Soil Quality Assessment
Building No. 986
Fort Richardson, Alaska

October, 1990

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FORT RICHARDSON, ALASKA

1.0 INTRODUCTION

This report presents the results of our soil quality assessment east of Building No. 986, Fort Richardson, Anchorage, Alaska. Shannon and Wilson was requested to assess soil quality at the above referenced site by placing two exploratory borings. This report describes our sampling activities, presents the results of laboratory analyses, characterizes the subsurface conditions, and presents a discussion of the potential contamination to soils from petroleum hydrocarbons, selected metals, and hazardous chemicals.

This study was conducted in accordance with a Quality Assurance Plan prepared by Shannon & Wilson, dated September 5, 1990, and approved by Fort Richardson's Directorate of Housing and Engineering. Work release number R00309/432 signed on August 31, 1990, by Mr. Marty Miksch authorized this project to proceed.

2.0 SITE AND PROJECT DESCRIPTION

The area evaluated is situated near a petroleum laboratory at Building No. 986 on Fort Richardson property. Building No. 986 contains an underground storage tank (UST) and a 4-foot diameter dry well. In the past the UST and dry well were used for the storage and disposal of waste chemicals from a petroleum laboratory. A new underground storage tank is to be installed in an area that appears to be undeveloped. The general site features in the vicinity of the project are shown on the site plan in Figure 1.

Prior to the installation of the new UST, Brown & Root Services Corporation has requested an environmental soil quality assessment be performed to evaluate whether the activities associated with the existing UST and the dry well have had an impact on the soil at the proposed new UST location (See Figure 1). The purpose of this environmental study is to assess the nature, magnitude, and extent of any environmental contamination, and develop sufficient information to adequately assess the health and environmental risks associated with the installation of the new UST. As part of this work Shannon & Wilson coordinated with a drilling contractor to drill and sample two borings, with an analytical laboratory to test selected samples, and reported the results of these efforts to the Brown & Root Project Manager.

3.0 FIELD INVESTIGATIONS

3.1 Exploratory Borings

On September 10, 1990, subsurface soil investigations were conducted at the site. Two exploratory borings, designated Borings TB-1 and TB-2, were each drilled to a depth of 21.5 feet. The borings were advanced using 4-inch I.D. hollow stem auger and a truck-mounted CME-75 drill rig provided by Discovery Drilling of Anchorage. The location of the borings are shown on the site plan in Figure 1. Boring TB-1 was positioned midway between the existing underground storage tank (UST) and the proposed UST site. Boring TB-2 was placed adjacent to the proposed UST location.

Mr. Herb Dunham from Brown & Root met with Shannon & Wilson's field representative to locate the borings. Shannon & Wilson's representative was also present continuously during drilling to log the materials encountered in the test holes and to obtain soil samples from the driller's split spoon sampler. All drilling equipment was steam cleaned prior to use to avoid potential cross-contamination of soil by residue from previous borings. The drill cuttings removed from the borings remained on-site and were placed on and covered by a plastic membrane. Bentonite chips were used to backfill the borings to prevent potential contamination of the groundwater via a pervious borehole backfill. The results of the field explorations including descriptions of materials encountered in the borings are shown on the boring logs in Figures 2 and 3.

Soil samples were recovered from Borings TB-1 and TB-2 using modified penetration resistance test methods. In the test holes, samples were obtained by driving a three-inch O.D. split spoon sampler into the bottom of the boring with a three hundred and forty pound hammer free falling onto the rods. Prior to sampling, the split spoon samplers were scrubbed with a dilute Liquinox wash solution, followed by a sequence of tap water, deionized water, methanol, and a final deionized water rinse. After sampling, analytical samples were collected by quickly and completely filling laboratory provided teflon lidded glass jars. All samples were transferred from the sampler to the jars using a decontaminated stainless steel spoon. A total of 4 soil samples from each boring were sent to the laboratory for analytical testing. The number and depth of the samples recovered from the borings are shown on the boring logs. The soil sample locations and descriptions are presented in Table 1. The results of the analytical testing are summarized in Table 2 and on the individual laboratory test reports presented in Appendix A.

3.2 Screening and Sampling

The split spoon samples obtained from the borings were screened for volatile compounds using a Photovac TIP II photoionization detector (PID) calibrated with an isobutylene standard gas and mathematically correlated to equivalent benzene concentration. The PID was used to sample the total volatile gases released by the soils recovered from the sampler. The headspace samples were collected after the analytical samples by quickly filling, using a decontaminated stainless steel spoon, 16 oz. sealable, "ziplock", plastic bags with freshly exposed soils to within about 1/2 its volume. The headspace samples were allowed to equilibrate to a common temperature and agitated before screening with the PID in a still environment. Screening was accomplished by inserting the teflon sampling probe of the PID through the wall of the plastic bag. The PID display was observed and the maximum reading was recorded for each sample.

A total of four soil samples were chosen from each borings for analyses. The soil samples from each boring with the highest and lowest PID headspace readings were sent to the laboratory for analyses. One soil sample was also chosen from each boring at the contact of the upper gravel soils with the lower till soils for laboratory analyses. This area would likely retain contaminants migrating through the gravel layer. One analytical sample, Sample TB1S9, from Boring TB-1 was taken from the bottom of the boring to characterize the deeper soils. Analytical Sample TB2S4 from Boring TB-2 was obtained to characterize the upper, gravel layer. The results of the headspace screening are presented on the boring logs and are summarized in Table 2.

4.0 LABORATORY ANALYSES

For this project, eight soil samples were selected for analysis to characterize the in-place soils for potential contamination by petroleum hydrocarbon constituents, selected metals and chemicals. These samples were analyzed for total petroleum hydrocarbons (EPA 418.1), halogenated volatile organics (EPA 8010), aromatic volatile organics (EPA 8020), pesticides and PCBs (EPA 8080), and for heavy metals (EPA 7000 Series). The metals tested include arsenic, cadmium, chromium, lead, mercury, and silver. All samples were analyzed by Chemical & Geological Laboratories, Inc. The results of the analyses are summarized in Table 2 and are presented in the laboratory report in Appendix A.

5.0 SOILS AND GROUNDWATER

The subsurface materials encountered in the borings drilled near Building No. 986 generally consist of a dense, gray to gray-brown, clean, sandy gravel from the surface to about 12 feet below the surface. A very dense, gray, till (sandy, gravelly, silt) with cobbles is encountered from 12 feet to the bottom of the boring at 21.5 feet. No groundwater was encountered in the borings.

6.0 DISCUSSION OF ANALYTICAL RESULTS

As evidenced by the analytical laboratory test results, low levels of petroleum hydrocarbon constituents were found in the samples analyzed. The upper limit of total petroleum hydrocarbon (TPH) concentration, 35.9 ppm (mg/kg), was found in Sample TB1S1 taken from 2.5 to 4.0 feet in Boring TB-1.

The laboratory analyses for selected metals and waste chemicals were either in the realm of background levels for similar type soils or non-detected. Arsenic, cadmium, total chromium, and lead concentrations ranged from 4.9 to 9.9 ppm, 0.08 to 0.17 ppm, 35.2 to 50.1 ppm, and 5.3 to 8.9 ppm, respectively. Mercury and silver were not detected in the samples analyzed. Concentrations of aromatic volatile organics, halogenated volatile organics, pesticides, and PCBs were non-detectable in all the soil samples analyzed.

7.0 CLOSURE

The results of our surface and subsurface soil evaluation indicate that soils containing low levels of petroleum hydrocarbons exist at the Building No. 986 site. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information if it is representative of contamination. Shannon and Wilson does not assume the responsibility for reporting these findings and therefore, has not, and will not, disclose the results of this study.

The observations and interpretations we have presented are based on the sampling and analyses that were performed; they should not be construed as a definitive characterization of the soil quality everywhere on the site. While our intent was to locate our exploratory boring and to sample the areas most likely to be contaminated, it is possible that our surface and subsurface sampling may have missed some contaminated areas. The screening and sampling performed can

only support our assessment of the subsurface conditions of the site, and in no way guarantee that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc.

We appreciate this opportunity to be of service. Please call the undersigned with any questions or comments concerning the contents of this report.

Sincerely,

SHANNON & WILSON, INC.

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Environmental Engineer

DBA/mac

Approved By:

Fred R. Brown, P.E.
Vice President

TABLE 1 - SOIL SAMPLE LOCATIONS AND DESCRIPTIONS

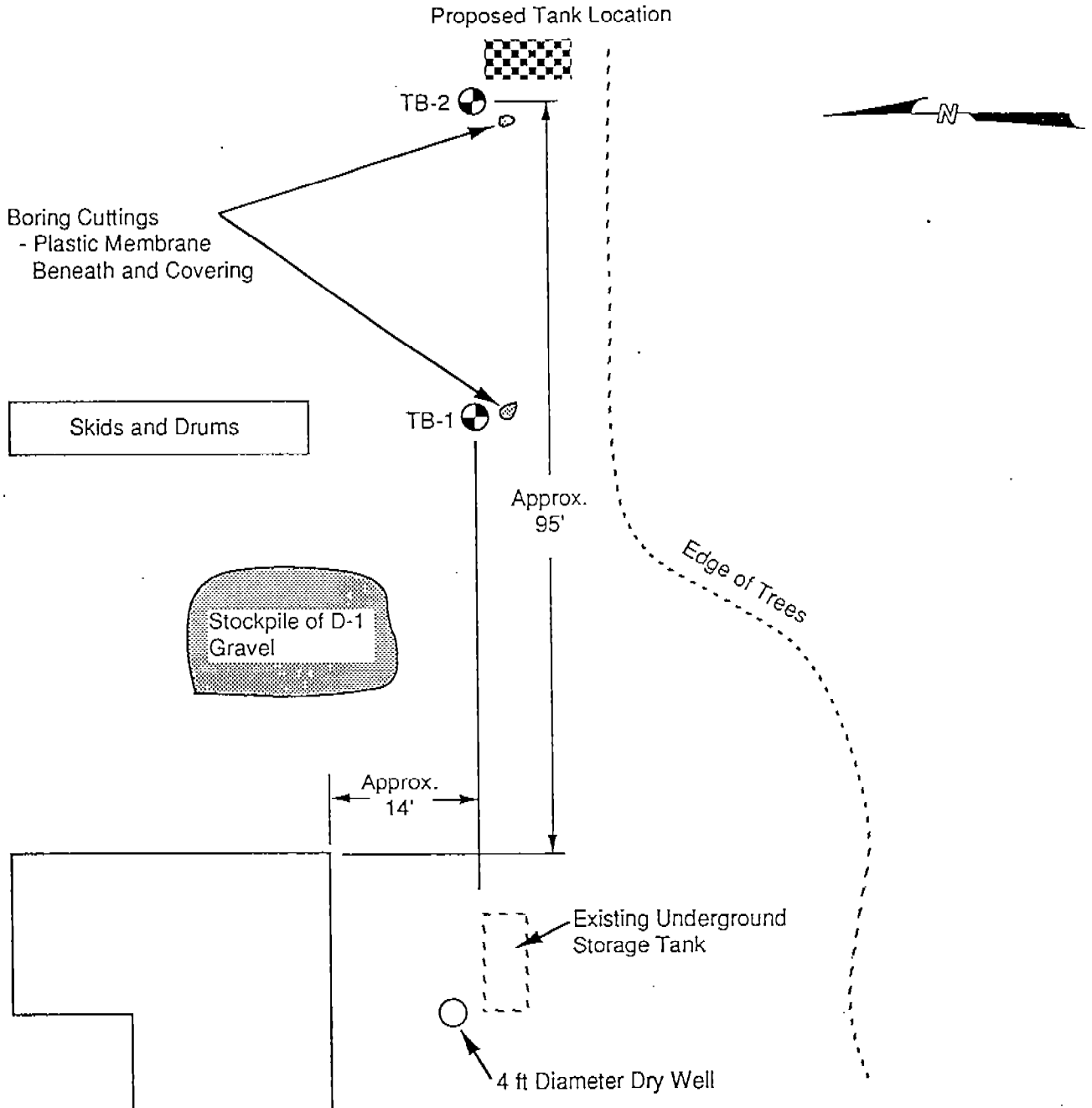
Sample Number	Date	Sample Location (See also Figure 1 and Table 2)	Depth (Ft)	Sample Classification
TB1S1	9/10/90	Boring No. TB-1, Sample No. 1	2.5-4.0	Brown, sandy SILT
TB1S2	9/10/90	Boring No. TB-1, Sample No. 2	5.0-6.5	Gray-brown, clean, sandy GRAVEL
TB1S3	9/10/90	Boring No. TB-1, Sample No. 3	7.5-9.0	Gray-brown, clean, sandy GRAVEL
TB1S4	9/10/90	Boring No. TB-1, Sample No. 4	10.0	Gray-brown, silty, sandy GRAVEL; with some cobbles
TB1S5	9/10/90	Boring No. TB-1, Sample No. 5	10.5-12.0	Gray-brown, silty, sandy GRAVEL; with some cobbles
TB1S6	9/10/90	Boring No. TB-1, Sample No. 6	12.5-14.0	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB1S7	9/10/90	Boring No. TB-1, Sample No. 7	15.0-16.5	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB1S8	9/10/90	Boring No. TB-1, Sample No. 8	17.5-19.0	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB1S9	9/10/90	Boring No. TB-1, Sample No. 9	20.0-21.5	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB2S1	9/10/90	Boring No. TB-2, Sample No. 1	2.5-4.0	Gray, silty, sandy GRAVEL; with some cobbles
TB2S2	9/10/90	Boring No. TB-2, Sample No. 2	4.0-5.5	Gray, clean, sandy GRAVEL
TB2S3	9/10/90	Boring No. TB-2, Sample No. 3	5.5-7.0	Gray, clean, sandy GRAVEL
TB2S4	9/10/90	Boring No. TB-2, Sample No. 4	7.5-9.0	Gray, clean, sandy GRAVEL
TB2S5	9/10/90	Boring No. TB-2, Sample No. 5	10.0-11.5	Gray, clean, sandy GRAVEL
TB2S6	9/10/90	Boring No. TB-2, Sample No. 6	12.5-14.0	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB2S7	9/10/90	Boring No. TB-2, Sample No. 7	15.0-16.5	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB2S8	9/10/90	Boring No. TB-2, Sample No. 8	17.5-19.0	Gray,sandy, gravelly SILT [TILL] ; with some cobbles
TB2S9	9/10/90	Boring No. TB-2, Sample No. 9	20.0-21.5	Gray,sandy, gravelly SILT [TILL] ; with some cobbles

TABLE 2 - SUMMARY OF HEADSPACE SCREENING AND ANALYTICAL RESULTS

		Headspace Sample Number - (See Also Table 1)										
Parameter Tested	Method	TB1S2	TB1S3	TB1S4	TB1S5	TB1S7	TB2S1	TB2S2	TB2S3	TB2S5	TB2S8	TB2S9
PID Headspace Reading (ppm)	Photovac TIP II	11	11	NA	6.4	1.5	NA	0.3	0.8	0.5	0.9	0.5

		Analytical Sample Number - (See Also Table 1 & Appendix A)										
		Soil Samples										
Parameter Tested	Method	TB1S1	TB1S6	TB1S8	TB1S9	TB2S2	TB2S4	TB2S6	TB2S7			
PID Headspace Reading (ppm)	Photovac TIPII	28	3.1	0.9	2	0.3	0.9	NA	1.7			
Total Petroleum Hydrocarbons - ppm	EPA 418.1	35.9	17.3	14.3	15.9	12.5	33.2	22.7	25.8			
Aromatic Volatile Organics (BTEX)	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
Benzene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
Toluene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
Ethylbenzene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
Chlorobenzene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
p & m Xylenes - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
o Xylenes - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
1,4 Dichlorobenzene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
1,3 Dichlorobenzene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
1,2 Dichlorobenzene - ppm	EPA 8020*	ND	ND	ND	ND	ND	ND	ND	ND			
Halogenated Volatile Organics	EPA 8010*	ND	ND	ND	ND	ND	ND	ND	ND			
PCBs and Pesticides	EPA 8080*	ND	ND	ND	ND	ND	ND	ND	ND			
Metals												
Arsenic - ppm	EPA 7060/7061	9.9	5.5	5.5	5.0	5.5	5.1	5.2	4.9			
Cadmium- ppm	EPA 7131	0.08	0.12	0.10	0.17	0.08	0.10	0.10	0.08			
Total Chromium- ppm	EPA 7191	50.1	39.5	42.0	35.2	39.7	39.9	50.5	35.6			
Lead- ppm	EPA 3050/7421	8.9	6.6	7.5	6.0	6.6	5.9	5.3	5.9			
Mercury- ppm	EPA 7760	ND	ND	ND	ND	ND	ND	ND	ND			
Silver - ppm	EPA 7471	ND	ND	ND	ND	ND	ND	ND	ND			

Key	Description
NA	Sample not analyzed for this parameter
ND	Not detected - see individual laboratory reports for detection limits
*	See Appendix A for chemicals tested and limits of detection



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SITE PLAN

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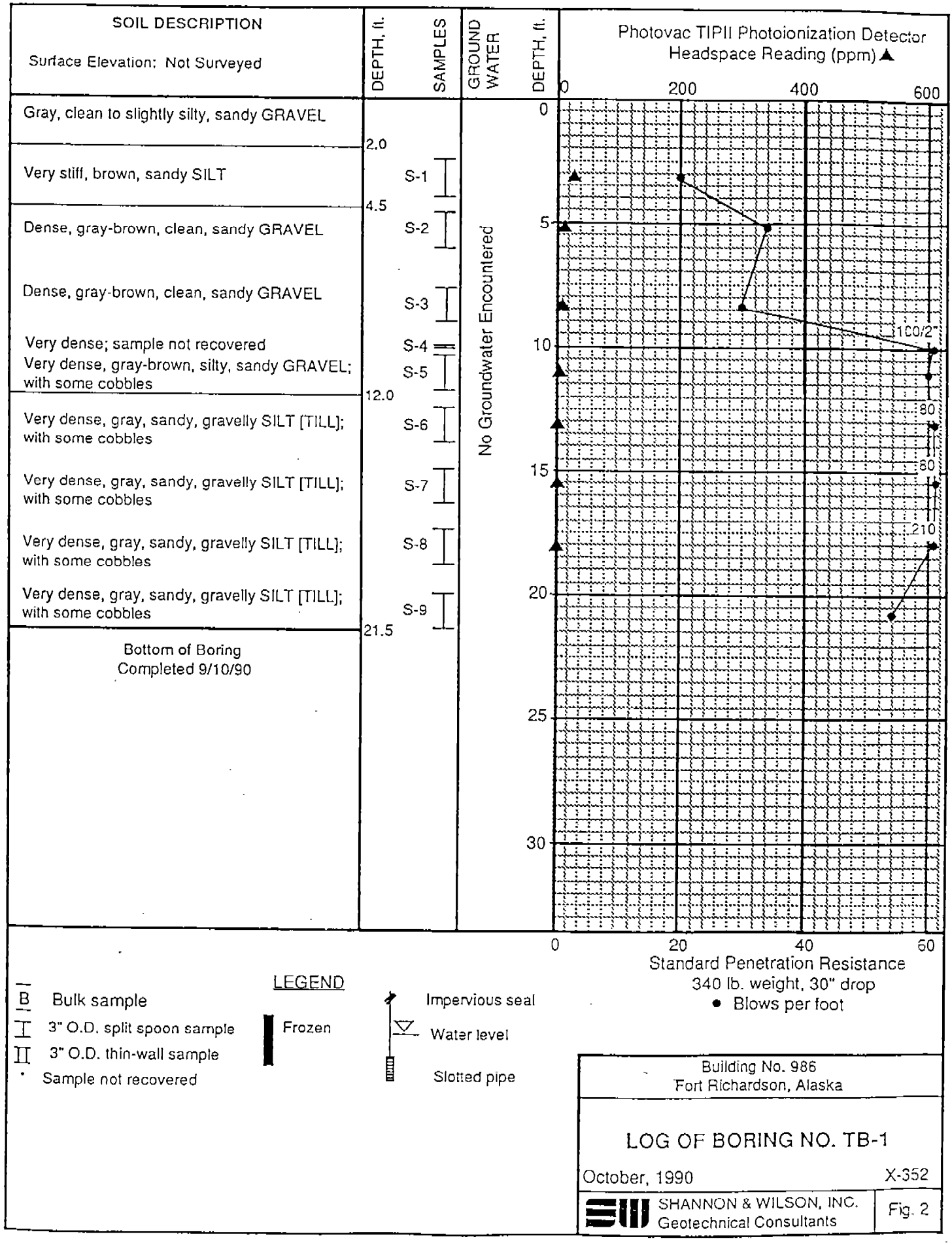
Fig. 1



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LOG OF BORING NO. TB-1

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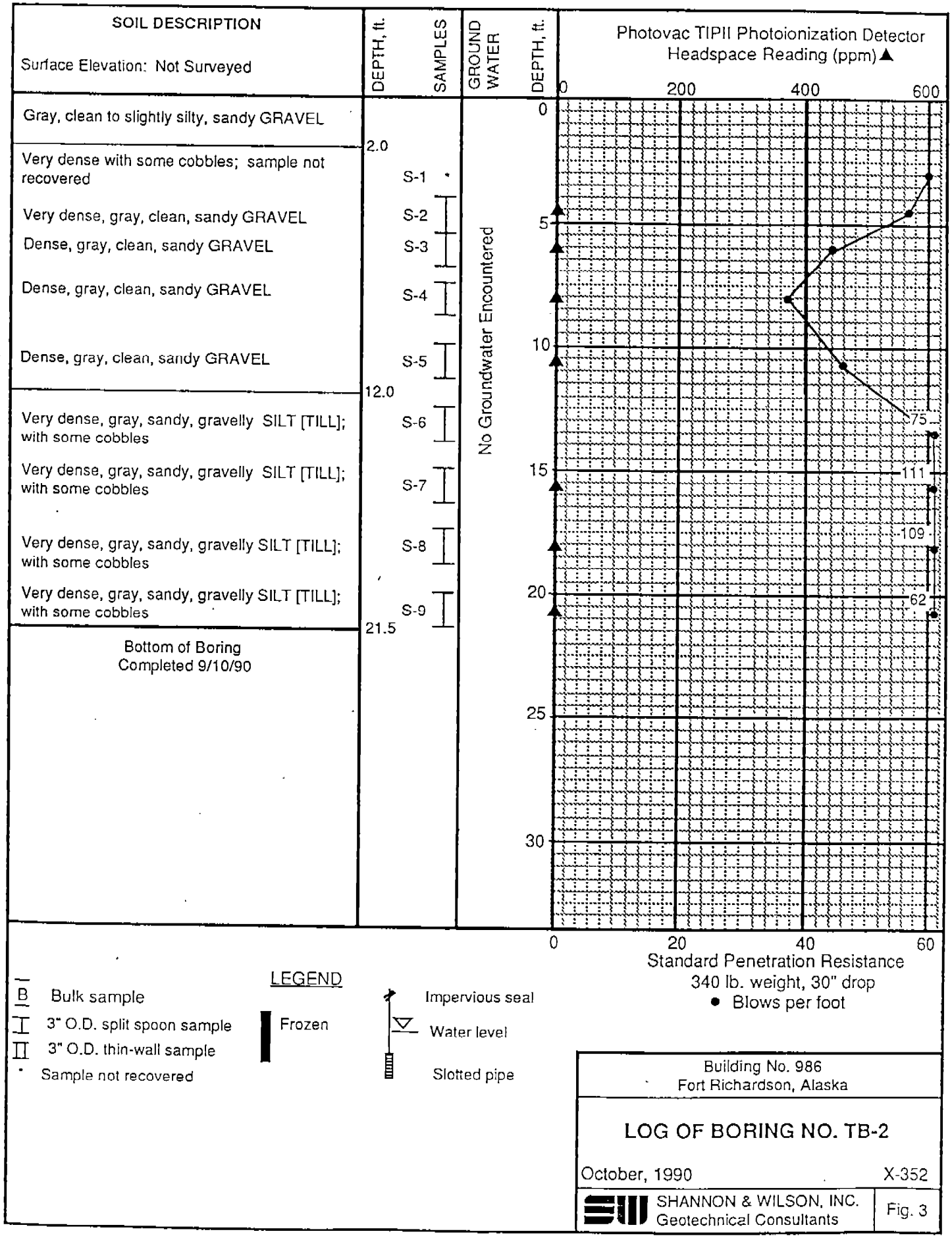
Fig. 2



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LOG OF BORING NO. TB-2

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Fig. 3