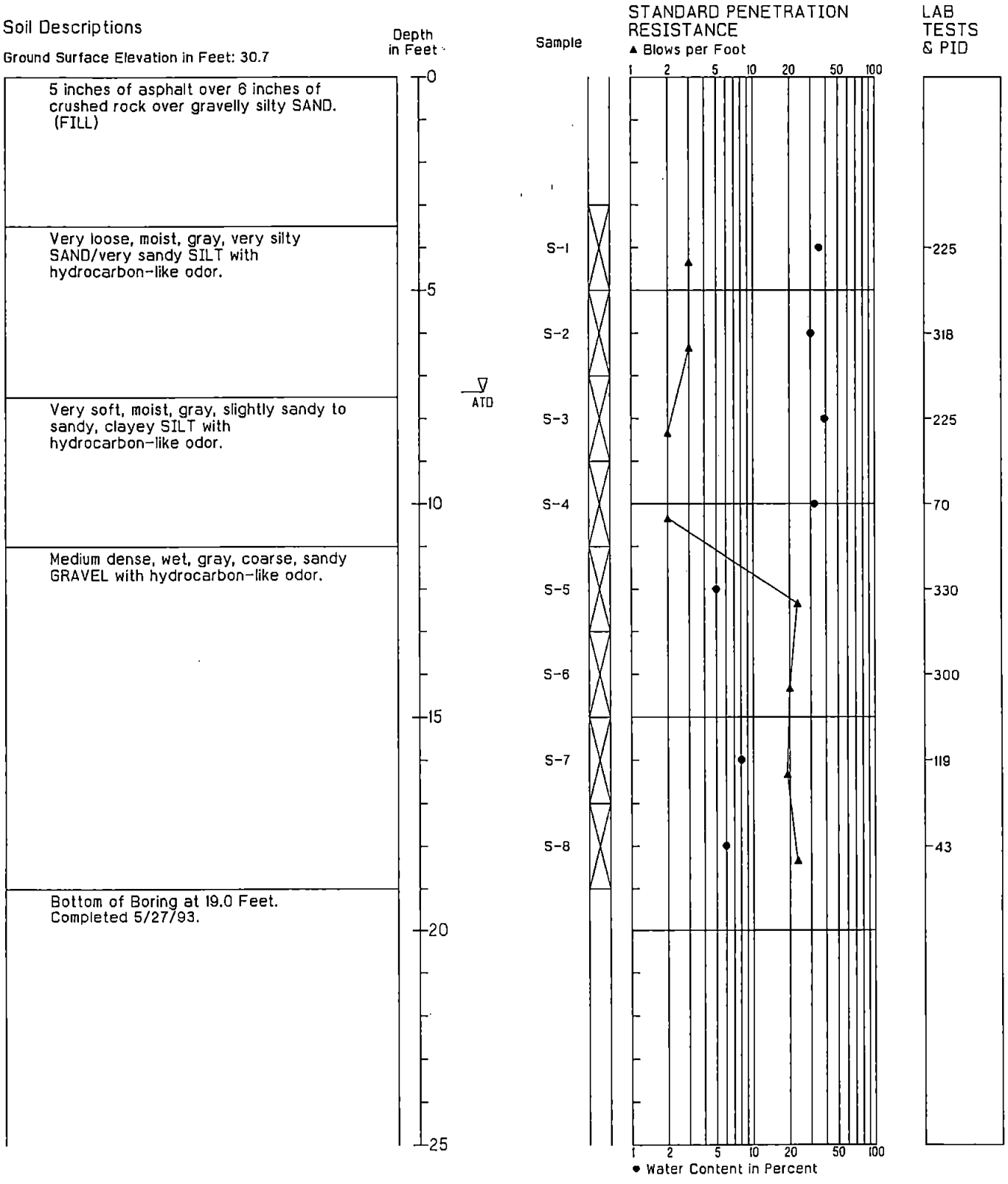
Figure A-12

Boring Log U-1B9



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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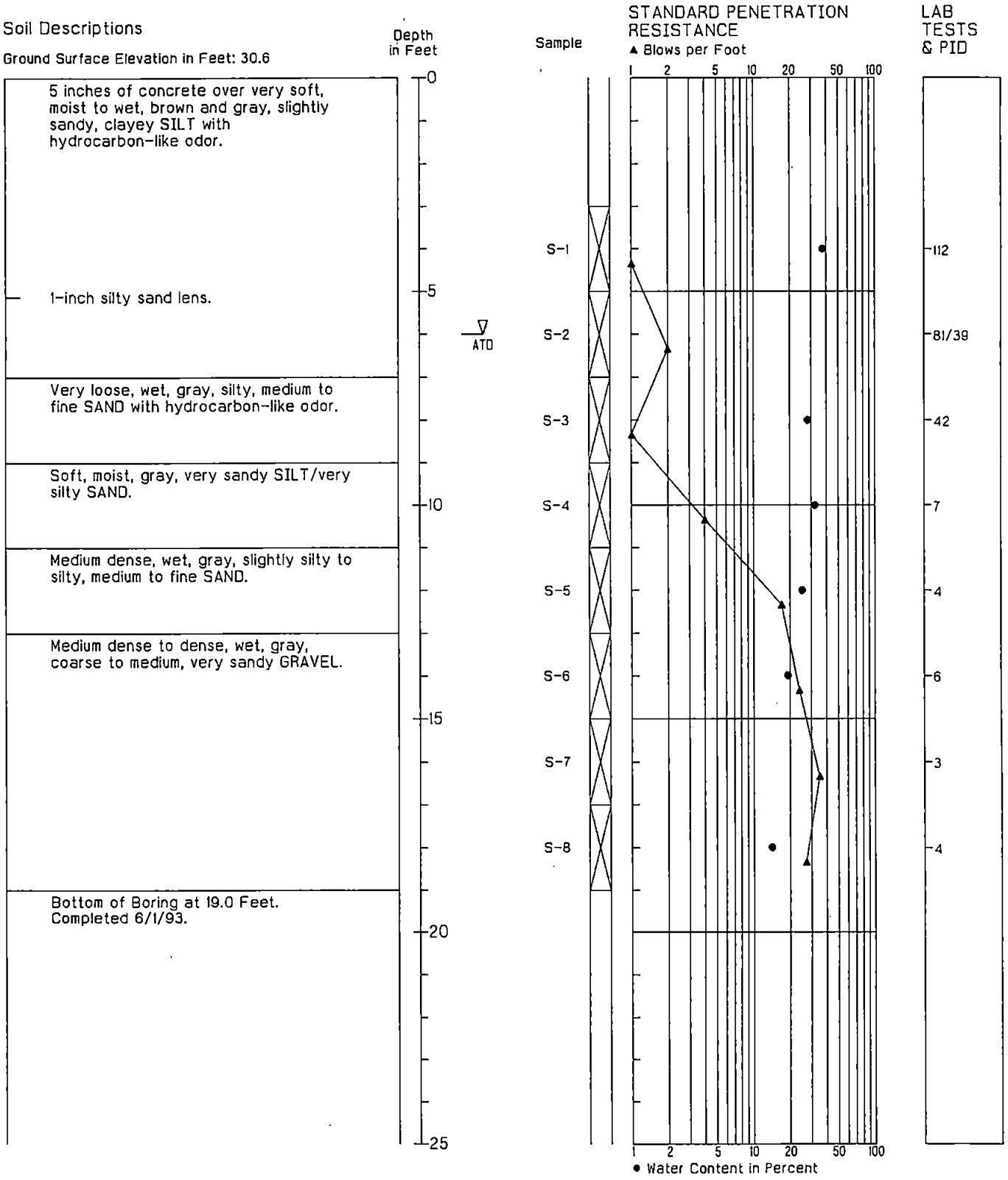
Figure A-13

Boring Log U-1B10



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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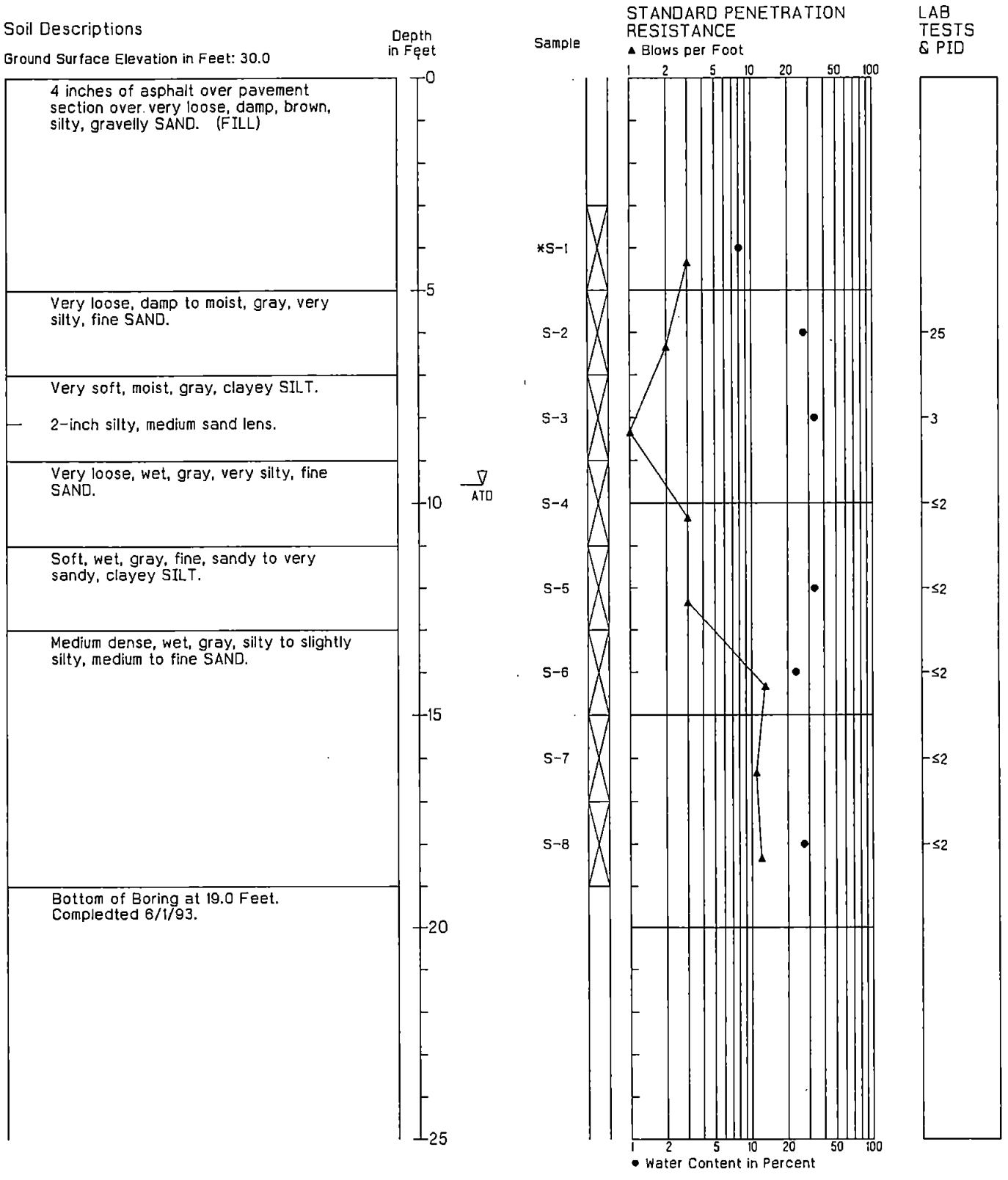
Figure A-14

Boring Log U-1B11



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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Figure A-15

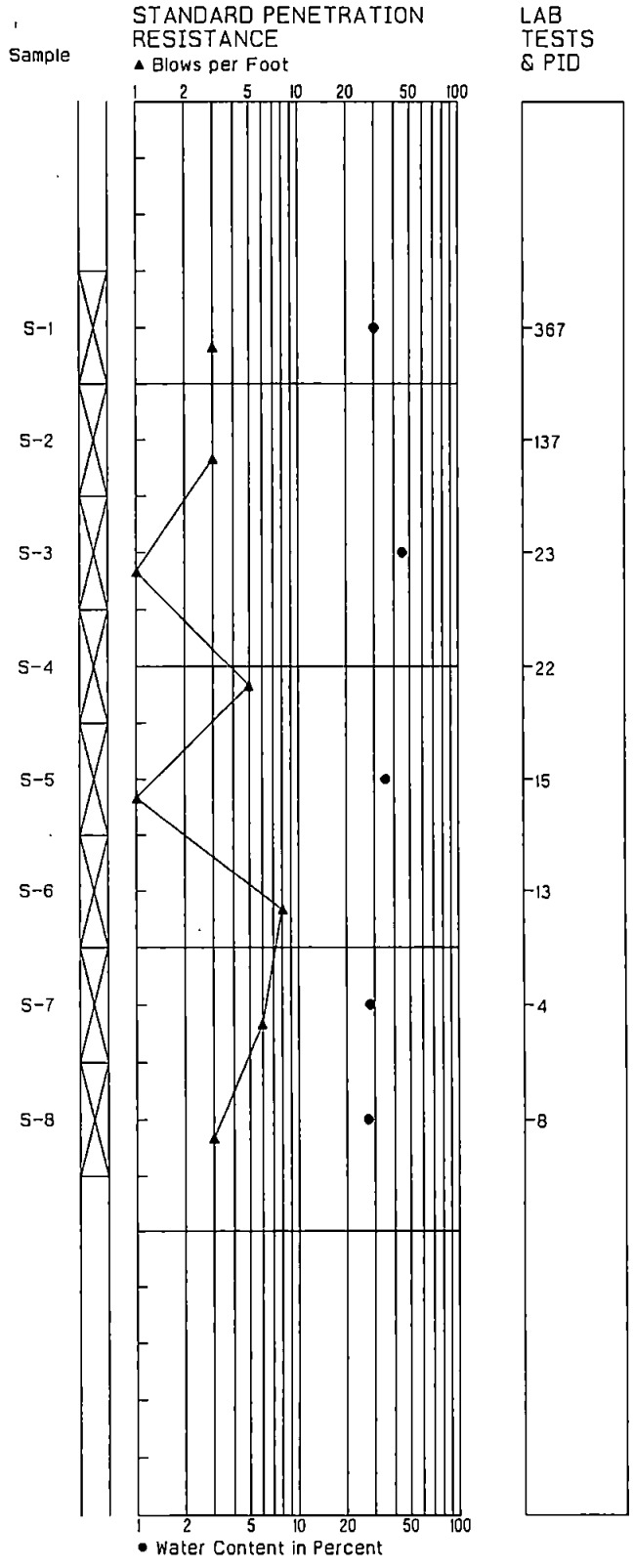
Boring Log U-1B12

Soil Descriptions

Ground Surface Elevation in Feet: 30.6

Depth in Feet	Soil Description
0	4 inches of asphalt over pavement section over silty SAND. (FILL)
	Soft, damp, gray, fine, very sandy SILT with hydrocarbon-like odor.
5	Very loose, moist, gray, silty, coarse to fine SAND with hydrocarbon-like odor.
	Very soft, moist, gray, clayey SILT with hydrocarbon-like odor.
10	Very loose to loose, moist to wet, gray, very silty to silty, medium to fine SAND with hydrocarbon-like odor. Odor decreases with depth.
15	
20	Bottom of Boring at 19.0 Feet. Completed 6/2/93.
25	

ATD



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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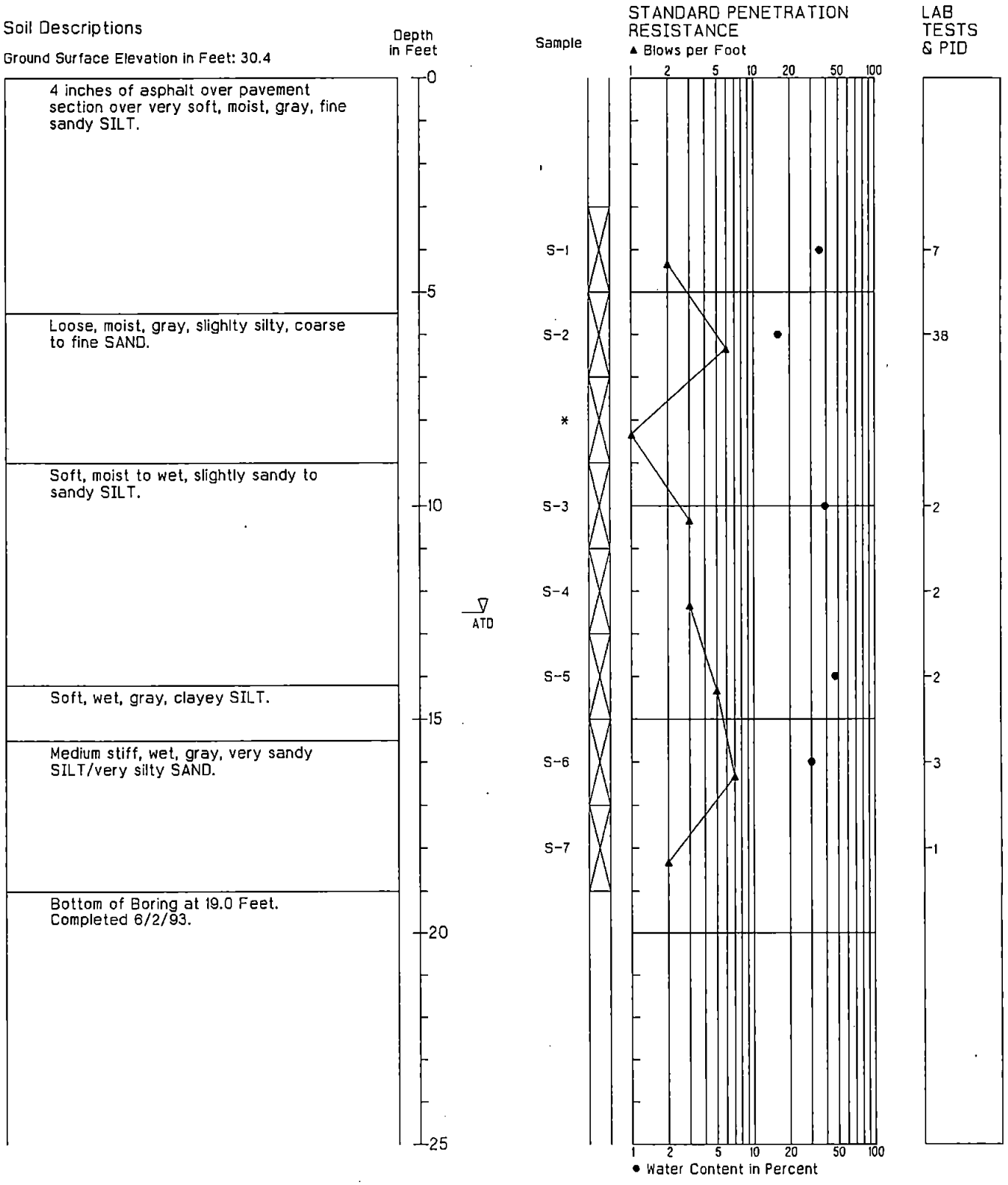
Figure A-16

Boring Log U-1B13



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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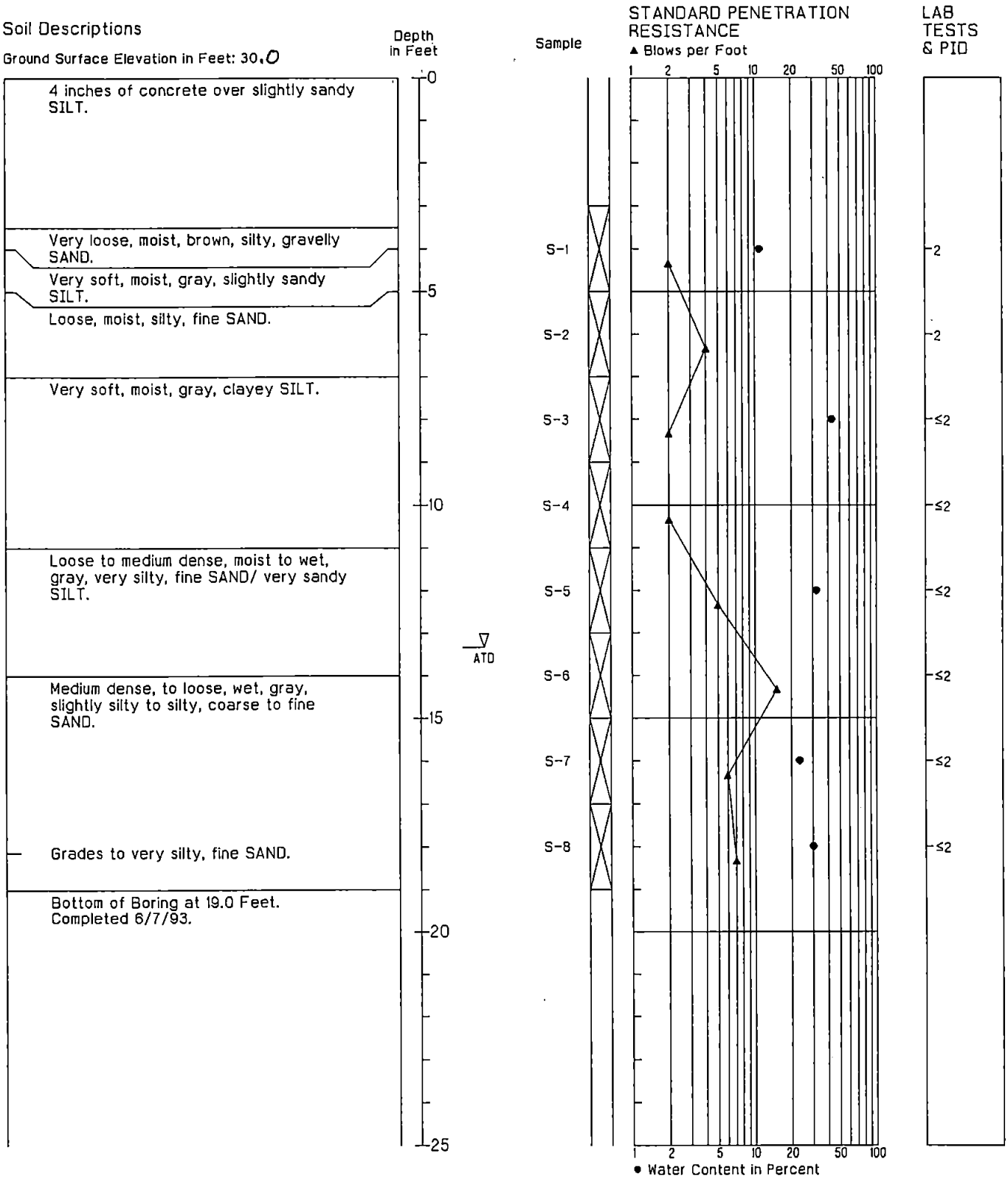
Figure A-17

Boring Log U-1B15



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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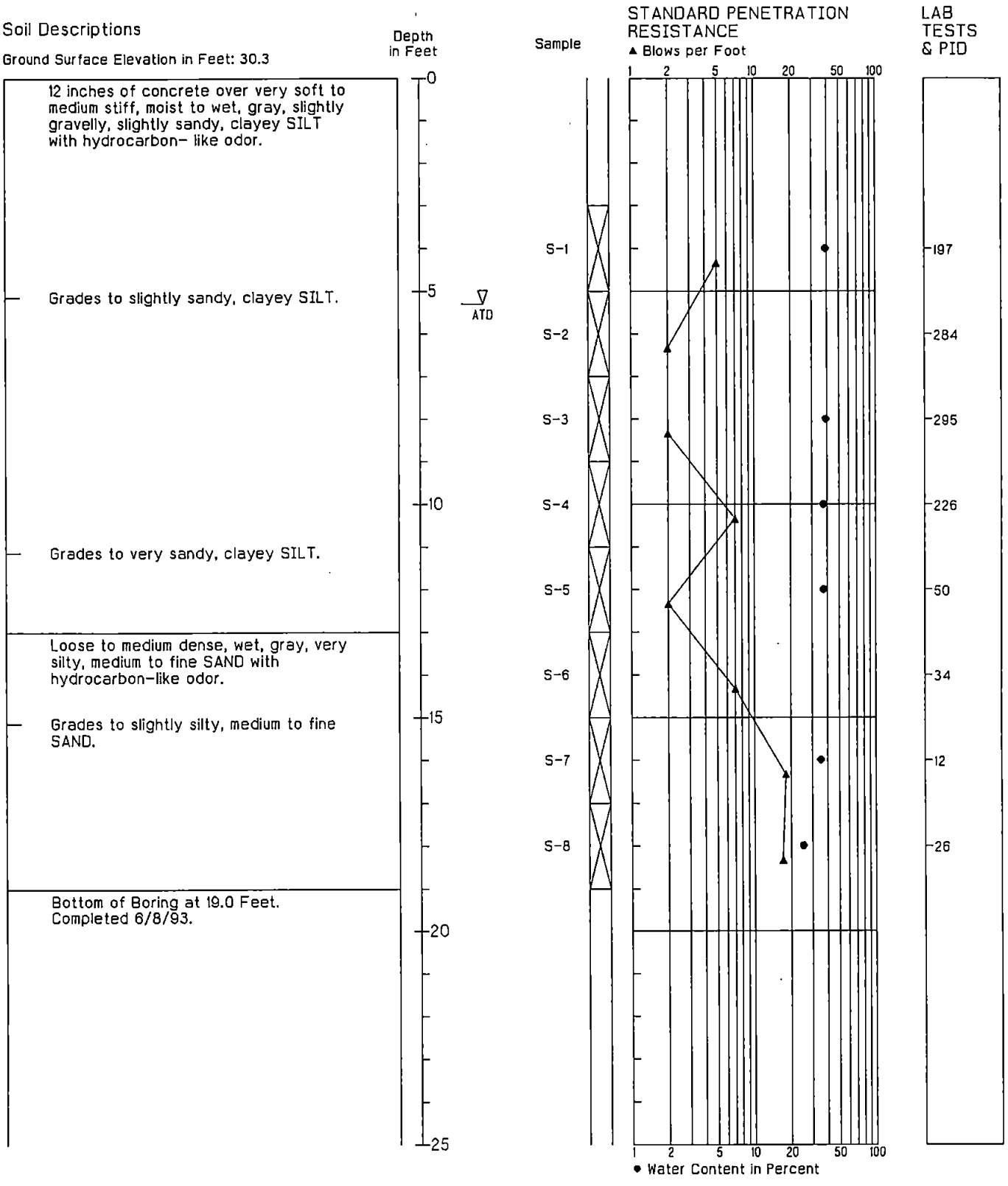
Figure A-18

Boring Log U-1BF1



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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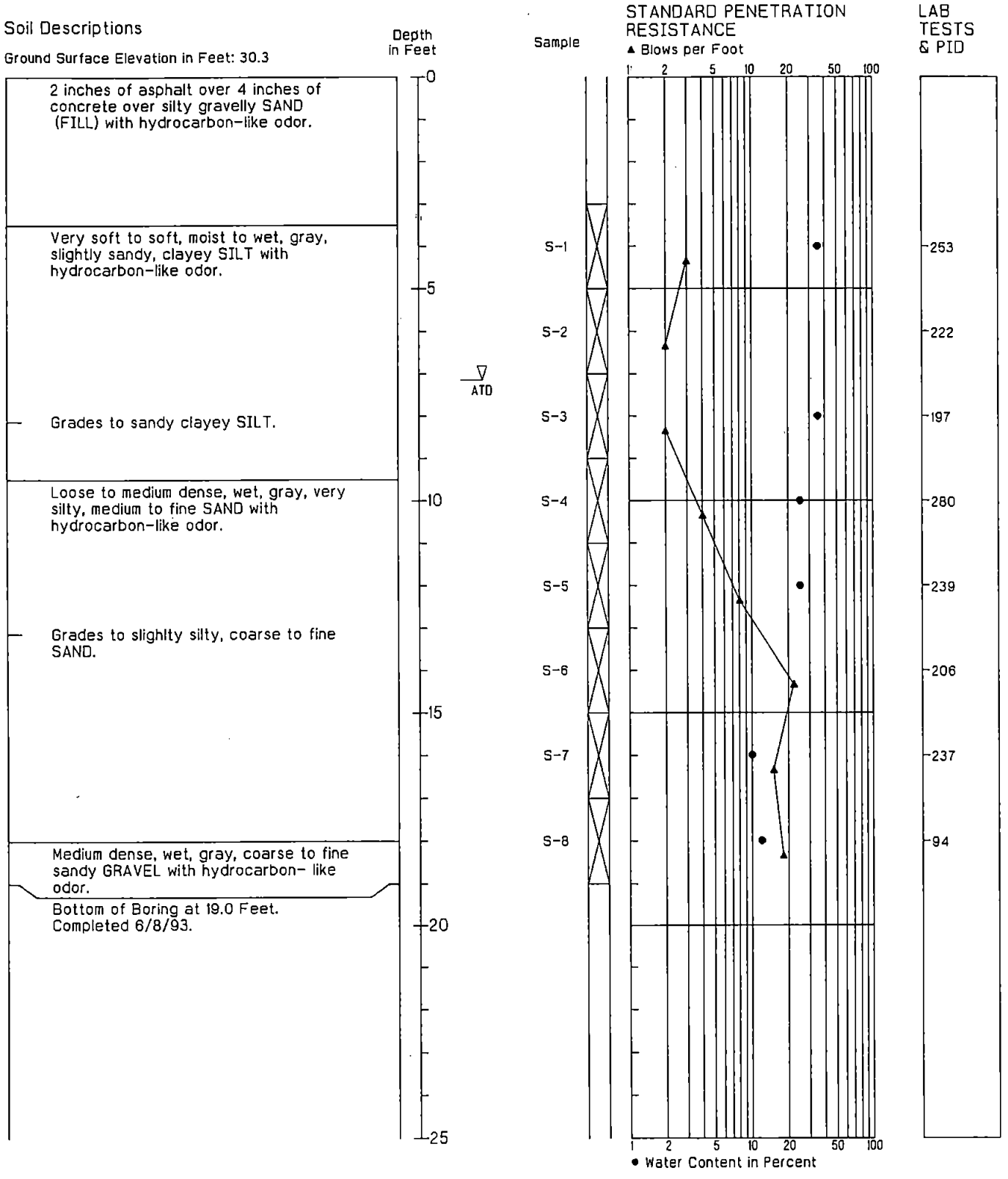
Figure A-19

Boring Log U-1BF2



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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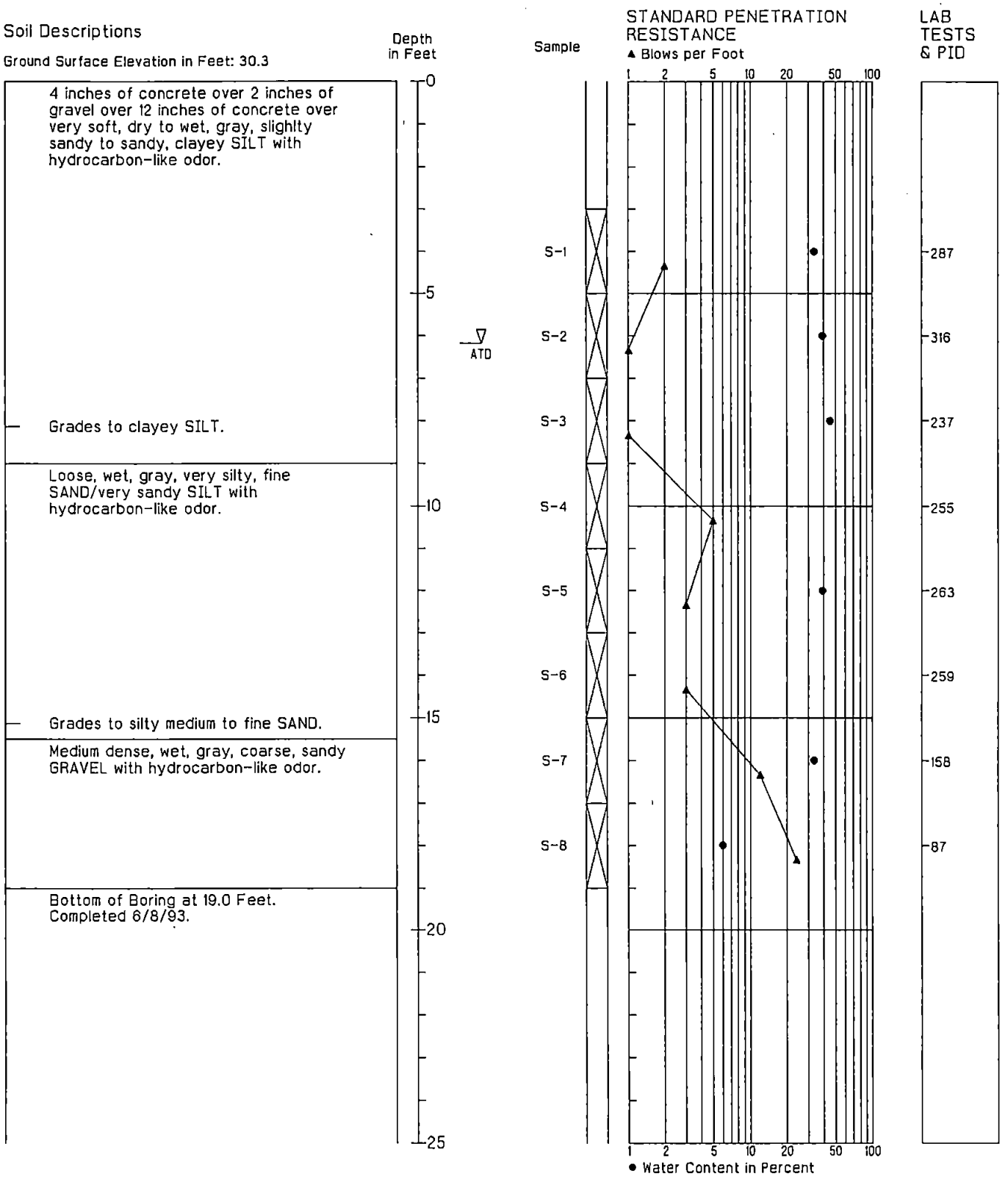
Figure A-20

Boring Log U-1BF3



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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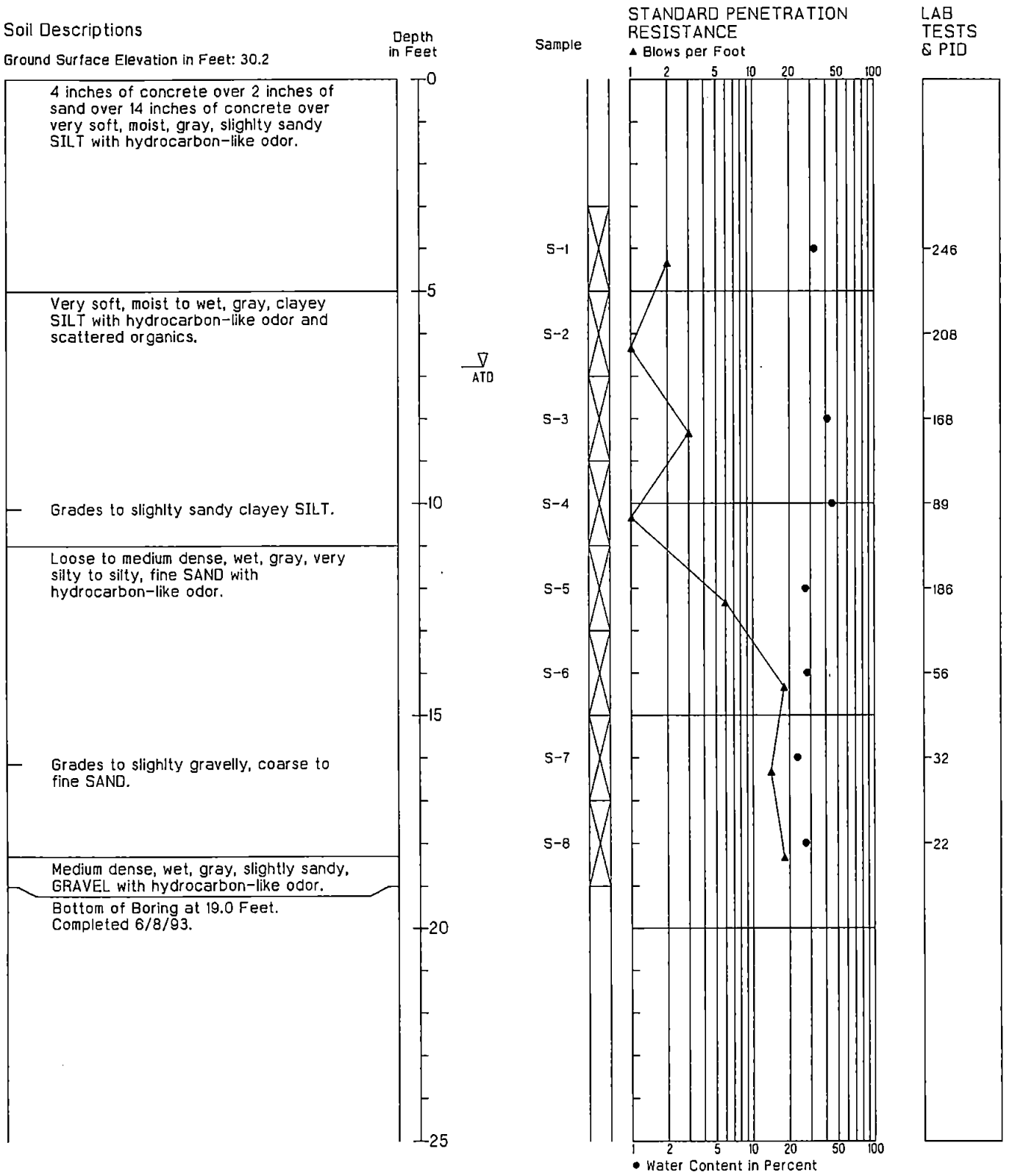
Figure A-21

Boring Log U-1BF4



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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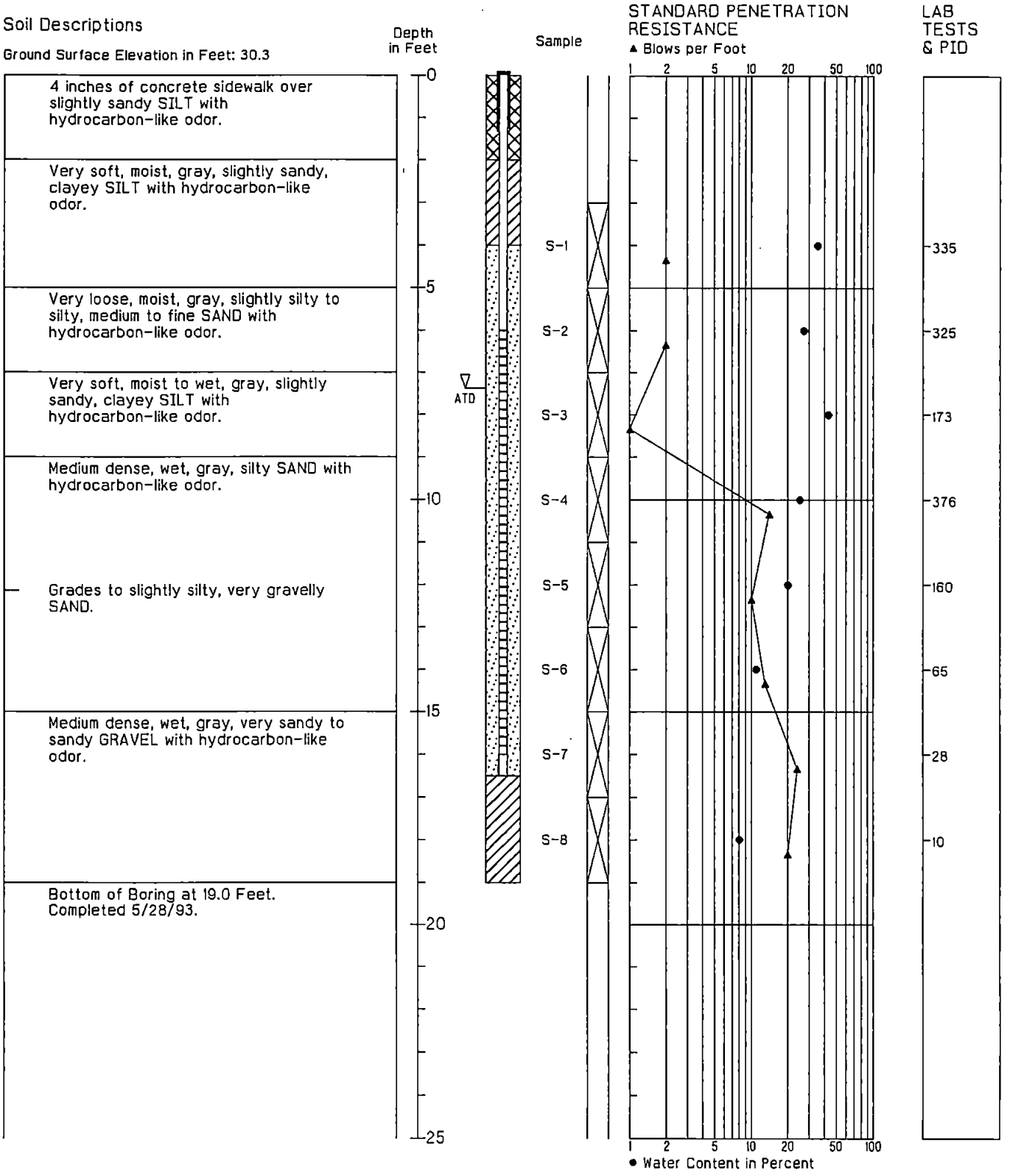
Figure A-22

Boring Log U-1W2



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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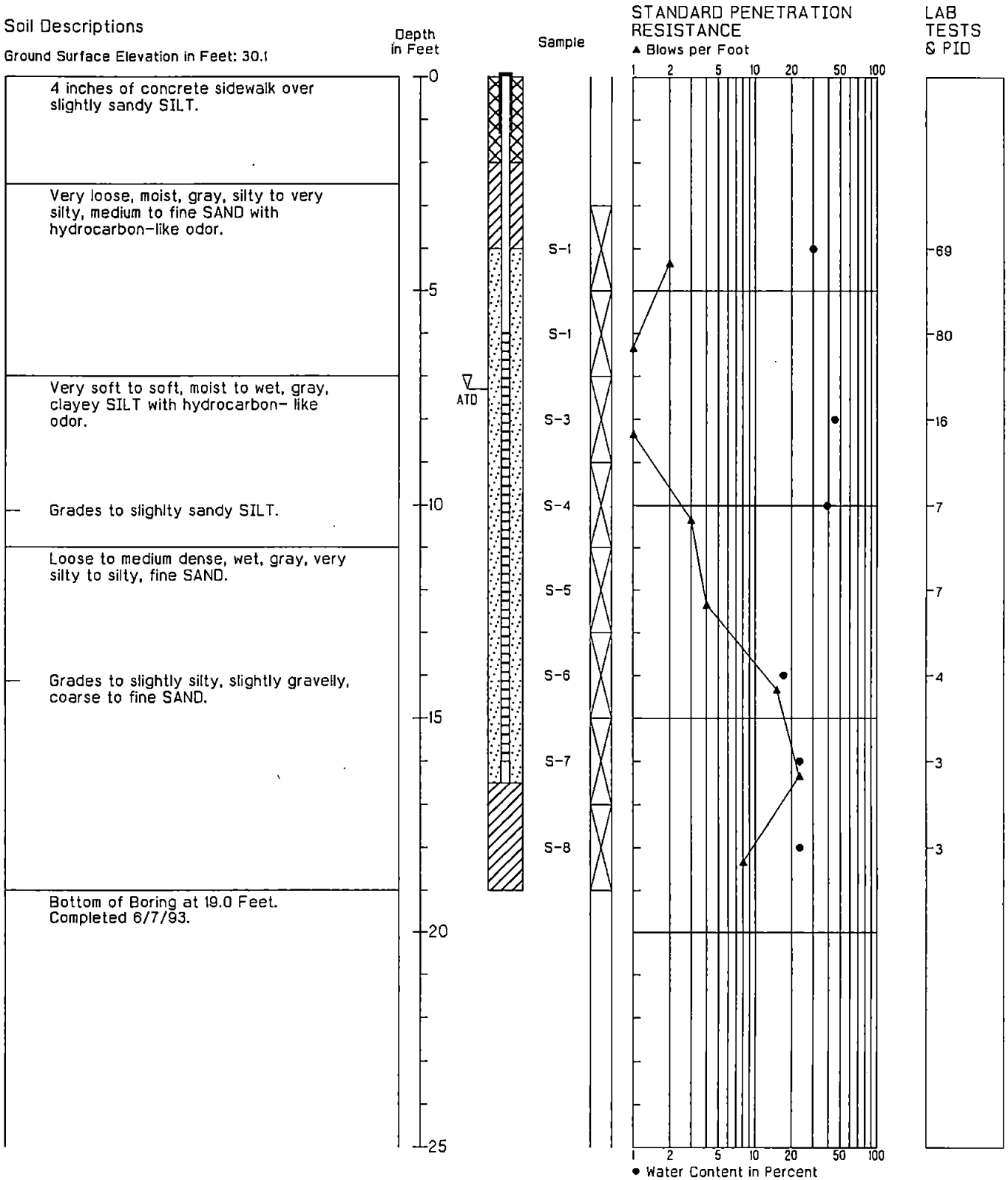
Figure A-23

Boring Log U-1W3



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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Figure A-24

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

January 2, 1993

Cathy Kiley, Hart Crowser Sr. Staff Environmental Chemist

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

Attached are the compiled results from analyses conducted on samples received November 20, 1992. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-ID	Soil	14	11/24/92	11/24/92

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, INC.

James Herndon

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

Analytical Results

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

Compound	U1N-S-1	U1N-S-2	U1N-S-3
Matrix	Soil	Soil	Soil
% Moisture	19%	15%	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	12,000	23	250
Bunker C	10 U	10 U	10 U
Oil	10 U	31	10 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	12,000	54	250
2-Fluorobiphenyl (surr #1)	M	89%	111%
o-Terphenyl (surr #2)	M	88%	99%
Hexacosane - nC26 (surr #3)	101%	89%	99%

Analytical Results, continued

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

Compound	U1N-S-4	U1N-S-5	U1N-S-6
Matrix	Soil	Soil	Soil
% Moisture	14%	7%	7%
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	300	120
Bunker C	10 U	10 U	10 U
Oil	10 U	10 U	10 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	230	300	120
2-Fluorobiphenyl (surr #1)	122%	100%	86%
o-Terphenyl (surr #2)	100%	99%	102%
Hexacosane - nC26 (surr #3)	100%	99%	100%

Analytical Results, continued

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

Compound	U1N-S-7	U1S-S-1	U1S-S-2
Matrix	Soil	Soil	Soil
% Moisture	8%	21%	25%
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	24	10 U	10 U
Bunker C	10 U	10 U	10 U
Oil	10 U	10 U	10 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	24	-	-
2-Fluorobiphenyl (surr #1)	96%	86%	88%
o-Terphenyl (surr #2)	99%	93%	98%
Hexacosane - nC26 (surr #3)	98%	93%	99%

Analytical Results, continued

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

Compound	U1S-S-3	U1S-S-4	U1S-S-5
Matrix	Soil	Soil	Soil
% Moisture	22%	21%	6%
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	10 U	10 U	10 U
Bunker C	10 U	10 U	10 U
Oil	10 U	10 U	10 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	-	-	-
2-Fluorobiphenyl (surr #1)	82%	94%	86%
o-Terphenyl (surr #2)	93%	97%	95%
Hexacosane - nC26 (surr #3)	93%	96%	95%

Analytical Results, continued

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

Compound	U1S-S-6	Duplicate U1S-S-6	U1S-S-7
Matrix	Soil	Soil	Soil
% Moisture	12%	12%	5%
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	10 U	10 U	10 U
Bunker C	10 U	10 U	10 U
Oil	10 U	10 U	10 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	-	-	-
2-Fluorobiphenyl (surr #1)	91%	90%	90%
o-Terphenyl (surr #2)	99%	102%	99%
Hexacosane - nC26 (surr #3)	98%	103%	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.

Method Blanks

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

Compound	
Matrix	Soil
Gasoline	10 U
Kensol	10 U
Kerosene/Jet A	10 U
Stoddard Solvent	10 U
Diesel/Fuel Oil #2	10 U
Bunker C	10 U
Oil	10 U
Unknown	10 U
Total TPH Concentration	-
2-Fluorobiphenyl (surr #1)	91%
o-Terphenyl (surr #2)	97%
Hexacosane - nC26 (surr #3)	98%

Spikes

% Recovery

Compound	MS U1N-S-7	MSD U1N-S-7	MS U1S-S-7	MSD U1S-S-7
Matrix	Soil	Soil	Soil	Soil
Kerosene/Jet A	97%	98%	76%	87%
2-Fluorobiphenyl (surr #1)	116%	88%	112%	113%
o-Terphenyl (surr #2)	97%	95%	98%	99%
Hexacosane - nC26 (surr #3)	95%	95%	97%	98%

Duplicates

Relative % Difference

Compound	U1N-S-7	U1S-S-7
Matrix	Soil	Soil
Kerosene/Jet A	-1%	-14%

Laboratory Control Sample

% Recovery

Compound	
Matrix	Soil
Kerosene/Jet A	96%
2-Fluorobiphenyl (surr #1)	126%
o-Terphenyl (surr #2)	95%
Hexacosane - nC26 (surr #3)	94%

Sample Custody Record

DATE 11/19/92 PAGE 1 OF 2

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER J. Finn

PROJECT NAME PACCAR Phase IV

SAMPLED BY: J. Bromley

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015 Mod	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
UIN	S-1	11/18/92	HC-UIN	Soil	/	1	For all: Certified Analyses Quant. w/ Phenanthrene
	S-2				/	1	
	S-3				/	1	
	S-4				/	1	
	S-5				/	1	
	S-6				/	1	
	S-7				/	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
John Bromley	11/19	Valery Ivanov	11/20/92
SIGNATURE (John Bromley)	TIME	SIGNATURE VALERY IVANOV	TIME
PRINTED NAME Hart Crowser		PRINTED NAME HC	10:01
COMPANY		COMPANY	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 7

METHOD OF SHIPMENT Hand Deliver

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

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

Sample Custody Record

DATE 11/19/92 PAGE 2 OF 2

HART CROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER J FINN

PROJECT NAME PACCAR Phase IV

SAMPLED BY: J. Bromley

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015 Mod	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
							For all:
U15	S-1	11/19	HC-U15	Soil	/	1	Certified Analyses
	S-2				/	1	Quant w/Phenanthrene
	S-3				/	1	
	S-4				/	1	
	S-5				/	1	
	S-6				/	1	
	S-7				/	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
John Bromley	11/19	Valery Ivanov	10/20/92
SIGNATURE John Bromley	TIME	SIGNATURE VALERY IVANOV	TIME
PRINTED NAME Hart Crowser		PRINTED NAME UC	10:02
COMPANY		COMPANY	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 7

METHOD OF SHIPMENT Hand Deliver

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
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HART CROWSER

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

January 4, 1993

Cathy Kiley, Hart Crowser Sr. Staff Environmental Chemist

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

Attached are the compiled results from analyses conducted on samples received December 7, 1992. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-ID	Water	2	12/09/92	12/09/92
► TPH-ID	Product	1	12/09/92	12/09/92

This report contains the following:

- Analytical results for water and product samples.
- Data qualifiers.
- Results for method blanks.
- Differences for duplicate analyses.
- Recoveries for laboratory control sample.
- Copies of chain of custody forms.

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-N-2	U-1-S	Duplicate U-1-S	U-1-N
Matrix	Water	Water	Water	Product
Gasoline	0.2 U	0.2 U	0.2 U	1,000 U
Kensol	0.4 U	0.4 U	0.4 U	1,000 U
Kerosene/Jet A	0.4 U	0.4 U	0.4 U	1,000 U
Stoddard Solvent	0.2 U	0.2 U	0.2 U	1,000 U
Diesel/Fuel Oil #2	2	0.5	0.5	76,000
Bunker C	0.4 U	0.4 U	0.4 U	1,000 U
Oil	0.4 U	0.4 U	0.4 U	1,000 U
Unknown	0.4 U	0.4 U	0.4 U	1,000 U
Total TPH Concentration	2	0.5	0.5	76,000
2-Fluorobiphenyl (surr #1)	116%	112%	114%	129%
o-Terphenyl (surr #2)	99%	107%	108%	105%
Hexacosane - nC26 (surr #3)	99%	107%	106%	106%

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.

Method Blanks

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

Compound		
Matrix	Water	Product
Gasoline	0.2 U	1,000 U
Kensol	0.4 U	1,000 U
Kerosene/Jet A	0.4 U	1,000 U
Stoddard Solvent	0.2 U	1,000 U
Diesel/Fuel Oil #2	0.4 U	1,000 U
Bunker C	0.4 U	1,000 U
Oil	0.4 U	1,000 U
Unknown	0.4 U	1,000 U
Total TPH Concentration	-	-
2-Fluorobiphenyl (surr #1)	125%	97%
o-Terphenyl (surr #2)	123%	99%
Hexacosane - nC26 (surr #3)	125%	99%

Duplicates

Relative % Difference

Compound	U-1-S
Matrix	Water
Total TPH Concentration	11%

Laboratory Control Sample

% Recovery

Compound	
Matrix	Water
Kerosene/Jet A	92%
2-Fluorobiphenyl (surr #1)	157%
o-Terphenyl (surr #2)	118%
Hexacosane - nC26 (surr #3)	118%

BF

Sample Custody Record

DATE 12-7-92 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER H.C.

PROJECT MANAGER Finn

PROJECT NAME Pescar

SAMPLED BY:

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: TPH SGCS Mod	TESTING: HCPID & WTPH	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1-S			Water	X		1	24-48 HRS
	U-1-N		Product	↓	X	~~X~~ mc 12/7/92	2	VOA on Hold (U1-N)
					↑ mck 12/8/92			

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Brian Sullivan	12/7/92	SIGNATURE: Mary Catherine Kiley	12/7/92
PRINTED NAME: Brian Sullivan	TIME: 1600	PRINTED NAME: Mary Catherine Kiley	TIME: 1600
COMPANY: H.C.		COMPANY: HC	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE:		SIGNATURE: Valery Ivanov	12/7
PRINTED NAME:	TIME:	PRINTED NAME: Valery Ivanov	TIME: 4:05 pm
COMPANY:		COMPANY: HC	

TOTAL NUMBER OF CONTAINERS: 3

METHOD OF SHIPMENT: Hand

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: S-3

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
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4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

Sample Custody Record

DATE 12/8/92 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER J. FINN

PROJECT NAME PACCAR.

SAMPLED BY: S. SIEBERT

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: TPH 8015 MOD	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
~~HIN~~	~~S-1~~	2:30	U1N	WATER	X	1	QUANTIFY w/PHENANTHRENE
	U1-N-2						24 HR T.A.T.

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: STEPHEN SIEBERT	12/8/92	SIGNATURE	
PRINTED NAME: HART CROWSER	TIME: 4:50	PRINTED NAME	TIME
COMPANY		COMPANY	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE: Valery Ivanov	12/8
PRINTED NAME	TIME	PRINTED NAME: VALERY IVANOV	TIME
COMPANY		COMPANY: HC	4:50 PM

TOTAL NUMBER OF CONTAINERS: 1

METHOD OF SHIPMENT: HAND CARRY

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
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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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

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%

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%

Analytical Results, continued

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

Compound	U1B3-S-2	Duplicate U1B3-S-2	U1B3-S-3
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%

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.

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%

Spikes

% Recovery

Compound	MS U1W-S-1	MSD 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%

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%

BL

Sample Custody Record

DATE 1/19/93 PAGE 1 OF 1

HART CROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER J. Finn

PROJECT NAME PACCAR Phase IV

SAMPLED BY: J. Bromley

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015 Modified	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U1W-S-1		U1W	Soil		1	Quantify Phenethrene
	U1W-S-2		U1W			1	Certified Analysis
	U1W-S-3		U1W			1	
	U1W-S-4		U1W			1	
	U1W-S-5		U1W			1	
	U1B3-S-1		U1B3			1	8015 Mod TPH Equivalent
	U1B3-S-2		U1B3			1	to WTPH-ID
	U1B3-S-3		U1B3			1	
	U1B3-S-4		U1B3			1	
	U1B3-S-5		U1B3			1	24 HR TAT

RELINQUISHED BY	DATE	RECEIVED BY	DATE
John Bromley	1/19/93	Valeriy Ivanov	1/20/93
SIGNATURE		SIGNATURE	
John Bromley	TIME	Valery Ivanov	TIME
PRINTED NAME		PRINTED NAME	8:30
Hart Crowser		HC	
COMPANY		COMPANY	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
	TIME		TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 10

METHOD OF SHIPMENT Hand Delivery

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

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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.

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

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

Analytical Results

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

Compound	A U1B1-S-1	A U1B1-S-2	A U1B1-S-3
Matrix	Soil	Soil	Soil
% 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%

Analytical Results, continued

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

Compound	B U1B1-S-4	A U1B1-S-5	B 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%

Analytical Results, continued

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

Compound	A U1B2-S-2	A U1B2-S-3	A 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%

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.

Method Blanks

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

Compound	A 01/20/93	B 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%

Spikes

% Recovery

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

Laboratory Control Sample

% Recovery

Compound	A 01/20/93	B 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 1639-27 LAB NUMBER

PROJECT MANAGER J. FINN

PROJECT NAME PACCAR PHASE IV

SAMPLED BY: J. Bromley

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015 Mod	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/COMPOSITING INSTRUCTIONS
	U1B1-S-1	1/20/92	U1B1	Soil	X	1	Quantify Phenthrene
	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
SIGNATURE: John Bromley	1/20/92	SIGNATURE: [illegible]	1/20
PRINTED NAME: John Bromley	TIME: 2130	PRINTED NAME: [illegible]	TIME: 2130
COMPANY: Hart Crowser		COMPANY: HC	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS: 10

METHOD OF SHIPMENT: Hand Deliver

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: S-3

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

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1W	Duplicate 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.

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%

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%

1639-27.00

Sample Custody Record

DATE 1/22/93 PAGE 1 OF 1

HART CROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER J. Finn

PROJECT NAME PACCAR IV

SAMPLED BY: JPB

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: NWTPH-ID (Ecology Method)	NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
	UIW	1/22/93	UIW	Water	✓	1	
							48 HR
							24 HR TAT
							1/26/93

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE John Brawley	1/22/93	SIGNATURE Valery Ivanov	1/26/93
PRINTED NAME John Brawley	TIME 11:30	PRINTED NAME VALERY IVANOV	TIME 9:00
COMPANY HC		COMPANY HC	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 1

METHOD OF SHIPMENT Hand Deliver

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

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

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

June 30, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B4 Borings, J-1639-27, Sequence EU

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

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Soil	5	5/27/93	5/27/93

This report contains the following:

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

Analytical Comment

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

The TPH-HCID concentration in sample U1-B4-S-5 is greater than five times the spike concentration. Therefore, spike and spike duplicate recoveries are not calculated. Relative percent difference is calculated from the sample concentrations in the spike and spike duplicate.

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B4-S-1	Duplicate U1-B4-S-1	U1-B4-S-3
Matrix	Soil	Soil	Soil
% Moisture	23%	23%	32%
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	13,000	14,000	30
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	80
Unknown	10 U	10 U	10 U
Total TPH Concentration	13,000	14,000	110
2-Fluorobiphenyl (surr #1)	M	M	98%
o-Terphenyl (surr #2)	M	M	100%
Hexacosane - nC26 (surr #3)	M	M	106%

Analytical Results, continued

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

Compound	U1-B4-S-5	U1-B4-S-7	U1-B4-S-8
Matrix	Soil	Soil	Soil
% Moisture	20%	12%	18%
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	5,800	1,600	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	5,800	1,600	-
2-Fluorobiphenyl (surr #1)	M	121%	105%
o-Terphenyl (surr #2)	M	102%	105%
Hexacosane - nC26 (surr #3)	M	116%	100%

Analytical Results, continued

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

Compound	MS U1-B4-S-5	MSD U1-B4-S-5
Matrix	Soil	Soil
% Moisture	20%	20%
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	4,400	4,500
Bunker C	50 U	50 U
Oil	50 U	50 U
Unknown	10 U	10 U
Total TPH Concentration	4,400	4,500
2-Fluorobiphenyl (surr #1)	M	M
o-Terphenyl (surr #2)	111%	130%
Hexacosane - nC26 (surr #3)	109%	120%

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.

Method Blanks

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

Compound	05/27/93
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)	100%
o-Terphenyl (surr #2)	103%
Hexacosane - nC26 (surr #3)	72%

Duplicates

Relative % Difference

Compound	U1-B4-S-1	U1-B4-S-5
Matrix	Soil	Soil
Total TPH Concentration	-7%	-2%

Laboratory Control Sample

% Recovery

Compound	05/27/93
Matrix	Soil
Diesel/Fuel Oil #2	88%
2-Fluorobiphenyl (surr #1)	115%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	83%

Sample Custody Record

DATE 5.26.93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER H.C.

PROJECT MANAGER Tiley

PROJECT NAME Paccar Garden Ave,

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1B4		S-1 → S-8	Soil	X	8	
	U-1B5		S-1 → S-8	Soil	X	8	RUSH 24H
							Cathy Tiley which to run
	U-1B4		S-2				
			S-4				
			S-6				DO NOT
	U-1B5		S-2				
			S-5				Run per Cathy Tiley 5/27/93 SRC

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	5/26	SIGNATURE	5/26
PRINTED NAME Brian Sullivan	TIME	PRINTED NAME	TIME
COMPANY H.C.	1645	COMPANY	1645
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 16

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS S-1

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
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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

June 23, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B5 Borings, J-1639-27, Sequence EU

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

	Matrix	Quantity	Date Extracted	Date Analyzed
▸ TPH-HCID	Soil	6	5/27/93	5/27/93

This report contains the following:

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

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B5-S-1	Duplicate U1-B5-S-1	U1-B5-S-3
Matrix	Soil	Soil	Soil
% Moisture	25%	25%	22%
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	9,200	4,500	22,000
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	9,200	4,500	22,000
2-Fluorobiphenyl (surr #1)	M	M	M
o-Terphenyl (surr #2)	M	M	M
Hexacosane - nC26 (surr #3)	M	M	130%

Analytical Results, continued

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

Compound	U1-B5-S-4	U1-B5-S-6	U1-B5-S-7	U1-B5-S-8
Matrix	Soil	Soil	Soil	Soil
% Moisture	22%	26%	21%	25%
Gasoline	10 U	10 U	10 U	10 U
Kensol	10 U	10 U	10 U	10 U
Kerosene/Jet A	10 U	10 U	10 U	10 U
Stoddard Solvent	10 U	10 U	10 U	10 U
Diesel/Fuel Oil #2	34	20 U	67	23
Bunker C	50 U	50 U	50 U	50 U
Oil	50 U	50 U	50 U	50 U
Unknown	10 U	10 U	10 U	10 U
Total TPH Concentration	34	-	67	23
2-Fluorobiphenyl (surr #1)	100%	95%	107%	108%
o-Terphenyl (surr #2)	100%	95%	107%	106%
Hexacosane - nC26 (surr #3)	102%	96%	102%	94%

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.

Method Blanks

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

Compound	05/27/93
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)	100%
o-Terphenyl (surr #2)	103%
Hexacosane - nC26 (surr #3)	72%

Duplicates

Relative % Difference

Compound	U1-B5-S-1
Matrix	Soil
Total TPH Concentration	69%

Laboratory Control Sample

% Recovery

Compound	05/27/93
Matrix	Soil
Diesel/Fuel Oil #2	88%
2-Fluorobiphenyl (surr #1)	115%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	83%

Sample Custody Record

DATE 5.26.93 PAGE 1 OF 1

HART CROWSER

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

JOB NUMBER 1639-27 LAB NUMBER H.C.

PROJECT MANAGER Kiley

PROJECT NAME Puccar Garden Ave,

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1 B4		S-1 → S-8	Soil	X	8	
	U-1 B5		S-1 → S-8	Soil	X	8	RUSH 48h Cathy Kiley which to run
	U-1 B4		S-2				
			S-4				
			S-6				Do not Run per Cathy Kiley 5/27/93 SRC
	U-1 B5		S-2				
			S-5				

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Brian Sullivan	5/26		5/26
SIGNATURE		SIGNATURE	
Brian Sullivan	TIME	Rob Pettyby	TIME
PRINTED NAME	1645	PRINTED NAME	1645
H.C.		H2	
COMPANY		COMPANY	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
	TIME		TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 16

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS S-1

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
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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

June 22, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B6 Borings, J-1639-27, Sequence EZ

Attached are the compiled results from analyses conducted on samples received May 28, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▸ TPH-HCID	Soil	6	6/01/93	6/01/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B6-S-1	Duplicate U1-B6-S-1	U1-B6-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	110	77	30
Bunker C	50 U	50 U	50 U
Oil	58	36	50 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	168	113	30
2-Fluorobiphenyl (surr #1)	77%	78%	85%
o-Terphenyl (surr #2)	75%	74%	84%
Hexacosane - nC26 (surr #3)	67%	65%	73%

Analytical Results, continued

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

Compound	U1-B6-S-3	U1-B6-S-5	U1-B6-S-6
Matrix	Soil	Soil	Soil
% Moisture	32%	25%	26%
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	430	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	430	-	-
2-Fluorobiphenyl (surr #1)	92%	92%	81%
o-Terphenyl (surr #2)	88%	91%	78%
Hexacosane - nC26 (surr #3)	85%	81%	65%

Analytical Results, continued

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

Compound	U1-B6-S-9
Matrix	Soil
% Moisture	22%
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)	72%
o-Terphenyl (surr #2)	83%
Hexacosane - nC26 (surr #3)	83%

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.

Method Blanks

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

Compound	06/01/93
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)	106%
o-Terphenyl (surr #2)	107%
Hexacosane - nC26 (surr #3)	108%

Spikes

% Recovery

Compound	MS U1-B6-S-9	MSD U1-B6-S-9
Matrix	Soil	Soil
Diesel/Fuel Oil #2	110%	104%
2-Fluorobiphenyl (surr #1)	90%	84%
o-Terphenyl (surr #2)	97%	93%
Hexacosane - nC26 (surr #3)	91%	86%

Duplicates

Relative % Difference

Compound	U1-B6-S-1	U1-B6-S-9
Matrix	Soil	Soil
Diesel/Fuel Oil #2		5%
Total TPH Concentration	39%	

Laboratory Control Sample

% Recovery

Compound	06/01/93
Matrix	Soil
Diesel/Fuel Oil #2	106%
2-Fluorobiphenyl (surr #1)	138%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	120%

EZ

Sample Custody Record

DATE 5·28·93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER A.C.

PROJECT MANAGER Kiley

PROJECT NAME Paccar Garden Ave.

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1W2		S-1 → S-8	Soil	X	8	
	U-1B6		S-1 → S-9	Soil	X	9	Ask Cathy which #'s to run
			See attached				
			Sample list				

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Brian Sullivan	5/28/93	SIGNATURE: [illegible]	5/28
PRINTED NAME: Brian Sullivan	TIME: 1630	PRINTED NAME: [illegible]	TIME: 1630
COMPANY: A.C.		COMPANY: HC	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS: 17

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: S-1

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

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

June 28, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B7 Borings, J-1639-27, Sequence EW

Attached are the compiled results from analyses conducted on samples received May 27, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Soil	8	5/28/93	5/28/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B7-S-1	Duplicate U1-B7-S-1	U1-B7-S-2
Matrix	Soil	Soil	Soil
% Moisture	24%	24%	26%
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)	97%	99%	95%
o-Terphenyl (surr #2)	98%	100%	93%
Hexacosane - nC26 (surr #3)	116%	110%	99%

Analytical Results, continued

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

Compound	U1-B7-S-3	U1-B7-S-4	U1-B7-S-5
Matrix	Soil	Soil	Soil
% Moisture	22%	33%	17%
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	2,900
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	-	-	2,900
2-Fluorobiphenyl (surr #1)	97%	99%	M
o-Terphenyl (surr #2)	97%	99%	107%
Hexacosane - nC26 (surr #3)	98%	103%	117%

Analytical Results, continued

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

Compound	U1-B7-S-6	U1-B7-S-7	U1-B7-S-8
Matrix	Soil	Soil	Soil
% Moisture	7%	7%	7%
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	77	21	26
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	77	21	26
2-Fluorobiphenyl (surr #1)	97%	97%	94%
o-Terphenyl (surr #2)	100%	97%	96%
Hexacosane - nC26 (surr #3)	99%	88%	86%

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.

Method Blanks

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

Compound	05/28/93
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)	102%
o-Terphenyl (surr #2)	101%
Hexacosane - nC26 (surr #3)	112%

Laboratory Control Sample

% Recovery

Compound	05/28/93
Matrix	Soil
Diesel/Fuel Oil #2	96%
2-Fluorobiphenyl (surr #1)	102%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	122%

Sample Custody Record

DATE 5.27.93 PAGE 1 OF 1

EN

HARTCROWSER

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

JOB NUMBER 1639.27 LAB NUMBER HC

PROJECT MANAGER Kiley

PROJECT NAME Paccar Garden Ave

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1B7		S-1 → S-~~7~~8	Soil	X	7	
	U-1B8		S-1 → S-~~8~~7	"	X	8	Ask Cathy K. which to run
	U-1B9		S-1 → S-8	"	X	8	
							see attached list of samples

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Brian Sullivan	5/27	SIGNATURE: Bobby M. Johnson Jr.	5/27
PRINTED NAME: Brian Sullivan	TIME: 1720	PRINTED NAME: Bobby M. Johnson Jr.	TIME: 1720
COMPANY: H.C.		COMPANY: HC	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS: 23

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: S-1

24 hr Rush per C. Kiley

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

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

June 22, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B8 Borings, J-1639-27, Sequence EW

Attached are the compiled results from analyses conducted on samples received May 27, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▸ TPH-HCID	Soil	6	5/28/93	5/28/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B8-S-1	U1-B8-S-3	U1-B8-S-4
Matrix	Soil	Soil	Soil
% Moisture	23%	30%	19%
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	10,000	70	37,000
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	10,000	70	37,000
2-Fluorobiphenyl (surr #1)	M	90%	M
o-Terphenyl (surr #2)	M	88%	M
Hexacosane - nC26 (surr #3)	123%	76%	122%

Analytical Results, continued

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

Compound	U1-B8-S-5	Duplicate U1-B8-S-5	U1-B8-S-6
Matrix	Soil	Soil	Soil
% Moisture	8%	8%	8%
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	1,300	1,100	140
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	1,300	1,100	140
2-Fluorobiphenyl (surr #1)	117%	108%	96%
o-Terphenyl (surr #2)	99%	95%	96%
Hexacosane - nC26 (surr #3)	101%	98%	87%

Analytical Results, continued

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

Compound	U1-B8-S-7
Matrix	Soil
% Moisture	8%
Gasoline	10 U
Kensol	10 U
Kerosene/Jet A	10 U
Stoddard Solvent	10 U
Diesel/Fuel Oil #2	150
Bunker C	50 U
Oil	50 U
Unknown	10 U
Total TPH Concentration	150
2-Fluorobiphenyl (surr #1)	100%
o-Terphenyl (surr #2)	98%
Hexacosane - nC26 (surr #3)	86%

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.

Method Blanks

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

Compound	05/28/93
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)	102%
o-Terphenyl (surr #2)	101%
Hexacosane - nC26 (surr #3)	112%

Spikes

% Recovery

Compound	MS U1-B8-S-3	MSD U1-B8-S-3
Matrix	Soil	Soil
Kerosene/Jet A	111%	102%
2-Fluorobiphenyl (surr #1)	93%	77%
o-Terphenyl (surr #2)	88%	72%
Hexacosane - nC26 (surr #3)	81%	62%

Duplicates

Relative % Difference

Compound	U1-B8-S-3	U1-B8-S-5
Matrix	Soil	Soil
Kerosene/Jet A	8%	
Total TPH Concentration		17%

Laboratory Control Sample

% Recovery

Compound	05/28/93
Matrix	Soil
Diesel/Fuel Oil #2	96%
2-Fluorobiphenyl (surr #1)	102%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	122%

Sample Custody Record

DATE 5.27.93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639.27 LAB NUMBER HC

PROJECT MANAGER Kiley

PROJECT NAME Paccar Gardner Ave

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1B7		S-1 → S-~~8~~	Soil	X	7	
	U-1B8		S-1 → S-~~7~~	"	X	8	Ask Cathy K. which to run
	U-1B9		S-1 → S-8	"	X	8	
							see attached list of samples

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE Brian Sullivan	5/27	SIGNATURE Bobby M. Johnson Jr.	5/27
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY H.C.	1720	COMPANY HC	1720
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 23

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS S-1 24 hr Rush per C. Kiley

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

Memorandum

HARTCROWSER

To

From

Project PACCAR

Subject U1 Borings (5/27)

Page of

Date 5/28/93

Job Number 1639-27

			PID
U1B7	S-1	3-5'	<5
	S-2	5-7'	<5
	S-3	7-9'	<5
	S-4	9-11'	<5
	S-5	11-13'	290
	S-6	13-15'	110
	S-8	17-19'	22
	S-7		
U1B8	S-1	5-7'	288
	S-3	9-11'	65
	S-4	11-13'	289
	S-5	13-15'	120
	S-6	15-17'	132
	S-7	17-19'	105
U1B9	S-1	3-5'	225
	S-2	5-7'	318
	S-3	7-9'	225
	S-4	9-11'	70
	S-5	11-13'	330
	S-7	15-17'	119
	S-8	17-19'	43

Analyze for TPH WTPH-1D

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

June 22, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B9 Borings, J-1639-27, Sequence EW

Attached are the compiled results from analyses conducted on samples received May 27, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▸ TPH-HCID	Soil	7	5/28/93	5/28/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B9-S-1	U1-B9-S-2	U1-B9-S-3
Matrix	Soil	Soil	Soil
% Moisture	26%	23%	28%
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	14,000	12,000	62
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	14,000	12,000	62
2-Fluorobiphenyl (surr #1)	M	M	100%
o-Terphenyl (surr #2)	M	M	99%
Hexacosane - nC26 (surr #3)	116%	M	86%

Analytical Results, continued

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

Compound	U1-B9-S-4	U1-B9-S-5	U1-B9-S-7
Matrix	Soil	Soil	Soil
% Moisture	24%	5%	7%
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	12,000	80
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	-	12,000	80
2-Fluorobiphenyl (surr #1)	99%	M	97%
o-Terphenyl (surr #2)	98%	M	97%
Hexacosane - nC26 (surr #3)	83%	121%	78%

Analytical Results, continued

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

Compound	U1-B9-S-8
Matrix	Soil
% Moisture	6%
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)	103%
o-Terphenyl (surr #2)	102%
Hexacosane - nC26 (surr #3)	76%

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.

Method Blanks

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

Compound	05/28/93
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)	102%
o-Terphenyl (surr #2)	101%
Hexacosane - nC26 (surr #3)	112%

Spikes

% Recovery

Compound	MS U1-B9-S-8	MSD U1-B9-S-8
Matrix	Soil	Soil
Kerosene/Jet A	93%	103%
2-Fluorobiphenyl (surr #1)	96%	106%
o-Terphenyl (surr #2)	99%	109%
Hexacosane - nC26 (surr #3)	73%	80%

Duplicates

Relative % Difference

Compound	U1-B9-S-8
Matrix	Soil
Kerosene/Jet A	-11%

Laboratory Control Sample

% Recovery

Compound	05/28/93
Matrix	Soil
Diesel/Fuel Oil #2	96%
2-Fluorobiphenyl (surr #1)	102%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	122%

Sample Custody Record

DATE 5.27.93 PAGE 1 OF 1

EN

HARTCROWSER

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

JOB NUMBER 1639.27 LAB NUMBER HC

PROJECT MANAGER Kiley

PROJECT NAME Paccar Gardena Ave

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1B7		S-1 → S-~~7~~8	Soil	X	7	
	U-1B8		S-1 → S-~~8~~7	"	X	8	Ask Cathy K. which to run
	U-1B9		S-1 → S-8	"	X	8	
							see attached list of samples

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE Brian Sullivan	5/27	SIGNATURE Bobby M Johnson Jr	5/27
PRINTED NAME Brian Sullivan	TIME 1720	PRINTED NAME Bobby M Johnson Jr.	TIME 1720
COMPANY H.C.		COMPANY HC	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 23

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS S-1

24 hr RUSH per C. Kiley

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

HARTCROWSER

Memorandum

To

From

Project PACCAR

Subject U1 Borings (5/27)

Page of

Date 5/28/93

Job Number 1439-27

			PID
U1B7	S-1	3-5'	<5
	S-2	5-7'	<5
	S-3	7-9'	<5
	S-4	9-11'	<5
	S-5	11-13'	290
	S-6	13-15'	110
	S-8	17-19'	22
	S-7		
U1B8	S-1	5-7'	288
	S-3	9-11'	65
	S-4	11-13'	289
	S-5	13-15'	120
	S-6	15-17'	132
	S-7	17-19'	105
U1B9	S-1	3-5'	225
	S-2	5-7'	318
	S-3	7-9'	225
	S-4	9-11'	70
	S-5	11-13'	330
	S-7	15-17'	119
	S-8	17-19'	43

Analyze for TPH WTPH-1D

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

June 30, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B10 Borings, J-1639-27, Sequence FB

Attached are the compiled results from analyses conducted on samples received June 1, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Soil	6	6/02/93	6/02/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B10-S-1	U1-B10-S-3	U1-B10-S-4
Matrix	Soil	Soil	Soil
% Moisture	27%	22%	24%
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	610	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	610	-	-
2-Fluorobiphenyl (surr #1)	85%	78%	79%
o-Terphenyl (surr #2)	84%	83%	83%
Hexacosane - nC26 (surr #3)	94%	84%	89%

Analytical Results, continued

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

Compound	U1-B10-S-5	U1-B10-S-6	U1-B10-S-8
Matrix	Soil	Soil	Soil
% Moisture	20%	16%	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	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)	80%	80%	78%
o-Terphenyl (surr #2)	83%	84%	77%
Hexacosane - nC26 (surr #3)	84%	81%	77%

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.

Method Blanks

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

Compound	06/02/93
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)	76%
o-Terphenyl (surr #2)	79%
Hexacosane - nC26 (surr #3)	78%

Spikes

% Recovery

Compound	MS U1-B10-S-8	MSD U1-B10-S-8
Matrix	Soil	Soil
Diesel/Fuel Oil #2	90%	92%
2-Fluorobiphenyl (surr #1)	76%	80%
o-Terphenyl (surr #2)	87%	92%
Hexacosane - nC26 (surr #3)	77%	82%

Duplicates

Relative % Difference

Compound	U1-B10-S-8
Matrix	Soil
Diesel/Fuel Oil #2	-2%

Laboratory Control Sample

% Recovery

Compound	06/02/93
Matrix	Soil
Diesel/Fuel Oil #2	92%
2-Fluorobiphenyl (surr #1)	98%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	105%

Sample Custody Record

DATE 6.1.93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639.27 LAB NUMBER H.C.

PROJECT MANAGER Kiley

PROJECT NAME Paccar Garden Ave.

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1B10		S-1 → S-8	Soil	+	8	
	U-1B11		S-1 → S-8	Soil	+	8	Ask Cathy Kiley which #'s to run (see attached list) SRL

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Brian Sullivan	6/1/93	SIGNATURE: CD Johns	6/1
PRINTED NAME: Brian Sullivan	TIME: 1600	PRINTED NAME: Zeb Roberts	TIME: 1666
COMPANY: HC		COMPANY: HC	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 16

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: S-1

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

Memorandum

HARTCROWSER

To

From

Project PACCAR

Subject U1 BORINGS

Page of

Date 6/1/93

Job Number 1639-27

U1B10

		PID
S-1	3-5'	112
S-3	7-9'	42
S-4	9-11'	7
S-5	11-13'	4
S-6	13-15'	3
S-8	17-19'	4

U1B11

		PID
S-1	3-5'	4
S-2	5-7'	55
S-3	7-9'	3
S-5	11-13'	<2
S-6	13-15'	<2
S-8	17-19'	<2

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

June 30, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B11 Borings, J-1639-27, Sequence FB

Attached are the compiled results from analyses conducted on samples received June 1, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Soil	6	6/02/93	6/02/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B11-S-1	Duplicate U1-B11-S-1	U1-B11-S-2
Matrix	Soil	Soil	Soil
% Moisture	7%	7%	21%
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	99	67	89
Bunker C	50 U	50 U	50 U
Oil	300	260	50
Unknown	10 U	10 U	10 U
Total TPH Concentration	399	327	139
2-Fluorobiphenyl (surr #1)	87%	77%	82%
o-Terphenyl (surr #2)	106%	91%	90%
Hexacosane - nC26 (surr #3)	119%	109%	113%

Analytical Results, continued

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

Compound	U1-B11-S-3	U1-B11-S-5	U1-B11-S-6
Matrix	Soil	Soil	Soil
% Moisture	25%	25%	19%
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)	82%	80%	77%
o-Terphenyl (surr #2)	88%	87%	83%
Hexacosane - nC26 (surr #3)	110%	103%	102%

Analytical Results, continued

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

Compound	U1-B11-S-8
Matrix	Soil
% Moisture	21%
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)	67%
o-Terphenyl (surr #2)	75%
Hexacosane - nC26 (surr #3)	87%

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.

Method Blanks

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

Compound	06/02/93
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)	76%
o-Terphenyl (surr #2)	79%
Hexacosane - nC26 (surr #3)	78%

Spikes

% Recovery

Compound	MS U1-B11-S-8	MSD U1-B11-S-8
Matrix	Soil	Soil
Diesel/Fuel Oil #2	77%	80%
2-Fluorobiphenyl (surr #1)	78%	79%
o-Terphenyl (surr #2)	92%	93%
Hexacosane - nC26 (surr #3)	99%	100%

Duplicates

Relative % Difference

Compound	U1-B11-S-1	U1-B11-S-8
Matrix	Soil	Soil
Diesel/Fuel Oil #2		-4%
Total TPH Concentration	20%	

Laboratory Control Sample

% Recovery

Compound	06/02/93
Matrix	Soil
Diesel/Fuel Oil #2	92%
2-Fluorobiphenyl (surr #1)	98%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	105%

Sample Custody Record

DATE 6.1.93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639.27 LAB NUMBER H.C.

PROJECT MANAGER Kiley

PROJECT NAME Paccar Garden Ave.

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015	NO. OF CONTAINERS	OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
	U-1 B10		S-1 → S-8	Soil	+	8	
	U-1 B11		S-1 → S-8	Soil	+	8	Ask Cathy Kiley which #'s to run (see attached list) SRL

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Brian Sullivan	6/1/93	SIGNATURE: [illegible]	6/1
PRINTED NAME: Brian Sullivan	TIME: 1600	PRINTED NAME: [illegible] ROBERTS	TIME: 1666
COMPANY: HC		COMPANY: HC	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 16

METHOD OF SHIPMENT

SPECIAL SHIPMENT / HANDLING OR STORAGE REQUIREMENTS

S-1

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

Memorandum

HARTCROWSER

To

From

Project PACCAR

Subject U1 BORINGS

Page of

Date 6/1/93

Job Number 1639-27

U1B10

		PID
S-1	3-5'	112
S-3	7-9'	42
S-4	9-11'	7
S-5	11-13'	4
S-6	13-15'	3
S-8	17-19'	4

U1B11

		PID
S-1	3-5'	-
S-2	5-7'	35
S-3	7-9'	3
S-5	11-13'	<2
S-6	13-15'	<2
S-8	17-19'	<2

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

June 22, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-B12 and U1-B13 Borings, J-1639-27, Sequence FC

Attached are the compiled results from analyses conducted on samples received June 2, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▸ TPH-HCID	Soil	11	6/03/93	6/03/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-B12-S-1	Duplicate U1-B12-S-1	U1-B12-S-2
Matrix	Soil	Soil	Soil
% Moisture	23%	23%	52%
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	270	360	310
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	270	360	310
2-Fluorobiphenyl (surr #1)	101%	100%	98%
o-Terphenyl (surr #2)	99%	96%	99%
Hexacosane-nC26 (surr #3)	102%	99%	99%

Analytical Results, continued

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

Compound	U1-B12-S-3	U1-B12-S-5	U1-B12-S-7
Matrix	Soil	Soil	Soil
% Moisture	31%	26%	22%
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)	96%	99%	95%
o-Terphenyl (surr #2)	99%	100%	100%
Hexacosane-nC26 (surr #3)	96%	99%	96%

Analytical Results, continued

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

Compound	U1-B12-S-8	U1-B13-S-1	U1-B13-S-2
Matrix	Soil	Soil	Soil
% Moisture	21%	26%	14%
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	140
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	-	-	140
2-Fluorobiphenyl (surr #1)	98%	75%	78%
o-Terphenyl (surr #2)	98%	81%	82%
Hexacosane-nC26 (surr #3)	95%	92%	90%

Analytical Results, continued

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

Compound	U1-B13-S-3	U1-B13-S-5	U1-B13-S-7
Matrix	Soil	Soil	Soil
% Moisture	28%	32%	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	50 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	-	-	-
2-Fluorobiphenyl (surr #1)	70%	79%	77%
o-Terphenyl (surr #2)	78%	88%	84%
Hexacosane-nC26 (surr #3)	84%	100%	95%

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.

Method Blanks

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

Compound	06/03/93
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)	89%
o-Terphenyl (surr #2)	90%
Hexacosane-nC26 (surr #3)	84%

Spikes

% Recovery

Compound	MS U1-B13-S-7	MSD U1-B13-S-7
Matrix	Soil	Soil
Diesel/Fuel Oil #2	83%	88%
2-Fluorobiphenyl (surr #1)	78%	78%
o-Terphenyl (surr #2)	93%	93%
Hexacosane-nC26 (surr #3)	93%	94%

Duplicates

Relative % Difference

Compound	U1-B12-S-1	U1-B13-S-7
Matrix	Soil	Soil
Diesel/Fuel Oil #2		-6%
Total TPH Concentration	-29%	

Laboratory Control Sample

% Recovery

Compound	06/03/93
Matrix	Soil
Diesel/Fuel Oil #2	89%
2-Fluorobiphenyl (surr #1)	107%
o-Terphenyl (surr #2)	M
Hexacosane-nC26 (surr #3)	132%

FC

Sample Custody Record

DATE 6/2/93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 FC LAB NUMBER HC

PROJECT MANAGER Kiley

PROJECT NAME Paccar Garden Ave.

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1 B12		S-1 → S-8	Soil	X	8	Ask Cathy K. which to run
	U-1 B13		S-1 → S-7	Soil	X	7	
			See attached				
			sample list				

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE Brian Sullivan	6/3/93	SIGNATURE Rob Rohlf	6/2
PRINTED NAME	TIME 1600	PRINTED NAME	TIME 1600
COMPANY		COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 15

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

S-1

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

Memorandum

HARTCROWSER

To

From

Project PACCAR

Subject U1 BORINGS

Page of

Date 6/2/93

Job Number 1639-27

U1B12

		PID
S-1	3-5'	367
S-2	5-7'	137
S-3	7-9'	23
S-5	11-13'	15
S-7	15-17'	4
S-8	17-19'	8

U1B13

S-1	3-5'	7
S-2	5-7'	38
S-3	9-11'	9
S-5	13-15'	2
S-7	17-19'	1

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

June 30, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

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

Attached are the compiled results from analyses conducted on samples received June 7, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Soil	11	6/09/93	6/10/93

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.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	~~U-1 B14~~ (U-1 W-3) S-1	~~U-1 B14~~ (U-1 W-3) S-3	~~U-1 B14~~ U-1 W-3 S-4
Matrix	Soil	Soil	Soil
% Moisture	23%	31%	28%
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	53	110	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	53	110	-
2-Fluorobiphenyl (surr #1)	102%	102%	99%
o-Terphenyl (surr #2)	103%	102%	100%
Hexacosane - nC26 (surr #3)	122%	119%	114%

MCK 2/94

Analytical Results, continued

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

Compound	~~U-1 B14~~ U-1 W-3 S-6	~~U-1 B14~~ U-1 W3 S-7	~~U-1 B14~~ U-1 W3 S-8
Matrix	Soil	Soil	Soil
% Moisture	16%	19%	19%
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	35	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	-	35	-
2-Fluorobiphenyl (surr #1)	97%	100%	98%
o-Terphenyl (surr #2)	99%	102%	100%
Hexacosane - nC26 (surr #3)	110%	123%	111%

MEK 2/94

Analytical Results, continued

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

Compound	U-1 W3 Duplicate ~~U-1 B14~~ S-8	U-1 B15 S-1	U-1 B15 S-3
Matrix	Soil	Soil	Soil
% Moisture	19%	10%	30%
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)	98%	96%	95%
o-Terphenyl (surr #2)	101%	98%	99%
Hexacosane - nC26 (surr #3)	110%	112%	112%

MK 2/94

Analytical Results, continued

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

Compound	U-1 B15 S-5	U-1 B15 S-7	U-1 B15 S-8
Matrix	Soil	Soil	Soil
% Moisture	24%	19%	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	50 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	-	-	-
2-Fluorobiphenyl (surr #1)	99%	99%	99%
o-Terphenyl (surr #2)	102%	101%	102%
Hexacosane - nC26 (surr #3)	112%	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.

Method Blanks

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

Compound	06/09/93
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)	107%
o-Terphenyl (surr #2)	110%
Hexacosane - nC26 (surr #3)	113%

Spikes

% Recovery

Compound	MS U-1 B15 S-8	MSD U-1 B15 S-8
Matrix	Soil	Soil
Kerosene/Jet A	84%	84%
2-Fluorobiphenyl (surr #1)	103%	109%
o-Terphenyl (surr #2)	100%	99%
Hexacosane - nC26 (surr #3)	115%	106%

Duplicates

Relative % Difference

Compound	U-1 B15 S-8
Matrix	Soil
Kerosene/Jet A	-1%

Laboratory Control Sample

% Recovery

Compound	06/09/93
Matrix	Soil
Kerosene/Jet A	82%
2-Fluorobiphenyl (surr #1)	135%
o-Terphenyl (surr #2)	100%
Hexacosane - nC26 (surr #3)	112%

FO

Sample Custody Record

DATE 6.7.93 PAGE 1 OF 1

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

JOB NUMBER 1639.27 LAB NUMBER HC
PROJECT MANAGER Kiley / Kuroiwa
PROJECT NAME Paccar Garden Ave
SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
U1W3	U-1B14		S-1→S-8	Soil	X	8	
AMK 2/94	U-1B15		S-1→S-8	Soil	X	8	Ask Roy K. which #'s to run
							Called Roy K 8am 6/8 SKL
							Received list (see attached) 1020 SKL

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Brian Sullivan	6/4/93		6/7
SIGNATURE		SIGNATURE	
Brian Sullivan	TIME	Rob Richards	TIME
PRINTED NAME	1545	PRINTED NAME	1545
H.C.		HC	
COMPANY		COMPANY	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
	TIME		TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 16

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS 5-1

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

Sample Custody Record

DATE 6 7 93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER [illegible] LAB NUMBER [illegible]

PROJECT MANAGER [illegible]

PROJECT NAME [illegible]

SAMPLED BY: [illegible]

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
U1W3	U-1B1/	S-1	[illegible]	[illegible]	X	8	
wk 2/74	~~[illegible]~~	S-3	[illegible]	[illegible]	X	8	Alt key #. which d's to run
		S-4			X		
		S-6			X		
		S-7			X		
		S-8			X		Rick call with Sherry to run 6/8/93 9:00am
	U1B15	S-1			X		
		S-3			X		
		S-5			X		received 1020 SRL
		S-7			X		
		S-8			X		
					X		

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE [illegible]	[illegible]	SIGNATURE [illegible]	6/7
PRINTED NAME [illegible]	TIME [illegible]	PRINTED NAME [illegible]	TIME [illegible]
COMPANY [illegible]		COMPANY [illegible]	[illegible]

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 16

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS S-1

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

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

June 22, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR Phase IV, U1-W2 Borings, J-1639-27, Sequence EZ

Attached are the compiled results from analyses conducted on samples received May 28, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
▸ TPH-HCID	Soil	7	6/01/93	6/01/93

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.

Analytical Comment

The Relative Percent Difference (RPD) for duplicate sample U1-W2-S-1 is out of control. The sample was reextracted and reanalyzed. The reanalysis RPD is out of control. The sample matrix is variable.

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-W2-S-1	Duplicate U1-W2-S-1	U1-W2-S-2
Matrix	Soil	Soil	Soil
% Moisture	26%	26%	21%
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	3,600	9,500	8,400
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	3,600	9,500	8,400
2-Fluorobiphenyl (surr #1)	M	M	M
o-Terphenyl (surr #2)	M	92%	M
Hexacosane - nC26 (surr #3)	M	97%	119%

Analytical Results, continued

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

Compound	U1-W2-S-3	U1-W2-S-4	U1-W2-S-5
Matrix	Soil	Soil	Soil
% Moisture	30%	20%	17%
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	980	8,800	55
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	980	8,800	55
2-Fluorobiphenyl (surr #1)	102%	M	90%
o-Terphenyl (surr #2)	89%	M	88%
Hexacosane - nC26 (surr #3)	91%	115%	73%

Analytical Results, continued

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

Compound	U1-W2-S-6	U1-W2-S-8
Matrix	Soil	Soil
% Moisture	10%	7%
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	180	20 U
Bunker C	50 U	50 U
Oil	50 U	50 U
Unknown	10 U	10 U
Total TPH Concentration	180	-
2-Fluorobiphenyl (surr #1)	93%	90%
o-Terphenyl (surr #2)	89%	88%
Hexacosane - nC26 (surr #3)	74%	69%

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.

Method Blanks

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

Compound	06/01/93
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)	106%
o-Terphenyl (surr #2)	107%
Hexacosane - nC26 (surr #3)	108%

Laboratory Control Sample

% Recovery

Compound	06/01/93
Matrix	Soil
Diesel/Fuel Oil #2	106%
2-Fluorobiphenyl (surr #1)	138%
o-Terphenyl (surr #2)	M
Hexacosane - nC26 (surr #3)	120%

(E2)

Sample Custody Record

DATE 5·28·93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER H.C.

PROJECT MANAGER Kiley

PROJECT NAME Paccar Garden Ave.

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1W2		S-1 → S-8	Soil	+	8	
	U-1B6		S-1 → S-9	Soil	+	9	Ask Cathy which #'s to run
			See attached Sample list				

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: Brian Sullivan	5/28/93	SIGNATURE	5/28
PRINTED NAME: Brian Sullivan	TIME: 1630	PRINTED NAME	TIME: 1630
COMPANY: H.C.		COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS: 17

METHOD OF SHIPMENT:

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS: S-1

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

Spikes

% Recovery

Compound	MS U1-W2-S-8	MSD U1-W2-S-8
Matrix	Soil	Soil
Kerosene/Jet A	83%	85%
2-Fluorobiphenyl (surr #1)	88%	91%
o-Terphenyl (surr #2)	93%	98%
Hexacosane - nC26 (surr #3)	71%	74%

Duplicates

Relative % Difference

Compound	U1-W2-S-1	U1-W2-S-8
Matrix	Soil	Soil
Kerosene/Jet A		-2%
Total TPH Concentration	-90%	

Analytical Comments

The relative percent difference (RPD) for duplicate samples U-1 BF1 S-1 and U-1 BF4 S-3 are out of control. The samples were reextracted and reanalyzed. The reanalysis RPD is out of control. The sample matrices are variable.

The TPH-HCID concentration in sample U-1 BF3 S-2 is greater than five times the spike concentration. Therefore, spike and spike duplicate recoveries are not calculated. Relative percent difference is calculated from the sample concentrations in the spike and spike duplicate.

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

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	A U-1 BF1 S-1	A Duplicate U-1 BF1 S-1	A U-1 BF1 S-3
Matrix	Soil	Soil	Soil
% Moisture	28%	28%	28%
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	820	1,300	360
Bunker C	50 U	50 U	50 U
Oil	50 U	50 U	220
Unknown	10 U	10 U	10 U
Total TPH Concentration	820	1,300	580
2-Fluorobiphenyl (surr #1)	121%	131%	120%
o-Terphenyl (surr #2)	105%	117%	109%
Hexacosane - nC26 (surr #3)	104%	114%	112%

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

June 30, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

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

Attached are the compiled results from analyses conducted on samples received June 9, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Soil	25	6/11/93	6/14/93

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.

Analytical Results, continued

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

Compound	A U-1 BF1 S-4	A U-1 BF1 S-5	A U-1 BF1 S-7
Matrix	Soil	Soil	Soil
% Moisture	27%	27%	26%
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	170	31	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	170	31	-
2-Fluorobiphenyl (surr #1)	119%	115%	114%
o-Terphenyl (surr #2)	111%	112%	112%
Hexacosane - nC26 (surr #3)	111%	106%	110%

Analytical Results, continued

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

Compound	A U-1 BF1 S-8	A U-1 BF2 S-1	A U-1 BF2 S-3
Matrix	Soil	Soil	Soil
% Moisture	18%	26%	26%
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	6,100	1,200
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	-	6,100	1,200
2-Fluorobiphenyl (surr #1)	117%	M	133%
o-Terphenyl (surr #2)	115%	154%	110%
Hexacosane - nC26 (surr #3)	106%	126%	110%

Analytical Results, continued

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

Compound	A U-1 BF2 S-4	A U-1 BF2 S-5	A U-1 BF2 S-7
Matrix	Soil	Soil	Soil
% Moisture	20%	20%	9%
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	4,100	1,900	830
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	4,100	1,900	830
2-Fluorobiphenyl (surr #1)	M	M	M
o-Terphenyl (surr #2)	116%	118%	M
Hexacosane - nC26 (surr #3)	125%	121%	119%

Analytical Results, continued

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

Compound	A U-1 BF2 S-8	A Duplicate U-1 BF2 S-8	A U-1 BF3 S-1
Matrix	Soil	Soil	Soil
% Moisture	11%	11%	25%
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	450	420	1,300
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	450	420	1,300
2-Fluorobiphenyl (surr #1)	130%	121%	M
o-Terphenyl (surr #2)	118%	112%	M
Hexacosane - nC26 (surr #3)	112%	102%	98%

Analytical Results, continued

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

Compound	A U-1 BF3 S-2	A MS U-1 BF3 S-2	A MSD U-1 BF3 S-2
Matrix	Soil	Soil	Soil
% Moisture	28%	28%	28%
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	4,000	5,200	3,100
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	4,000	5,200	3,100
2-Fluorobiphenyl (surr #1)	M	M	M
o-Terphenyl (surr #2)	112%	M	113%
Hexacosane - nC26 (surr #3)	114%	108%	116%

Analytical Results, continued

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

Compound	A U-1 BF3 S-3	A U-1 BF3 S-5	A U-1 BF3 S-7
Matrix	Soil	Soil	Soil
% Moisture	31%	28%	25%
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	470	7,400	200
Bunker C	50 U	50 U	50 U
Oil	64	50 U	50 U
Unknown	10 U	10 U	10 U
Total TPH Concentration	530	7,400	200
2-Fluorobiphenyl (surr #1)	118%	M	123%
o-Terphenyl (surr #2)	97%	M	117%
Hexacosane - nC26 (surr #3)	94%	121%	112%

Analytical Results, continued

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

Compound	A U-1 BF3 S-8	B U-1 BF4 S-1	B U-1 BF4 S-3
Matrix	Soil	Soil	Soil
% Moisture	6%	24%	29%
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	21,000	1,300
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	20	21,000	1,300
2-Fluorobiphenyl (surr #1)	113%	M	123%
o-Terphenyl (surr #2)	112%	M	107%
Hexacosane - nC26 (surr #3)	82%	131%	98%

Analytical Results, continued

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

Compound	B Duplicate U-1 BF4 S-3	A U-1 BF4 S-4	A U-1 BF4 S-5
Matrix	Soil	Soil	Soil
% Moisture	29%	31%	21%
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	3,200	53	290
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	3,200	53	290
2-Fluorobiphenyl (surr #1)	133%	112%	119%
o-Terphenyl (surr #2)	111%	108%	112%
Hexacosane - nC26 (surr #3)	104%	84%	88%

Analytical Results, continued

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

Compound	A U-1 BF4 S-6	A U-1 BF4 S-7	A U-1 BF4 S-8
Matrix	Soil	Soil	Soil
% Moisture	22%	19%	21%
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	31	60	78
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	31	60	78
2-Fluorobiphenyl (surr #1)	118%	114%	113%
o-Terphenyl (surr #2)	117%	112%	111%
Hexacosane - nC26 (surr #3)	84%	78%	80%

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.

Method Blanks

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

Compound	A 6/11/93	B 6/15/93
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)	113%	91%
o-Terphenyl (surr #2)	115%	84%
Hexacosane - nC26 (surr #3)	123%	178%

Spikes

% Recovery

Compound	A MS U-1 BF1 S-8	A MSD U-1 BF1 S-8
Matrix	Soil	Soil
Diesel/Fuel Oil #2	102%	97%
2-Fluorobiphenyl (surr #1)	121%	110%
o-Terphenyl (surr #2)	108%	106%
Hexacosane - nC26 (surr #3)	97%	97%

Duplicates

Relative % Difference

Compound	A U-1 BF1 S-1	A U-1 BF1 S-8	A U-1 BF2 S-8
Matrix	Soil	Soil	Soil
Diesel/Fuel Oil #2		5%	
Total TPH Concentration	-45%		7%

Compound	A U-1 BF3 S-2	B U-1 BF4 S-3
Matrix	Soil	Soil
Total TPH Concentration	51%	-84%

Laboratory Control Sample

% Recovery

Compound	A 6/11/93	B 6/15/93
Matrix	Soil	Soil
Kerosene/Jet A	91%	88%
2-Fluorobiphenyl (surr #1)	M	M
o-Terphenyl (surr #2)	109%	101%
Hexacosane - nC26 (surr #3)	117%	M

(FH)

Sample Custody Record

DATE 6.8.93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639.27 LAB NUMBER HC

PROJECT MANAGER Kuroiwa

PROJECT NAME Paccar Foundry Bldg.

SAMPLED BY: BES

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: 8015	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	U-1BF1		S-1 → S-8	Soil	X	8	Ask Roy K. which #'s to run
	U-1BF2		S-1 → S-8	↓	X	8	
	U-1BF3		S-1 → S-8		X	8	
	U-1BF4		S-1 → S-8		X	8	
							(See attached USA). SRL

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Brian Sullivan (SIGNATURE)	6/8/93	Sherry Laugh (SIGNATURE)	6/9/93
Brian Sullivan (PRINTED NAME)	TIME	SHERRY LAUGHLIN (PRINTED NAME)	TIME
H.C. (COMPANY)	2045	HC (COMPANY)	800
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 32

METHOD OF SHIPMENT

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS S-2 (2 boxes)

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

RKH 6/9/93

PACCAR Renton
1639-27
U1 Soil Boring Investigation

U1-BF1	U1-BF2	U1-BF3
S-1	S-1	S-1
S-3	S-3	S-2
S-4	S-4	S-3
S-5	S-5	S-5
S-7	S-7	S-7
S-8	S-8	S-8

U1-BF4
S-1
S-3
S-4
S-5
S-6
S-7
S-8

Run for WTPH-ID
48 hours TAT okay (by Monday morning 6/14/93)

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

June 30, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR U1W2, J-1639-27, Sequence FD

Attached are the compiled results from analyses conducted on the sample received June 3, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Water	1	6/14/93	6/14/93

This report contains the following:

- Analytical results for the water sample.
- Data qualifiers.
- Results for method blanks.
- Differences for duplicate analyses.
- Recoveries for laboratory control sample.
- Copies of chain of custody forms.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1W2-1	Duplicate U1W2-1
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	50	55
Bunker C	2.0 U	2.0 U
Oil	2.0 U	2.0 U
Unknown	0.2 U	0.2 U
Total TPH Concentration	50	55
2-Fluorobiphenyl (surr #1)	100%	110%
o-Terphenyl (surr #2)	83%	92%
Hexacosane - nC26 (surr #3)	88%	114%

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.

Method Blanks

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

Compound	06/14/93
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	0.8 U
Bunker C	2.0 U
Oil	2.0 U
Unknown	0.2 U
Total TPH Concentration	-
2-Fluorobiphenyl (surr #1)	87%
o-Terphenyl (surr #2)	93%
Hexacosane - nC26 (surr #3)	50%

Duplicates

Relative % Difference

Compound	U1W2-1
Matrix	Water
Total TPH Concentration	-10%

Laboratory Control Sample

% Recovery

Compound	06/14/93
Matrix	Water
Kerosene/Jet A	107%
2-Fluorobiphenyl (surr #1)	M
o-Terphenyl (surr #2)	95%
Hexacosane - nC26 (surr #3)	63%

(FD)

Sample Custody Record

DATE 6/3/93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER Kiley

PROJECT NAME PACCAR

SAMPLED BY: ASM

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: TPH id	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
VIW2-1			VIW2	Water	X	1	Certified Analysis Quantify with Phenanthrene

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Amy Sue Martin	6/3/93	Sherry Laugh	6/3/93
SIGNATURE Amy Sue Martin	TIME 3pm	SIGNATURE SHERRY LAUGHLIN	TIME 1500
PRINTED NAME HC		PRINTED NAME HC	
COMPANY		COMPANY	
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME		PRINTED NAME	
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS 1

METHOD OF SHIPMENT Hand deliver

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

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2. RETURN PINK COPY TO PROJECT MANAGER
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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

July 15, 1993

Cathy Kiley, Hart Crowser Project Environmental Chemist

RE: PACCAR U1 Hot Spot, J-1639-27, Sequence FT

Attached are the compiled results from analyses conducted on the sample received June 25, 1993. We performed extractions and analyses as indicated:

	Matrix	Quantity	Date Extracted	Date Analyzed
► TPH-HCID	Water	1	6/25/93	6/25/93

This report contains the following:

- Analytical results for the water sample.
- Results for method blanks.
- Differences for duplicate analyses.
- Recoveries for laboratory control sample.
- Copies of chain of custody forms.

Analytical Comment

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

HART CROWSER, INC.

James Herndon

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

Analytical Results

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

Compound	U1-W3	Duplicate U1-W3
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	8.3	9.6
Bunker C	2.0 U	2.0 U
Oil	2.0 U	2.0 U
Unknown	0.2 U	0.2 U
Total TPH Concentration	8.3	9.6
2-Fluorobiphenyl (surr #1)	104%	108%
o-Terphenyl (surr #2)	101%	103%
Hexacosane - nC26 (surr #3)	120%	123%

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.

Method Blanks

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

Compound	06/25/93
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	0.8 U
Bunker C	2.0 U
Oil	2.0 U
Unknown	0.2 U
Total TPH Concentration	-
2-Fluorobiphenyl (surr #1)	98%
o-Terphenyl (surr #2)	98%
Hexacosane - nC26 (surr #3)	115%

Duplicates

Relative % Difference

Compound	U1-W3
Matrix	Water
Total TPH Concentration	-14%

Laboratory Control Sample

% Recovery

Compound	06/25/93
Matrix	Water
Kerosene/Jet A	100%
2-Fluorobiphenyl (surr #1)	M
o-Terphenyl (surr #2)	97%
Hexacosane - nC26 (surr #3)	113%

FT

Sample Custody Record

DATE 6/24/93 PAGE 1 OF 1

HARTCROWSER

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

JOB NUMBER 1639-27 LAB NUMBER

PROJECT MANAGER J. Kleppe / K. Kiley

PROJECT NAME PACCAR Phase IV

SAMPLED BY: W.H.D / J.P.B

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: WTPH-ID	TESTING: XRF(Cr,As,Pb)	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
	CSP-P-44	6/24/93	Crushed Concrete Stockpile	Crushed Concrete	X		2	Certified analyses
	CSP-P-45		↓ per MCK	Concrete Soil	X		2	Chemt. w/ Phenanthrene
	P10-SE-14		P10-14	Soil	X	X	1	(1 jar of each pair
	P10-EB-14				X	X	1	of CSP's to be combined
	P10-SW-14				X	X	1	for ATI)
	P10-WB-14		↓	↓	X	X	1	
	U1-W3		U1-W3	Water	X		1	← 1ℓ amber

C/A KMC 6.25.93

RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE: [signature]	6/24/93	Brian Van Ysseldyk	6/25/93
PRINTED NAME: William Dawson	TIME	Brian Van Ysseldyk	TIME
COMPANY: HC		COMPANY: HCI	800
RELINQUISHED BY	DATE	RECEIVED BY	DATE
SIGNATURE		SIGNATURE	
PRINTED NAME	TIME	PRINTED NAME	TIME
COMPANY		COMPANY	

TOTAL NUMBER OF CONTAINERS: 9

METHOD OF SHIPMENT: HAND DELIVERY

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
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