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Hazardous Waste Management — FAP

**PHASE II ENVIRONMENTAL
SITE ASSESSMENT
RADER PROPERTY
TRACT A, BLOCK 32A AT
WEST 15TH AVENUE & C STREET
ANCHORAGE, ALASKA**

March 1998

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1.0 INTRODUCTION

This report presents the results of our Phase II Site Assessment activities conducted at the Rader Property located on Tract A, Block 32A at the southeast corner of the West 15th Avenue and C Street intersection, Anchorage, Alaska. The primary purpose of this project was to further delineate the extent of soil and groundwater contamination and evaluate the site for in-situ biodegradation potential of petroleum hydrocarbon constituents. With the exception of the excavation and sampling of additional test pits, postponement of the installation and sampling of groundwater monitoring wells, and modification of the analytical parameters, the work was conducted in accordance with our proposal dated November 26, 1997. Authorization to proceed with this work was provided by receipt of our signed proposal dated November 29, 1997, by Mr. Valentine S. Rader for Mr. John L. Rader, current owner of the subject property.

Shannon & Wilson was retained to monitor the test pit excavation activities, collect soil samples, sample select existing monitoring wells, and coordinate with the project laboratory for sample testing. Shannon & Wilson was also responsible for validating the laboratory data and preparing this site assessment report. This report is documentation of Shannon & Wilson's efforts with respect to monitoring the test pit explorations, screening and sampling the soil and groundwater, laboratory analyses, and characterization of the subsurface conditions and extent of potential petroleum hydrocarbon impact to the soil. Based on our assessment efforts, we found that petroleum hydrocarbon concentrations above the Alaska Department of Environmental Conservation (ADEC) Category A cleanup criteria remain in the undisturbed soil at the project location. In addition, the site groundwater is impacted with benzene above the Environmental Protection Agency (EPA) maximum contaminant levels (MCLs) for drinking water. Conversely, groundwater contaminant levels were below the alternative cleanup levels (ACLs) established for the impacted sites associated with UNOCAL's 1986 gasoline release.

Site assessment activities were conducted in accordance with the sampling procedures outlined in Shannon & Wilson's Quality Assurance Program Plan (QAPP) approved by the ADEC on April 23, 1991 and amended by our adoption of the ADEC's September 22, 1995 Standard Sampling Procedures.

1.1 Site and Project Description

The project site, referred to herein as the Rader Property, is a 300 foot square, south sloping lightly wooded property, forming the northern half of Block 32A and the southeast corner of the West 15th Avenue and C Street intersection. A vicinity map, generally identifying the location of the site, the area street systems, nearby drainages, and the general contours in the region, is included as Figure 1. This area borders residential, office, commercial, church, and public school properties and is less than 0.5 mile south of downtown and 0.5 mile north of midtown Anchorage, Alaska. From the Municipality of Anchorage (MOA) Assessor's Map, the site is in the North 1/2 of the Northeast 1/4 of Section 19, Township 13 North, Range 3 West, Seward Meridian. The legal description for the Rader Property is Tract A, Block 32A of the Third Addition to the Anchorage Original Townsite (A.O.T.). This description was obtained from the records at the MOA Assessor's Office.

The project consisted of monitoring the excavation and sampling of 12 exploratory test pits, designated TP-A through TP-L, and sampling five existing monitoring wells. Shannon & Wilson's field representative, Haydar Turker, supervised field operations. Our field representative also performed duties as the on-site health and safety officer. Mr. Allen Wichman of B.C. Excavating (BCX) was the backhoe operator who performed excavation and backfilling activities. A representative from UNOCAL's environmental consultant, Geo Engineers of Anchorage, Alaska, was also present during the excavating and sampling activities. CT&E Environmental Services Inc. (CT&E) of Anchorage, Alaska provided laboratory analysis of the soil and water samples.

This report describes our field sampling activities, presents the results of laboratory analyses and field screening, and characterizes the subsurface conditions and extent of potential petroleum hydrocarbon impact to the soil and groundwater. Table 1 presents a sequential listing of site assessment samples with descriptions of sample location, depth, headspace screening results, and soil classification. Table 2 summarizes the analytical results for soil and groundwater samples collected for the site assessment, and groundwater field measurements and purging data are included in Table 3. Figures 1 and 2 depict the project vicinity and a site plan, respectively. A log of each test pit is presented in Figures 3 through 14. Appendix A presents photographs of the project at various stages of completion. Appendix B presents the laboratory analysis reports, and Appendix C contains "Important Information About Your Geotechnical/Environmental Report".

1.2 Previous Site Assessments

Based on our review of available information, environmental assessment studies have been completed on Tract A by various UNOCAL environmental consultants as a result of an upgradient gasoline release in 1986. As included in Shannon & Wilson's July 1997 Phase I Environmental Site Assessment report, the site assessment reports which were completed between 1986 and 1997 document that petroleum contaminants have migrated to the Rader Property and impacted the groundwater and soil.

From the records search of ADEC's file and personnel interviews with ADEC project managers, the following information was obtained about this release, follow-on remediation, and ongoing monitoring well measurement efforts being conducted by UNOCAL's consultants.

In 1986, a gasoline release was detected at one of UNOCAL's USTs at 1441 C Street, located north of the Rader Property across 15th Avenue, as shown on Figure 2. The source of contamination at the site was a leak caused by a defective in-line leak detector. The presence of free-phase gasoline floating on the shallow groundwater adjacent to the leak confirmed that this was the source of contamination.

AGRA, formerly Rittenhouse-Zeman & Associates (RZA), was retained to monitor the tank removals, conduct evaluations of the contamination, design, install and operate a remediation system, and perform monitoring activities between 1986 and 1994. During this time, AGRA installed 18 monitoring wells (designated MW-3 through MW-20) and excavated approximately 12 test pits on the UNOCAL site and surrounding properties (including the Property). A number of the pits and wells, positioned on the Rader Property, encountered both soil and groundwater contamination. In a January 1989 contamination assessment report, RZA identifies two potential sources of petroleum on the UNOCAL property. These sources were the known gasoline leak, which occurred in the area of underground tanks in the central part of the site, and a cess-pool and a west oil tank located near the southeast corner of the property at the approximate locations shown on Figure 2.

An April 1990 report by RZA regarding the soil and groundwater impacts on the Rader Property determined from test pit explorations that the soil was contaminated with petroleum hydrocarbons. The estimated horizontal extent of contaminated soil is shown on the site plan, Figure 2. The consultants estimated at the time that the soil contamination plume on the Rader Property could be excavated, requiring removal of 200 to 300 cubic yards or 650 to 700 cubic yards of soil depending on whether soil was removed on the downgradient side of the collection gallery/impervious barrier only or on both sides of the barrier. Soil removal to depths of 6 feet

were anticipated. At the time, the following proposed ADEC soil cleanup standards were used to determine the extent of contamination: less than 0.5 ppm of benzene and 1 ppm total benzene, toluene, ethylbenzene, and xylenes (BTEX) as determined by EPA Method 8020 and less than 10 ppm total petroleum hydrocarbons (TPH) as gasoline using EPA Method 418.1. However, it was proposed by RZA that the TPH analyses were being affected by the organic matter present in the samples, and that a TPH cleanup level of 40 ppm was used to estimate the volume of the contaminated soil reported above. Seven monitoring events from 1989 to 1992 documented non-detectable concentrations of gasoline constituents in two wells (MW-14 and MW-16) situated in the middle of Tract A at approximate locations shown in Figure 2.

In 1989, AGRA completed a Supplemental Contamination Assessment for the UNOCAL site and vicinity and began remedial actions. This included installation of groundwater collection trenches with low permeability vertical barriers along the southern edge of the UNOCAL property and the northern edge of the Rader Property to the south (i.e. on both sides of West 15th Avenue). The groundwater treatment system (GTS), started in October 1989, consisted of collecting, pumping, and treating 350 to 1300 gallons of water per day from the collection gallery for discharge to the city's sanitary sewer. An on-site vapor extraction system (VES) was also installed on the UNOCAL site and was started in January 1990. From that time through March 1994, AGRA conducted regular system monitoring and groundwater sampling at the site and surrounding properties. AGRA shut down the VES in October 1993, and the GTS around March 1994.

Compliance monitoring conducted during the above treatment period was reduced in April 1994, to the annual testing of five select monitoring wells. The selected wells, which included two new wells (MW-17 and MW-18) installed on the Rader Property at the approximate locations shown on Figure 2, were monitored in 1995, 1996, and 1997.

The 1996 and 1997 benzene concentrations of the groundwater samples collected from the five wells are as follows:

<u>Well Number</u>	<u>Benzene Level, parts per billion (ppb)</u>	
	<u>1996</u>	<u>1997</u>
MW-6A	1100	356
MW-8	1200	618 (2820 ppb GRO)
MW-9	290	165
MW-17	110	150 (2370 ppb GRO)
MW-18	Dry	892

These results show a drop in benzene concentrations in three of the five wells, however, the concentrations are still above the EPA's MCL for benzene of 5 ppb.

ICF Technology & Clement Associates completed a risk assessment for the UNOCAL property in March 1991 using 1986 to 1989 data to develop ACLs considering both on and off-site risks to human health. This assessment found that the highest future risk to human health was associated with inhalation of benzene vapors from an on-site basement. From four off-site scenarios studied, inhalation of vapors in a basement by residents was also found to produce the maximum off-site risk or a risk level of 6×10^{-5} for the maximum condition.

In ADEC's letter dated January 2, 1992, an ACL of 6,240 ppb for benzene in groundwater was established with a lifetime risk of 10^{-5} for this site. Along with this ACL/risk level, a number of conditions were stipulated and were aimed at notifying adjacent property owners of the need to take precautions when working around the contamination in the future. As part of the approval of the higher ACLs, the letter also informs UNOCAL that they have a future responsibility for the contamination both on and off-site and must treat and dispose of any contaminated soil and groundwater to meet the most restrictive cleanup levels as defined in the AAC 78.315 if encountered in future on and off-site construction activities. This restriction, therefore, implies that the ADEC expects UNOCAL to be responsible for handling any soil and water contamination that may be encountered from this release during future development on the Rader Property. Currently, Mr. Rader's plans include excavating and leveling, preparatory to site improvements for further development.

During an interview conducted on July 23, 1997 prior to submittal of Shannon & Wilson's Phase I report, Mr. Robert Weimer of the ADEC confirmed that the ADEC may issue a no further remediation letter for the UNOCAL site, but indicated that a no further action letter was not likely without qualifiers to protect contaminated off-site properties. He also suggested that future monitoring would likely be required of UNOCAL along with possible institutional controls or posted bonds.

2.0 FIELD INVESTIGATIONS

The field activities for the project included health and safety monitoring, test pit excavation and backfill monitoring, and soil and groundwater sample collection and screening. The following sections provide an overview of the project and address each of the field activities. Throughout the project, Shannon & Wilson's representative was on site for field screening and sampling, and to observe and document the field activities. With the following listed

modifications, the field program was completed in accordance with our approved November 26, 1997 proposal. The approved variations from the proposal included:

- 12 test pits were advanced instead of the originally proposed 10 test pits;
- Drilling, installation, and sampling of the three additional monitoring wells were canceled;
- The proposed hand level survey to tie in the contact layers in each pit and determine elevations of the proposed monitoring wells was not performed since monitoring well installation was canceled;
- Quality control (QC) samples were added to the sampling program and analytical parameters of the selected soil samples were modified.

Weather conditions during the test pit explorations and sampling work were mostly cloudy and snowy. Temperatures ranged from about 5 °F to 25 °F.

2.1 Health and Safety Monitoring

Before the start of each day's field activities, the BCX and Shannon & Wilson field team along with UNOCAL's representative held a safety meeting to discuss procedures and safety issues at the project site. Our field representative served as on-site safety officer for the duration of the project. A Sensidyne flame ionization detector (FID) or a MiniRae photoionization detector (PID) were interchangeably used to monitor total hydrocarbon vapors in the breathing zone, and were used periodically during field activities.

2.2 Exploratory Test Pits

A total of 12 test pits, designated Test Pits TP-A through TP-L, were advanced on December 4, 16, and 17, 1997 by BCX, under subcontract to Shannon & Wilson. Test Pits TP-A through TP-D were advanced, sampled, and backfilled on December 4 while Test Pits TP-E through TP-H and Test Pits TP-I through TP-L were completed on December 16 and 17, respectively. Photographs 1 through 3 in Appendix A show site conditions during test pit explorations. Test pit locations were selected to better understand the current extent of soil contamination. Therefore, the test pits were advanced at locations downgradient from the known contaminant plume in the vicinity of the sewer line hookup and the reported natural seep area. The test pit locations are shown on the site plan in Figure 2 while the test pit logs are included as Figures 3 through 14.

BCX provided two different Hitachi tracked excavators to advance the approximately 4 feet wide test pits. Depth of the test pits ranged from about 4.5 feet below the ground surface (bgs) to 12.5 feet bgs while the long axis of the test pits ranged from 11 feet to 18 feet. After advancing each test pit to the final depth as designated by our field representative, headspace screening and analytical soil samples were collected from the bottom and sidewalls of each test pit. When the test pit was deeper than 4 feet, the backhoe bucket was used to recover soil from the excavation for sampling. Following screening and sampling, the test pits were backfilled with the excavated soil.

2.3 Test Pit Screening and Sampling

Prior to sampling, all sampling equipment was cleaned with an Alconox wash solution, followed by a sequence of tap water, isopropanol and deionized water rinses. The soil in the test pits was evaluated or "screened" for volatile organic compounds using a FID or a PID calibrated daily with 100 ppm of isobutylene standard gas. The FID or PID was used to sample the total hydrocarbon vapors released from the soil by direct screening or using headspace sampling methods. Direct screening was accomplished by creating a depression or pocket in the soil of interest with a stainless steel spoon and holding the FID/PID probe in the depression. This sample screening technique was applied either in-situ or to soil in the backhoe bucket to determine potentially contaminated locations. Headspace samples were collected in zip lock plastic bags by filling them with freshly exposed soil to one-half of their volumes using a stainless steel spoon and then sealing the top. A new contaminant free stainless steel spoon was used to collect each analytical sample. Headspace samples were allowed to warm up to a common temperature prior to field headspace screening. Field FID/PID readings were obtained within one hour of the sample collection. Screening was accomplished by inserting the FID/PID sampling probe into the air space above the soil in the bag. The FID/PID display was observed and the maximum reading was recorded for each sample.

Analytical samples, with the exception of gasoline range organics (GRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX) samples, which were analyzed using Alaska Method 101 (AK 101), were collected by quickly and completely filling the appropriate laboratory provided jars. For the AK 101 sampling procedure, about 25 grams of soil were quickly placed into a laboratory supplied 2 oz. jar that had been pre-weighed. Afterward, 25 milliliters (ml) of reagent grade methanol were added to completely submerge the soil. The methanol extracted the volatile petroleum hydrocarbons from the soil at the time of sampling, thereby reducing the possible loss of volatile constituents prior to sample analysis. All samples were transferred to the jars using a decontaminated stainless-steel spoon, and transferred to the laboratory in coolers with ice packs using chain-of-custody procedures. The number, depth, and classification of

samples collected for the project are summarized in Table 1. The sampler's name, the date, and time of sample collection are listed on the chain-of-custody forms included in Appendix B.

Under the sample numbering scheme used for this project, a typical analytical sample number is Y-5778-TP-A-S1 for the test pit samples. The 'Y5778' indicates the Shannon & Wilson job number. The 'TP-A-S1' designation represents the sample location and number. For brevity in the text of this report, the 'Y-5778' prefix is omitted and samples are identified by their sample location and number.

Five to seven headspace screening samples were collected from the bottom and sidewalls of each test pit excavation. Based on screening results of the headspace samples and soil type, two soil samples were selected from each test pit for laboratory analysis. The headspace screening results are presented on Table 1 and Table 2.

In addition to the 24 project samples, six QC samples were also submitted to the project laboratory for analysis. These QC samples included two field duplicates, two field blanks, and two trip blanks.

2.4 Groundwater Sampling

As part of our site assessment activities, field measurements were obtained from groundwater samples collected from five of the eight existing monitoring wells, MW-14 through MW-18, on December 3, 1997. Upon obtaining field measurements from the groundwater samples from the five monitoring wells, two samples were collected from MW-14 and MW-18. These two samples, along with a trip blank, were submitted to the project laboratory for analyses. MW-18 is located within the suspected groundwater plume while MW-14 is located outside of the plume in a background (clean) area. These samples were tested to evaluate contaminant levels and biodegradation potential at both monitoring well locations.

Field monitoring was initiated for each well using a water level indicator to measure the water table elevation. A YSI-55 down-hole DO meter was then used to measure DO levels and temperatures in the monitoring wells. Also, water quality parameters including specific conductance, pH, and turbidity were measured in the field using a HORIBA U-10 water quality instrument. A disposable polyethylene bailer, dedicated for each well, was used to remove water from the wells for field measurements and sampling. Prior to sampling of the two monitoring wells, stagnant water was purged from each well. After the monitoring wells had recovered to at least 80% of their pre-purged volumes, the water samples were obtained from the wells using the dedicated polyethylene bailers. The results of the purging, water level, pH, temperature, DO,

conductivity, and turbidity measurements for the December 3, 1997 groundwater sampling event are presented in Table 3. The water sample numbers, collection dates, and locations are shown in Table 1.

After two consecutive reasonably similar readings of the parameters listed above, water samples were collected directly from the bailer and filled in order of decreasing volatility. The 40 milliliter septum-capped volatiles jars were filled first and capped rapidly and inspected to insure that no headspace was present in the jar. After completing sample collection, the sample jars were then placed in appropriate chilled containers for delivery to the laboratory using chain of custody procedures.

A laboratory-prepared trip blank sample was analyzed to document the presence or absence of contamination attributable to transportation and field handling procedures. The trip blank accompanied the project samples from/to the laboratory and was submitted for analysis of volatile constituents in water.

Water produced during purging of the wells was containerized in labeled, 5-gallon buckets and temporarily left onsite pending characterization. The equipment used in more than one monitoring well was decontaminated after each use to prevent cross contamination.

3.0 LABORATORY ANALYSES

Soil samples recovered from the test pit excavations were screened using our FID/PID and headspace methods. Laboratory analyses of the soil samples were determined based on the known potential contaminant of concern at the project site and in accordance with the ADEC regulations. Therefore, the soil samples were analyzed for GRO by AK 101 and BTEX using EPA Method 8020 as modified by AK 101. Additionally, selected soil samples were also tested for total lead by EPA Method 7421 and halogenated volatile organics (HVOs) by EPA Method 8010. Selected soil samples were also analyzed for BTEX using EPA Method 8020, which is the method used during previous assessments, to obtain comparable data. Field duplicate samples were selectively analyzed for GRO, BTEX, and total lead while field blanks and trip blanks were analyzed for GRO and BTEX using the above mentioned methods.

Two groundwater samples and one trip blank were tested for GRO and BTEX by AK 101 and EPA Method 602. The groundwater samples were also analyzed for total lead by EPA Method 7421, sulfate and nitrate by EPA 300, heterotrophic plate count (HPC) by SM17 9215, oil degrading bacteria (ODB) by sheen screen, and oxidation reduction potential using SM18 2580B.

The laboratory analyses were run on CT&E's normal turn around time of 10 days except for bacteria count analyses, which were completed in 21 days. The results of the laboratory testing are summarized in Table 2, with the individual laboratory reports included in Appendix B.

4.0 SUBSURFACE CONDITIONS

The subsurface soil and groundwater conditions are described herein based on both the previous site assessment reports and our observations during the current field activities.

4.1 Soil

The subsurface materials encountered throughout the site can be classified under four soil types: a surficial organic silty material; a silty, sandy gravel (fill material); a brown to dark brown sandy silt and silty sand unit (silt unit); and a gray silt or clay with traces of sand and gravel (silt/clay unit). Approximately four inches of surficial, organic silty material and snow cover were underlain by the fill material (where encountered) or by the silt unit. The thickness of the fill material, which was encountered at the north-northwest portion of the property in Test Pits TP-A through TP-H, ranged from approximately 2.5 feet to 4.0 feet. In addition to the peaty organic material observed in most of the test pits, an organic layer comprised of roots and branches and measuring up to 4 inches in thickness defines the contact between the fill material and underlying silt unit. The brown to dark brown, silt unit varies in content from traces of organics, sand, and gravel to sand and gravel lenses. This heterogeneous silt unit overlies a gray silt/clay unit. This hard, gray silt/clay unit, which contains different amounts of sand and gravel, is interpreted as being the upper surface of the Bootlegger Cove Formation. This extensive silt/clay unit is found throughout much of the Anchorage area. The contact between the brown to dark brown silt unit and the gray silt/clay unit can be seen in Photograph 4. Detailed information on the materials encountered during our field work can be seen in the test pit logs included in Figure 3 through Figure 14.

4.2 Groundwater

Groundwater was not encountered during our test pit excavation activities. However, slow water seepage was observed in four of the 12 test pits at depths ranging from 1.5 bgs to 5.5 bgs. Based on previous extensive work conducted by UNOCAL's consultants in the project area, groundwater is found perched above the less permeable clayey material of the Bootlegger Cove

Formation in the relatively permeable silty sand to sandy silt unit. Based on previous reports, groundwater flows toward the south-southeast.

5.0 DISCUSSION OF RESULTS

The following sections present the results of the analytical testing of the samples collected from the test pit excavations and monitoring wells, as well as the QC samples. Based on existing information, this project location is designated as a Category A site. The corresponding soil cleanup criteria for a Category A site require less than 100 ppm of DRO, 50 ppm GRO, 0.1 ppm benzene, and 10 ppm total BTEX. The following sections describe the results of our analytical sampling and testing program. The analytical results are summarized in Table 2, and the laboratory results are presented in Appendix B.

5.1 Soil Samples

As summarized in Table 2, of the 24 project soil samples submitted to the laboratory three samples contained detectable levels of GRO and 10 samples contained detectable BTEX constituents. Reported GRO concentrations of the three samples, TP-A-S4, TP-B-S3, and TP-F-S2, are below the site specific cleanup level with respective concentrations of 6.89 ppm, 2.41 ppm, and 5.38 ppm. Benzene concentrations of the 10 samples ranged from an estimated value that falls below the practical quantitation limit (PQL) of 0.0169 ppm to as high as 3.67 ppm while total BTEX levels ranged from an estimated value of 0.0169 ppm up to 3.7157 ppm. Reported benzene concentrations of four samples were below the PQL and, along with the benzene content of two additional samples are, below the applicable Category A cleanup criteria. Benzene contents of the remaining four samples, TP-A-S2, TP-A-S4, TP-E-S5, and TP-F-S2, were above the applicable benzene cleanup level of 0.1 ppm with respective concentrations of 0.107 ppm, 3.67 ppm, 0.118 ppm, and 2.85 ppm.

To obtain comparable data, three of the soil samples were also tested for BTEX using EPA Method 8020, the method used during previous investigations. Only one of the three samples collected from different test pits contained detectable benzene. Sample TP-F-S2 had 0.624 ppm benzene. As mentioned above, the same sample contained 2.85 ppm benzene when it was extracted in the field and tested using EPA Method 8020 as modified by AK 101. As shown on Figure 2, TP-F was advanced to the south of the previously defined contaminant plume approximately next to TP-7 and TP-8.

The five samples tested for halogenated volatile organics (HVOs) had non-detectable HVO constituents except for Sample TP-H-S2 which had a *cis*-1,2-dichloroethene concentration

of 0.454 ppm. This reported level exceeds the ADEC's proposed cis-1,2-dichloroethene cleanup level of 0.2 ppm. Upon further sample chromatogram review by the project laboratory, it was confirmed that the cis-1,2-dichloroethene peak was also observed in the AK 101 analyses chromatograms for Samples TP-H-S5 and TP-I-S7. Since these field extracted samples were submitted for GRO and BTEX analyses only, the presence of a cis-1,2-dichloroethene peak on these chromatograms was not reported and was not quantified. Detection of the subject compound in the two field preserved samples and not in the laboratory extracted HVO samples is likely due to high volatility of the target compound.

Total lead levels of the 16 soil samples analyzed ranged from 4.32 ppm to 17.0 ppm. These lead contents are within background levels typically observed in Anchorage and are well below the ADEC's proposed lead soil cleanup levels for the Anchorage area. Proposed lead cleanup levels for the Anchorage area soils are 400 ppm for residential and 1,000 ppm for commercial and industrial properties.

The GRO, benzene, total BTEX, HVOs, and total lead concentrations of the test pit samples are either non-detectable or are less than the applicable Category A cleanup criteria except for the benzene levels of Samples TP-A-S2, TP-A-S4, TP-E-S5, and TP-F-S2 and the cis-1,2-dichloroethene concentration of Sample TP-H-S2.

5.2 Water Samples

The water sample collected from MW-14 had non-detectable levels of GRO, BTEX and total lead while the water sample collected from MW-18 contained 3.5 ppm GRO, 1.90 ppm benzene, 0.00118 ppm toluene, and non-detectable levels of total lead.

Sample MW-14 had a sulfate concentration of 201 ppm, and oxidation reduction (redox) potential of 450 millivolts (mV). ODB and HPC of this sample were 40 most probable number per gram (MPN/gm) and 9,200 MPN/gm, respectively. In contrast, Sample MW-18 contained 14.9 ppm sulfate and a redox potential of 493 mV. Reported ODB and HPC of Sample MW-18 were 80 MPN/gm and 16,000 MPN/gm, respectively. Nitrate concentrations of both samples, MW-14 and MW-18, were below the detection limits of 1.0 ppm and 0.1 ppm, respectively.

The relatively low sulfate and high petroleum hydrocarbon and bacteria counts of Sample MW-18 may suggest that biological degradation of the petroleum hydrocarbon constituents is occurring at the MW-18 location. Below detection limits of nitrate concentrations of both samples coupled with significantly lower sulfate content of Sample MW-18 can be explained by preferential use of nitrate by the microorganisms and utilization of the sulfate as an alternative

electron acceptor in an anaerobic environment. The field measured groundwater DO levels of less than 0.5 ppm, shown in Table 3, in both monitoring wells are below the 2 ppm recommended threshold level of DO necessary to sustain aerobic microbial metabolism. In addition to measured DO levels, redox potential results of the groundwater samples correspond to the amount of energy released in an anaerobic environment. The higher bacteria count reported for MW-18 also supports the idea that biological activity is higher at this location as the presence of the carbon source (GRO and benzene) is possibly stimulating bacterial growth. It should be noted that microorganisms present in the saturated zone are generally attached to the soil particles as opposed to being dispersed in the groundwater. Therefore, analyzed water samples may contain a smaller number of microorganisms than actually present in the soil. Another consideration is that hydrocarbon contamination likely occurs within a limited depth of the smear-zone, therefore, the water may only be in contact with a portion of the soil contamination zone. Since the monitoring wells are generally screened 5 to 10 feet into the saturated zone, the bacteria count of the groundwater samples may be somewhat diluted compared to the bacteria counts in soil samples collected from the zone of contaminated soil.

5.3 Generated Materials

Materials generated from the Phase II Environmental Site Assessment efforts at the Rader Property consist of the purge water generated during monitoring well sampling activities. The approximately five gallons of water purged from MW-14 and about one gallon generated from MW-18 were placed in two separate, labeled 5-gallon buckets and left onsite. Based on laboratory results of samples collected from these monitoring wells, the water generated from MW-14 was poured onto the ground and the water from MW-18 was disposed of at the Hiland Road Landfill in Eagle River, Alaska.

5.4 Data Quality Assessment

Analytical samples were submitted to CT&E in three batches using chain-of-custody procedures. Copies of the chain-of-custody forms are included in Appendix B. All samples were received in good condition and analyzed as requested within prescribed holding times. No change orders were submitted to the project laboratory.

A Level 1 data deliverable package was prepared by CT&E to present the results of the analysis. Level 1 data deliverables are not designed to provide the extensive laboratory data necessary to fully evaluate the reported results. Rather, Level 1 data deliverables report results and comments related to the quality of the results, minimizing costs by relying on the laboratory's required internal quality controls for data validation.

Two field duplicate soil samples were submitted to the laboratory to provide the data necessary to assess sampling precision. Sample TP-B-S6, a QC duplicate of Sample TP-B-S2, was analyzed for GRO, BTEX, and total lead. The results of the sample analyte were compared to the duplicate results and the relative percent difference (RPD) calculated. Since the GRO and BTEX results were below the detection limits for both samples except for the toluene result of the duplicate sample, only total lead results were used for precision calculation. Based on these calculations, the precision of total lead has been found to be 18% which is within Shannon & Wilson's data quality objectives (DQO) of +/- 20% for lead analysis. The second field duplicate sample, Sample TP-F-S8, and the corresponding project sample, Sample TP-F-S2, were analyzed for GRO, BTEX, and total lead to calculate precision. Both samples had detectable levels of GRO, benzene, and lead. These two samples had a precision of 5% GRO, 18% benzene, and 4% total lead which are within Shannon & Wilson's DQO for each analysis. Because all GRO, BTEX, and total lead results are valid, the data is considered 100% complete, exceeding the 95% completeness DQO. The DQOs for this project are contained in Shannon & Wilson's April 20, 1991 QAPP, which has been approved by the ADEC as amended by our adoption of the ADEC September 22, 1995 Standard Sampling Procedures.

The two field blanks and three trip blanks which accompanied the associated soil and water samples from the time of collection to the time of testing were analyzed by the laboratory. The trip blanks and one of the field blanks had non-detectable GRO and BTEX constituents while the other field blank, TP-C-S6, which was collected at the Test Pit TP-C location next to C Street, contained 3.20 ppm GRO. The laboratory reports indicate that the reported GRO was not consistent with a gasoline pattern and that Unknown Hydrocarbons were contributing to this sample's GRO recovery. In a phone conversation with the laboratory's representative, we learned that the reported Unknown Hydrocarbons reported may have been caused by exhaust emissions of the vehicles on C Street. Since the trip blanks and the samples collected from TP-C were non-detectable for GRO and BTEX, this Unknown Hydrocarbon anomaly does not affect data quality.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Soil and groundwater sample results from this Phase II Environmental Site Assessment project and the available previous site assessment reports were used to characterize the subsurface soil and groundwater conditions at Tract A, Block 32A at West 15th Avenue and C Street. Soil samples with concentrations exceeding the ADEC Category A cleanup guidelines were used to determine the vertical and lateral extent of the soil contaminant plume. Based on

the available data, the lateral extent of the soil contamination exceeding the applicable benzene cleanup level of 0.1 ppm was estimated as shown on Figure 2.

As seen in Figure 2, the soil contaminant plume extends across the north-northwest portion of the Rader Property and covers a larger area than estimated by RZA in their April 1990 assessment report. Using the ADEC Category A cleanup guidelines, the estimated horizontal extent of contamination shown on Figure 2, and an impacted soil thickness of about 4.0 feet across the contaminant plume, the estimated volume of contaminated soil would be 1,750 cubic yards. This estimate is greater than the previous estimate of 250 to 300 cubic yards presented in RZA's April 1990 report. It should be noted that the estimated quantity is based on a limited number of analytical samples and the assumption that the contaminant distribution and the soil type are identical across the contaminant plume. Therefore, the above estimate should be used only as a ballpark quantity.

Groundwater was not encountered during the test pit excavation activities with the exception of a slow water seepage observed in four of the 12 test pits. Former assessment activities on the Rader Property have shown the groundwater to be perched above the less permeable clayey material of the Bootlegger Cove Formation and generally flowing in a south-southeast direction. From this information, it appears that the near surface groundwater in the vicinity is seasonal. Information gathered from the former studies and this site assessment indicates that the benzene contamination present in the soil appears to be from the migration of impacted groundwater along the contact of the less permeable clayey material with the overlying silty sand to sandy silt unit. In this case, the lateral extent of the contaminated groundwater plume most likely corresponds with the contaminated soil plume. In the absence of groundwater during these test pit excavation activities, however, the lateral extent of the contaminated groundwater plume can not be estimated.

In addition to a benzene concentration of 0.0850 ppm detected in Sample TP-H-S5, collected from TP-H, an elevated level of cis-1,2-dichloroethene was reported in Sample TP-H-S2, collected from TP-H. Also, a cis-1,2-dichloroethene peak was observed in Samples TP-H-S5 and TP-I-S7. The presence of cis-1,2-dichloroethene on the Rader Property is not surprising since a 1988 soil vapor survey identifies a dichloroethylene (dichloroethene) plume at the northeast portion of the Rader Property. The survey results are included in RZA's January 1989 Contamination Assessment report. The abandoned sewer line extending from the UNOCAL site and reportedly ending on the north portion of the Rader Property (shown on Figure 2) provides a possible explanation for the presence of dichloroethene constituents since these compounds are usually associated with solvents which may have been stored in the waste oil tank or discharged to the cess-pool. A potential spill or leak in the vicinity of the cess-pool or waste oil tank may

have followed a less resistant pathway along the abandoned sewer line backfill material. Further assessments may be needed to confirm the past and the present conditions of the sewer line and to better define the extent of the chlorinated hydrocarbon contamination.

The purge water generated from MW-14 was non-detectable for all targeted analytes and was poured onto the ground. The approximately 1.0 gallon of water purged from MW-18, which contained 1.90 ppm benzene and 3.5 ppm GRO, was disposed of at the Hiland Road Landfill in Eagle River, Alaska.

The limited natural attenuation data evaluated for this project indicate that the primary contaminant of concern, benzene, is likely being degraded by natural processes in an oxygen deficient environment. Studies show that benzene is one of the more readily available compounds for natural attenuation. Although the data indicate biodegradation of benzene is occurring, the presence of the contaminant source area upgradient from the site with respect to groundwater flow can reasonably be expected to affect the time required to reduce benzene concentrations to below the cleanup levels at the Rader Property. With the presence of the upgradient source, the contaminant plume may be expanding or may be at equilibrium depending on the rate of contaminant contributed from the source area balanced with the rate of natural attenuation. The contaminant plume can be expected to shrink after the source area is depleted to the point that the rate of natural attenuation exceeds the source impact.

7.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives in the study of this site. The findings we have presented within this report are based on limited research and on the sampling and analysis that we conducted at this site. They should not be construed as a definite conclusion regarding the soil and groundwater at this site. It is possible that our subsurface tests may have missed some higher levels of petroleum hydrocarbon constituents, although our intention was to sample areas likely to be impacted. As a result, the analysis and sampling performed can only provide you with our best judgement as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur with time because of natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations for this site may need to be revised.

Shannon and Wilson has prepared the attachments in Appendix C "Important Information About Your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of our reports.

You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. 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.

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

Sincerely,

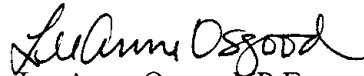
SHANNON & WILSON, INC.

Prepared By:



Haydar Turker
Environmental/Geological Engineer

Reviewed By:



LeeAnne Osgood, P.E.
Associate

HT/mw

TABLE 1 - SAMPLE LOCATIONS AND DESCRIPTIONS

Sample No.*	Date	Sample Location (See Figure 1)	Depth (ft.)	PID ppm	Sample Classification
Test Pit TP-A					
TP-A-S1	12/4/97	Bottom of Test Pit TP-A	12.0	0.0	Gray CLAY
**TP-A-S2	12/4/97	North wall of Test Pit TP-A	6.2	4.4	Brown, silty SAND; moist
TP-A-S3	12/4/97	South wall of Test Pit TP-A	6.2	0.8	Brown, silty SAND
**TP-A-S4	12/4/97	West wall of Test Pit TP-A	6.0	25.8	Brown, silty SAND, trace of gravel
TP-A-S5	12/4/97	East wall of Test Pit TP-A	6.2	0.7	Brown, silty SAND, trace of gravel
Test Pit TP-B					
TP-B-S1	12/4/97	Bottom of Test Pit TP-B	9.5	0.0	Gray CLAY
**TP-B-S2	12/4/97	West wall of Test Pit TP-B	6.5	0.8	Brown, silty SAND, trace of gravel; moist
**TP-B-S3	12/4/97	North wall of Test Pit TP-B	6.5	0.6	Brown, silty SAND, trace of gravel; moist
TP-B-S4	12/4/97	South wall of Test Pit TP-B	6.2	0.2	Brown, silty SAND, trace of gravel; wet
TP-B-S5	12/4/97	East wall of Test Pit TP-B	6.2	0.0	Brown, silty SAND, trace of gravel
**TP-B-S6	12/4/97	Duplicate of Sample TP-B-S2	6.5	0.8	Brown, silty SAND, trace of gravel; moist
Test Pit TP-C					
TP-C-S1	12/4/97	Bottom of Test Pit TP-C	12.5	0.0	Gray CLAY
**TP-C-S2	12/4/97	West wall of Test Pit TP-C	2.8	0.0	Brown, sandy GRAVEL
**TP-C-S3	12/4/97	North wall of Test Pit TP-C	2.8	0.0	Brown, sandy GRAVEL
TP-C-S4	12/4/97	South wall of Test Pit TP-C	2.8	0.0	Brown, sandy GRAVEL
TP-C-S5	12/4/97	East wall of Test Pit TP-C	2.8	0.0	Brown, sandy GRAVEL
Test Pit TP-D					
**TP-D-S1	12/4/97	Bottom of Test Pit TP-D	11	20^	Gray, silty GRAVEL
TP-D-S2	12/4/97	South wall of Test Pit TP-D	4.0	0^	Brown, sandy GRAVEL
TP-D-S3	12/4/97	North wall of Test Pit TP-D	4.0	0^	Brown, sandy GRAVEL
TP-D-S4	12/4/97	East wall of Test Pit TP-D	4.0	0^	Brown, sandy GRAVEL
**TP-D-S5	12/4/97	West wall of Test Pit TP-D	4.0	0^	Brown, sandy GRAVEL
TP-D-S6	12/4/97	West wall of Test Pit TP-D	10	0^	Gray, silty GRAVEL

KEY DESCRIPTION

- * SAMPLE NUMBERS ARE PRECEDED BY 'Y-5778' ON CHAIN OF CUSTODY FORMS
** SAMPLE ANALYZED BY THE LABORATORY
- NOT APPLICABLE
^ MEASUREMENTS OBTAINED USING FID

TABLE 1 - SAMPLE LOCATIONS AND DESCRIPTIONS

Sample No.*	Date	Sample Location (See Figure 1)	Depth (ft.)	PID ppm	Sample Classification
Test Pit TP-E					
TP-E-S1	12/16/97	South wall of Test Pit TP-E	5.5	0^	Gray, silty SAND; moist
**TP-E-S2	12/16/97	Bottom of Test Pit TP-E	9.0	12^	Gray, SILT/CLAY
TP-E-S3	12/16/97	East wall of Test Pit TP-E	6.0	1^	Brown, silty SAND
TP-E-S4	12/16/97	West wall of Test Pit TP-E	6.0	0^	Brown, silty SAND
**TP-E-S5	12/16/97	North wall of Test Pit TP-E	6.0	2^	Brown, silty SAND
Test Pit TP-F					
**TP-F-S1	12/16/97	Bottom of Test Pit TP-F	12.5	175^	Gray SILT/CLAY
**TP-F-S2	12/16/97	South wall of Test Pit TP-F	9.0	290^	Brown to gray, silty SAND, trace of gravel
TP-F-S3	12/16/97	North wall of Test Pit TP-F	9.0	30^	Brown, silty SAND, trace of gravel
TP-F-S4	12/16/97	North wall of Test Pit TP-F	3.0	0^	Brown, sandy GRAVEL
TP-F-S5	12/16/97	West wall of Test Pit TP-F	8.5	4^	Brown, silty SAND, trace of gravel
TP-F-S6	12/16/97	South wall of Test Pit TP-F	3.0	0^	Brown, sandy GRAVEL
TP-F-S7	12/16/97	East wall of Test Pit TP-F	9.0	190^	Gray, sandy GRAVEL
**TP-F-S8	12/16/97	Duplicate of Sample TP-F-S2	9.0	290^	Brown to gray, silty SAND, trace of gravel
Test Pit TP-G					
TP-G-S1	12/16/97	Bottom of Test Pit TP-G	12	0.0	Gray SILT/CLAY
TP-G-S2	12/16/97	South wall of Test Pit TP-G	9.0	0.0	Brown, silty SAND; with gravel
**TP-G-S3	12/16/97	West wall of Test Pit TP-G	8.0	0.0	Dark brown, silty, sandy GRAVEL
TP-G-S4	12/16/97	East wall of Test Pit TP-G	10	0.0	Gray, sandy SILT
TP-G-S5	12/16/97	North wall of Test Pit TP-G	9.5	0.0	Gray SILT, trace of gravel; moist
**TP-G-S6	12/16/97	North wall of Test Pit TP-G	7.0	0.0	Brown, silty, sandy GRAVEL; wet
Test Pit TP-H					
TP-H-S1	12/16/97	Bottom of Test Pit TP-H	8.0	0.0	Gray SILT/CLAY
**TP-H-S2	12/16/97	Southeast wall of Test Pit TP-H	4.0	0.5	Brown, silty SAND, trace of gravel; moist
TP-H-S3	12/16/97	Northwest wall of Test Pit TP-H	4.0	0.0	Brown, silty SAND, trace of gravel; moist
TP-H-S4	12/16/97	Southwest wall of Test Pit TP-H	4.0	0.0	Brown, silty SAND, trace of gravel
**TP-H-S5	12/16/97	Northeast wall of Test Pit TP-H	4.0	0.7	Brown, silty SAND, trace of gravel

KEY DESCRIPTION

- * SAMPLE NUMBERS ARE PRECEDED BY 'Y-5778' ON CHAIN OF CUSTODY FORMS
- ** SAMPLE ANALYZED BY THE LABORATORY
- NOT APPLICABLE
- ^ MEASUREMENTS OBTAINED USING FID

TABLE 1 - SAMPLE LOCATIONS AND DESCRIPTIONS

Sample No.*	Date	Sample Location (See Figure 1)	Depth (ft.)	PID ppm	Sample Classification
Test Pit TP-I					
TP-I-S1	12/17/97	Bottom of Test Pit TP-I	7.0	0.0	Gray SILT/CLAY
TP-I-S2	12/17/97	North wall of Test Pit TP-I	4.0	0.0	Brown, sandy GRAVEL; moist to wet
**TP-I-S3	12/17/97	North wall of Test Pit TP-I	2.0	0.6	Brown, silty SAND, trace of gravel; moist
TP-I-S4	12/17/97	South wall of Test Pit TP-I	4.0	0.0	Gray, sandy GRAVEL; moist
TP-I-S5	12/17/97	South wall of Test Pit TP-I	2.0	0.1	Brown, silty, fine SAND; wet
TP-I-S6	12/17/97	East wall of Test Pit TP-I	4.0	0.0	Gray, sandy GRAVEL; moist
**TP-I-S7	12/17/97	West wall of Test Pit TP-I	5.0	1.8	Brown, sandy GRAVEL
Test Pit TP-J					
TP-J-S1	12/17/97	Bottom of Test Pit TP-J	4.7	0.0	Gray SILT/CLAY
**TP-J-S2	12/17/97	North wall of Test Pit TP-J	3.5	0.0	Brown, sandy GRAVEL; wet
TP-J-S3	12/17/97	West wall of Test Pit TP-J	3.5	0.0	Brown, silty SAND, trace of gravel; wet
**TP-J-S4	12/17/97	South wall of Test Pit TP-J	3.5	0.0	Brown, silty, fine SAND; moist
TP-J-S5	12/17/97	East wall of Test Pit TP-J	3.5	0.0	Brown, silty, fine SAND; moist
Test Pit TP-K					
TP-K-S1	12/17/97	Bottom of Test Pit TP-K	5.0	0.0	Gray SILT/CLAY
TP-K-S2	12/17/97	North wall of Test Pit TP-K	3.0	0.4	Brown, silty, fine SAND, trace of gravel; wet
TP-K-S3	12/17/97	South wall of Test Pit TP-K	2.5	0.2	Brown, silty SAND; organics
**TP-K-S4	12/17/97	West wall of Test Pit TP-K	2.5	2.7	Brown, silty SAND
**TP-K-S5	12/17/97	East wall of Test Pit TP-K	2.5	1.7	Brown, silty SAND, trace of gravel
Test Pit TP-L					
TP-L-S1	12/17/97	Bottom of Test Pit TP-L	5.5	0.0	Gray SILT/CLAY, trace of gravel
TP-L-S2	12/17/97	South wall of Test Pit TP-L	3.5	0.0	Dark brown, silty SAND, trace of gravel
**TP-L-S3	12/17/97	North wall of Test Pit TP-L	3.0	0.0	Dark brown, silty, sandy GRAVEL
**TP-L-S4	12/17/97	East wall of Test Pit TP-L	3.0	0.5	Brown, sandy GRAVEL
TP-L-S5	12/17/97	West wall of Test Pit TP-L	2.5	0.0	Brown, silty SAND, trace of gravel
Monitoring Wells					
**MW-14	12/3/97	Monitoring Well No. 14	8.75	-	Groundwater
**MW-18	12/3/97	Monitoring well No. 18	6.66	-	Groundwater

KEY DESCRIPTION

- * SAMPLE NUMBERS ARE PRECEDED BY 'Y-5778' ON CHAIN OF CUSTODY FORMS
 ** SAMPLE ANALYZED BY THE LABORATORY
 - NOT APPLICABLE

TABLE 1 - SAMPLE LOCATIONS AND DESCRIPTIONS

Sample No.*	Date	Sample Location (See Figure 1)	Depth (ft.)	PID ppm	Sample Classification
Quality Control					
**TP-C-S6	12/4/97	Field Blank opened in field to document ambient air quality	-	-	Methanol and Ottawa Sand
**Trip Blank	12/4/97	Trip Blank accompanied sample bottles to/from laboratory	-	-	Methanol and Ottawa Sand
**TP-H-S6	12/16/97	Field Blank opened in field to document ambient air quality	-	-	Methanol and Ottawa Sand
**Trip Blank-2	12/17/97	Trip Blank accompanied sample bottles to/from laboratory	-	-	Methanol and Ottawa Sand
**Trip Blank	12/17/97	Trip Blank accompanied sample bottles to/from laboratory	-	-	Water

KEY DESCRIPTION

-
- * SAMPLE NUMBERS ARE PRECEDED BY 'Y-5778' ON CHAIN OF CUSTODY FORMS
 - ** SAMPLE ANALYZED BY THE LABORATORY
 - NOT APPLICABLE

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS

SHANNON & WILSON, INC.

Parameter Tested		Sample Number and Depth in Feet (See Table 1, Figure 1, and Appendix B)									
		Test Pit TP-A		Test Pit TP-B			Test Pit TP-C		Test Pit TP-D		
		TP-A-S2 @ 6.2	TP-A-S4 @ 6.0	TP-B-S2 @ 6.5	TP-B-S6^ @ 6.5	TP-B-S3 @ 6.5	TP-C-S2 @ 2.8	TP-C-S3 @ 2.8	TP-D-S1 @ 11'	TP-D-S5 @ 4.0'	
FID/PID Headspace Reading - ppm	Sensidyne FID/MiniRae PID	4.4	25.8	0.8	0.8	0.6	0	0	20	0	
Total Solids - percent	SM18 2540G	79.1	82.0	84.8	81.6	78.5	84.4	90.2	87.5	90.5	
Gasoline Range Organics (GRO) - ppm	AK 101	<0.853	6.89	<1.27	<1.22	2.41	<1.73	<1.00	<1.06	<1.04	
Aromatic Volatile Organics (BTEX)											
Benzene - ppm	AK 101/EPA 8020/602	0.107	3.67	<0.0318	<0.0305	0.0522	<0.0434	<0.0251	<0.0265	<0.0260	
Toluene - ppm	AK 101/EPA 8020/602	0.0266	0.0457	<0.0318	0.0345	<0.0346	<0.0434	<0.0251	<0.0265	<0.0260	
Ethylbenzene - ppm	AK 101/EPA 8020/602	<0.0213	<0.0343	<0.0318	<0.0305	<0.0346	<0.0434	<0.0251	<0.0265	<0.0260	
Xylenes - ppm	AK 101/EPA 8020/602	0.0463	<0.0343	<0.0318	<0.0305	<0.0346	<0.0434	<0.0251	<0.0265	<0.0260	
Total BTEX - ppm		0.1799	3.7157		0.0345	0.0522					
Aromatic Volatile Organics (BTEX)											
Benzene - ppm	EPA 8020	-	-	-	-	-	-	-	-	-	
Toluene - ppm	EPA 8020	-	-	-	-	-	-	-	-	-	
Ethylbenzene - ppm	EPA 8020	-	-	-	-	-	-	-	-	-	
Xylenes - ppm	EPA 8020	-	-	-	-	-	-	-	-	-	
Total BTEX - ppm											
Halogenated Volatile Organics (HVOs)											
cis-1,2-dichloroethene - ppm	EPA 8010	-	-	-	-	-	-	-	-	-	
Methylene chloride - ppm	EPA 8010	-	-	-	-	-	-	-	-	-	
All Other Analytes - ppm	EPA 8010	-	-	-	-	-	-	-	-	-	
Total Lead - ppm	EPA 7421	17.0	7.94	7.51	9.01	10.0	4.38	5.84	5.06	6.88	
Nitrate-N- ppm	EPA 300.0	-	-	-	-	-	-	-	-	-	
Sulfate - ppm	EPA 300.0	-	-	-	-	-	-	-	-	-	
Redox Potential - mV	ASA 1982:24-5	-	-	-	-	-	-	-	-	-	
Oil Degrading Bacteria - MPN/gm	SHEEN SCREEN	-	-	-	-	-	-	-	-	-	
Heterotrophic Plate Count - MPN/gm	SM179215D	-	-	-	-	-	-	-	-	-	

KEY	DESCRIPTION
-	Sample not analyzed for this parameter
*	See Appendix B for limits of detection
<0.853	Below detected limit of 0.853 ppm
^	Duplicate Sample
J	Estimated value; see laboratory reports
MPN/gm	Most probable number per gram
mV	Milivolts

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TABLE 2 - SUMMARY OF ANALYTICAL RESULTS

SHANNON & WILSON, INC.

Parameter Tested		Sample Number and Depth in Feet (See Table 1, Figure 1, and Appendix B)								
		Test Pit TP-E		Test Pit TP-F			Test Pit TP-G		Test Pit TP-H	
		TP-E-S2 @ 9.0'	TP-E-S5 @ 6.0'	TP-F-S1 @ 12.5'	TP-F-S2 @ 9.0'	TP-F-S8^ @ 9.0'	TP-G-S3 @ 8.0'	TP-G-S6 @ 7.0'	TP-H-S2 @ 4.0'	TP-H-S5 @ 4.0'
FID/PID Headspace Reading - ppm	Sensidyne FID/MiniRae PID	12	2	175	290	290	0	0	0.5	0.7
Total Solids - percent	SM18 2540G	86.2	84.8	83.9	84.5	85.3	87.1	81.9	60.1	85.6
Gasoline Range Organics (GRO) - ppm	AK 101	<0.909	<1.37	<1.35	5.38	5.68	<1.30	<1.21	<1.99	<4.53
Aromatic Volatile Organics (BTEX)										
Benzene - ppm	AK 101/EPA 8020/602	0.0194J	0.118	0.0277J	2.85	2.80	<0.0325	<0.0302	0.0405J	0.0850
Toluene - ppm	AK 101/EPA 8020/602	<0.0227	<0.0342	<0.0337	<0.0398	<0.0360	<0.0325	<0.0302	<0.0498	<0.0382
Ethylbenzene - ppm	AK 101/EPA 8020/602	<0.0227	<0.0342	<0.0337	<0.0398	<0.0360	<0.0325	<0.0302	<0.0498	<0.0382
Xylenes - ppm	AK 101/EPA 8020/602	<0.0227	<0.0342	<0.0337	<0.0398	<0.0360	<0.0325	<0.0302	<0.0498	<0.0382
Total BTEX - ppm			0.118		2.85	2.80				0.0850
Aromatic Volatile Organics (BTEX)										
Benzene - ppm	EPA 8020	-	-	-	0.624	-	-	-	-	<0.0571
Toluene - ppm	EPA 8020	-	-	-	<0.0575	-	-	-	-	<0.0571
Ethylbenzene - ppm	EPA 8020	-	-	-	<0.0575	-	-	-	-	<0.0571
Xylenes - ppm	EPA 8020	-	-	-	<0.0575	-	-	-	-	<0.0571
Total BTEX - ppm					0.624					
Halogenated Volatile Organics (HVOs)										
cis-1,2-dichloroethene - ppm	EPA 8010	-	-	-	<0.0575	-	-	-	0.454	<0.0571
Methylene chloride - ppm	EPA 8010	-	-	-	<0.575	-	-	-	<0.739	<0.571
All Other Analytes - ppm	EPA 8010	-	-	-	<0.0575	-	-	-	<0.0739	<0.0571
Total Lead - ppm	EPA 7421	15.7	8.01	5.99	5.90	5.67	6.47	9.80	4.32	4.38
Nitrate-N- ppm	EPA 300.0	-	-	-	-	-	-	-	-	-
Sulfate - ppm	EPA 300.0	-	-	-	-	-	-	-	-	-
Redox Potential - mV	ASA 1982:24-5	-	-	-	-	-	-	-	-	-
Oil Degrading Bacteria - MPN/gm	SHEEN SCREEN	-	-	-	-	-	-	-	-	-
Heterotrophic Plate Count - MPN/gm	SM179215D	-	-	-	-	-	-	-	-	-

KEY	DESCRIPTION
-	Sample not analyzed for this parameter
*	See Appendix B for limits of detection
<0.853	Below detected limit of 0.853 ppm
^	Duplicate Sample
J	Estimated value; see laboratory reports
MPN/gm	Most probable number per gram
mV	Milivolts

0031

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS

SHANNON & WILSON, INC.

Parameter Tested	Method*	Sample Number and Depth in Feet (See Table 1, Figure 1, and Appendix B)							
		Test Pit TP-I		Test Pit TP-J		Test Pit TP-K		Test Pit TP-L	
		TP-I-S3 @ 2.0'	TP-I-S7 @ 5.0'	TP-J-S2 @ 3.5'	TP-J-S4 @ 3.5'	TP-K-S4 @ 2.5'	TP-K-S5 @ 2.5'	TP-L-S3 @ 3.0'	TP-L-S4 @ 3.0'
FID/PID Headspace Reading - ppm	Sensidyne FID/MiniRae PID	0.6	1.8	0	0	2.7	1.7	0	0.5
Total Solids - percent	SM18 2540G	79.4	80.0	79.9	83.6	81.3	88.9	82.8	94.4
Gasoline Range Organics (GRO) - ppm	AK 101	<1.17	<0.818	<1.10	<0.851	<1.37	<1.19	<1.81	<1.13
Aromatic Volatile Organics (BTEX)									
Benzene - ppm	AK 101/EPA 8020/602	<0.0292	0.0169J	<0.0274	<0.0213	<0.0342	<0.0297	<0.0452	<0.0283
Toluene - ppm	AK 101/EPA 8020/602	<0.0292	<0.0205	<0.0274	<0.0213	<0.0342	<0.0297	<0.0452	<0.0283
Ethylbenzene - ppm	AK 101/EPA 8020/602	<0.0292	<0.0205	<0.0274	<0.0213	<0.0342	<0.0297	<0.0452	<0.0283
Xylenes - ppm	AK 101/EPA 8020/602	<0.0292	<0.0205	<0.0274	<0.0213	<0.0342	<0.0297	<0.0452	<0.0283
Total BTEX - ppm									
Aromatic Volatile Organics (BTEX)									
Benzene - ppm	EPA 8020	-	-	<0.0624	-	-	-	-	-
Toluene - ppm	EPA 8020	-	-	<0.0624	-	-	-	-	-
Ethylbenzene - ppm	EPA 8020	-	-	<0.0624	-	-	-	-	-
Xylenes - ppm	EPA 8020	-	-	<0.0624	-	-	-	-	-
Total BTEX - ppm									
Halogenated Volatile Organics (HVOs)									
cis-1,2-dichloroethene - ppm	EPA 8010	-	-	<0.0624	-	<0.0568	-	-	-
Methylene chloride - ppm	EPA 8010	-	-	<0.624	-	<0.568	-	-	-
All Other Analytes - ppm	EPA 8010	-	-	<0.0624	-	<0.0568	-	-	-
Total Lead - ppm	EPA 7421	-	-	-	-	-	-	-	-
Nitrate-N- ppm	EPA 300.0	-	-	-	-	-	-	-	-
Sulfate - ppm	EPA 300.0	-	-	-	-	-	-	-	-
Redox Potential - mV	ASA 1982:24-5	-	-	-	-	-	-	-	-
Oil Degrading Bacteria - MPN/gm	SHEEN SCREEN	-	-	-	-	-	-	-	-
Heterotrophic Plate Count - MPN/gm	SM179215D	-	-	-	-	-	-	-	-

KEY	DESCRIPTION
-	Sample not analyzed for this parameter
*	See Appendix B for limits of detection
<0.853	Below detected limit of 0.853 ppm
^	Duplicate Sample
J	Estimated value; see laboratory reports
MPN/gm	Most probable number per gram
mV	Milivolts

0032

TABLE 2 - SUMMARY OF ANALYTICAL RESULTS

SHANNON & WILSON, INC.

Parameter Tested	Method*	Sample Number and Depth in Feet (See Table 1, Figure 1, and Appendix B)						
		Monitoring Wells		Quality Control				
		MW-14 @ 8.75'	MW-18 @ 6.66'	TP-C-S6 Field Blank	Trip Blank 12/4/97	TP-H-S6 Field Blank	Trip Blk.-2 12/16-17/97	Trip Blank 12/16-17/97
FID/PID Headspace Reading - ppm	Sensidyne FID/MiniRae PID	-	-	-	-	-	-	-
Total Solids - percent	SM18 2540G	-	-	100	100	100	100	-
Gasoline Range Organics (GRO) - ppm	AK 101	<0.0400	3.5	3.20	<2.00	<2.00	<2.00	<0.0400
Aromatic Volatile Organics (BTEX)								
Benzene - ppm	AK 101/EPA 8020/602	<0.0010	1.90	<0.0500	<0.0500	<0.0500	<0.0500	<0.0010
Toluene - ppm	AK 101/EPA 8020/602	<0.0010	0.00118	<0.0500	<0.0500	<0.0500	<0.0500	<0.0010
Ethylbenzene - ppm	AK 101/EPA 8020/602	<0.0010	<0.0010	<0.0500	<0.0500	<0.0500	<0.0500	<0.0010
Xylenes - ppm	AK 101/EPA 8020/602	<0.0010	<0.0010	<0.0500	<0.0500	<0.0500	<0.0500	<0.0010
Total BTEX - ppm			1.90118					
Aromatic Volatile Organics (BTEX)								
Benzene - ppm	EPA 8020	-	-	-	-	-	-	-
Toluene - ppm	EPA 8020	-	-	-	-	-	-	-
Ethylbenzene - ppm	EPA 8020	-	-	-	-	-	-	-
Xylenes - ppm	EPA 8020	-	-	-	-	-	-	-
Total BTEX - ppm								
Halogenated Volatile Organics (HVOs)								
cis-1,2-dichloroethene - ppm	EPA 8010	-	-	-	-	-	-	-
Methylene chloride - ppm	EPA 8010	-	-	-	-	-	-	-
All Other Analytes - ppm	EPA 8010	-	-	-	-	-	-	-
Total Lead - ppm	EPA 7421	<0.00568	<0.00750	-	-	-	-	-
Nitrate-N- ppm	EPA 300.0	<1.00	<0.100	-	-	-	-	-
Sulfate - ppm	EPA 300.0	201	14.9	-	-	-	-	-
Redox Potential - mV	ASA 1982:24-5	450	493	-	-	-	-	-
Oil Degrading Bacteria - MPN/gm	SHEEN SCREEN	40	80	-	-	-	-	-
Heterotrophic Plate Count - MPN/gm	SM179215D	9,200	16,000	-	-	-	-	-

KEY	DESCRIPTION
-	Sample not analyzed for this parameter
*	See Appendix B for limits of detection
<0.853	Below detected limit of 0.853 ppm
^	Duplicate Sample
J	Estimated value; see laboratory reports
MPN/gm	Most probable number per gram
mV	Milivolts

0033

TABLE 3 - GROUNDWATER SAMPLING LOG

SHANNON & WILSON, INC.

WATER LEVEL MEASUREMENT DATA

MONITORING WELL NUMBER	MW-14	MW-15	MW-16	MW-17	MW-18
DATE WATER LEVEL MEASURED	12/3/97	12/3/97	12/3/97	12/3/97	12/3/97
TIME WATER LEVEL MEASURED	13:25	13:30	13:20	13:05	13:10
MW ELEVATION AT TOC, FT	53.79	50.75	55.07	61.99	62.51
DEPTH TO WATER BELOW TOC, FT*	6.66	6.37	13.51	8.82	8.75
WATER LEVEL ELEVATION (MLLW) , FT	47.13	44.38	41.56	53.17	53.76

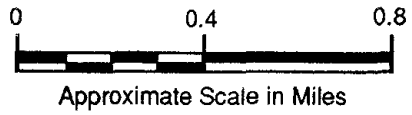
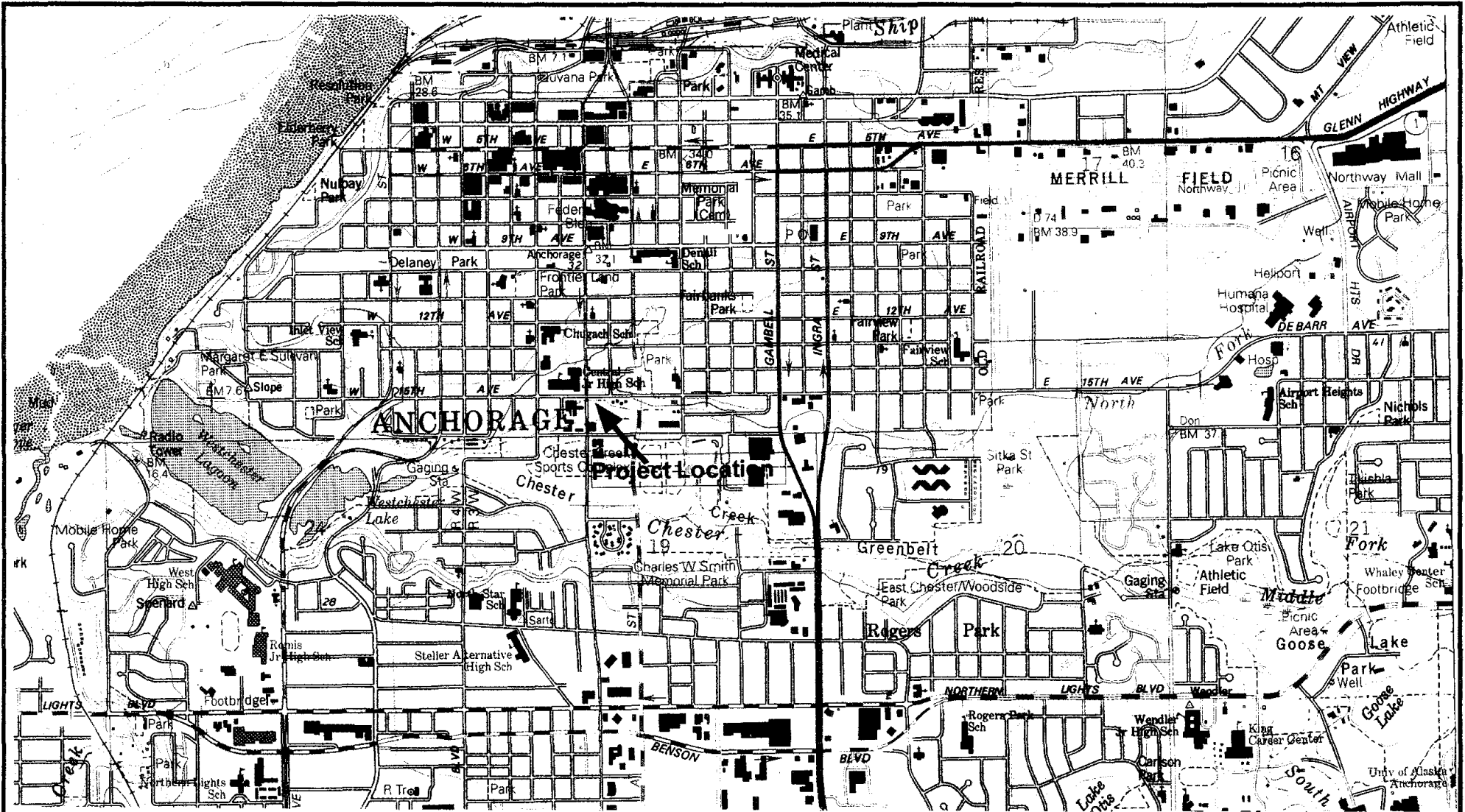
SAMPLING/PURGING DATA

MONITORING WELL NUMBER	MW-14	MW-15	MW-16	MW-17	MW-18
DATE SAMPLED	12/3/97	12/3/97	12/3/97	12/3/97	12/3/97
DEPTH TO WATER BELOW TOC, FT	6.66	6.37	13.51	8.82	8.75
TOTAL DEPTH OF WELL BELOW TOC, FT	16.00	16.50	14.50	12.37	11.20
WATER COLUMN IN WELL, FT	9.34	10.13	0.99	3.55	2.45
DIAMETER OF WELL CASING	2-inch	2-inch	1.6-inch	2-inch	2-inch
GALLONS PER FOOT	0.16	0.16	0.10	0.16	0.16
GALLONS IN WELL	1.49	1.62	0.10	0.57	0.39
TOTAL GALLONS PURGED	4.8	NS	NS	NS	1.0
TEMPERATURE**, °C	5.4	10.6	7.9	6.6	5.5
SPECIFIC CONDUCTANCE, µS/cm	1.51	0.96	1.13	1.16	0.99
pH	6.60	6.44	6.65	6.64	6.45
TURBIDITY, NTU	183	44	77	17	259
DISSOLVED OXYGEN**, ppm	0.42	0.26	1.19	0.29	0.46

Purging & Sampling Method: Disposable Bailer
 Sampling Personnel: Haydar Turker

KEY


MW-14	Monitoring Well 14
TOC	Top of well Casing
FT	Feet
ppm	parts per million
NTU	Nephelometric Turbidity Units
µS/cm	micro Siemens per centimeter
*	TOC elevation relative to Municipality of Anchorage Benchmark CB4B (Based on Geo Engineers report)
**	Measured using down-hole probe



Elevation in Meters
 Contour Interval 5 meters
 Taken From
 Anchorage A-8 NW Quadrangle
 U.S. Geological Survey

0035



West 15th Avenue & C Street Anchorage, Alaska	
Vicinity Map	
March 1998	Y-5778-3
 SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	
Fig. 1	

0036

B Street

Approximate location of reported cess-pool

UNOCAL SITE

Approximate location of former gasoline USTs

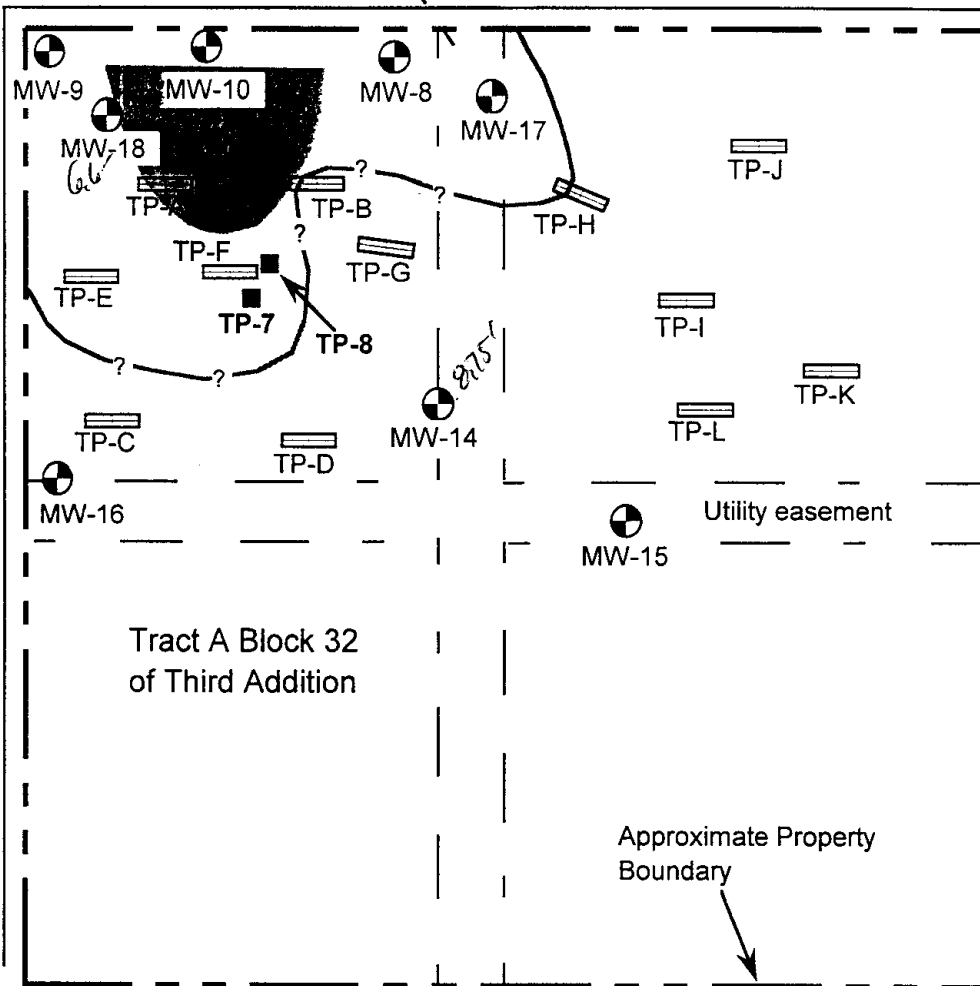
Approximate location of reported former waste oil tank

Approximate location of reported sewer line

MW-6A

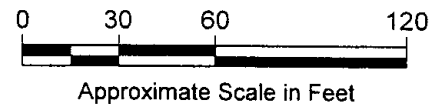
West 15th Avenue

C Street



LEGEND

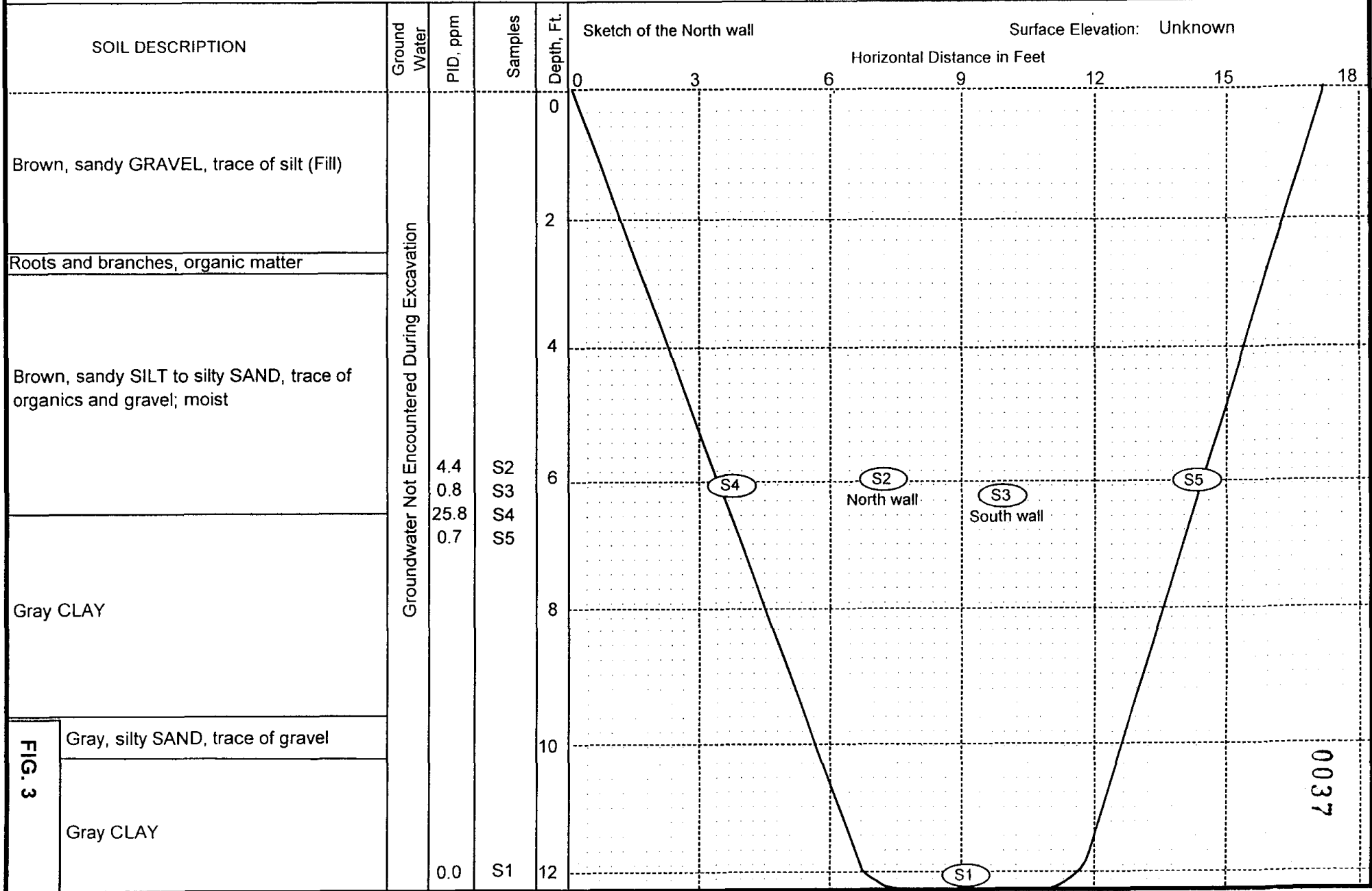
- Approximate Location of Monitoring Well No. 9
MW-9 Installed by Others
- Approximate Location of Test Pit TP-A Excavated
TP-A by Shannon & Wilson, December 1997
- Approximate Location of Test Pit TP-7 Excavated
TP-7 by Others
- Estimated horizontal extent of soil contaminant
plume with benzene levels exceeding 0.1 ppm
- Approximate area of impacted soil exceeding 0.5
ppm benzene, 1 ppm total BTEX, and 40 ppm TPH
as estimated in RZA's April 26, 1990 letter report



West 15th Avenue and C Street Anchorage, Alaska	
SITE PLAN	
March 1998	Y-5778-3
SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	
Fig. 2	

LOG OF TEST PIT TP-A

PROJECT: C Street & 15th Avenue



LOG OF TEST PIT TP-B

SOIL DESCRIPTION	Ground Water	PID, ppm	Samples	Depth, Ft.	Sketch of the North wall Surface Elevation: Unknown Horizontal Distance in Feet
Brown, sandy GRAVEL	Groundwater Not Encountered During Excavation			0	
Roots and branches, organic matter				2	
Brown, sandy, silty GRAVEL, changing sand and gravel content, trace of organics; moist		0.8 0.6 0.2 0.0 0.0 0.8	S2 S3 S4 S5 S6	6	
Gray CLAY		0.0	S1	10	
FIG. 4				12	0038

LOG OF TEST PIT TP-C

PROJECT: C Street & 15th Avenue

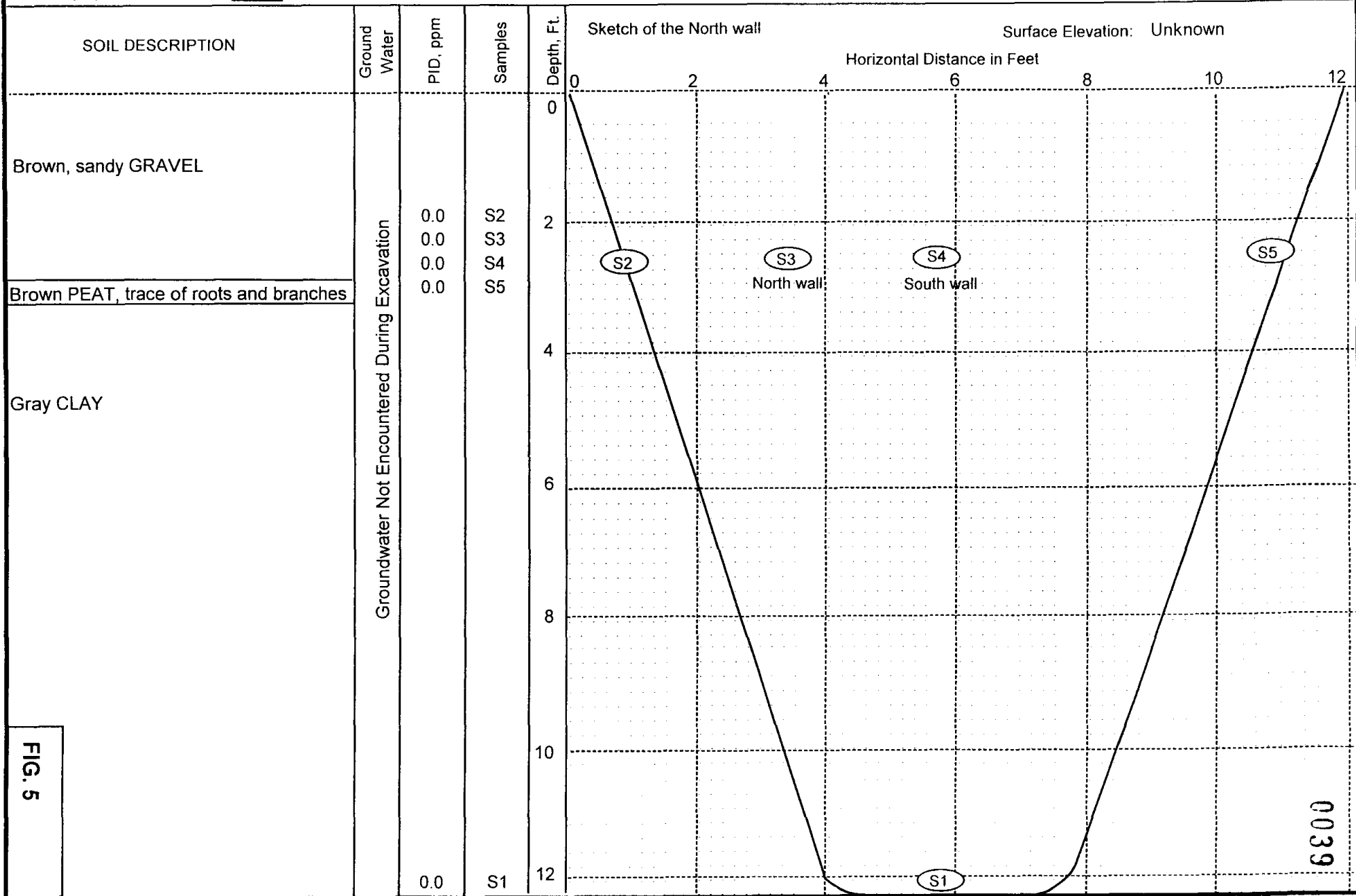


FIG. 5

0039

LOG OF TEST PIT TP-D

PROJECT: C Street & 15th Avenue

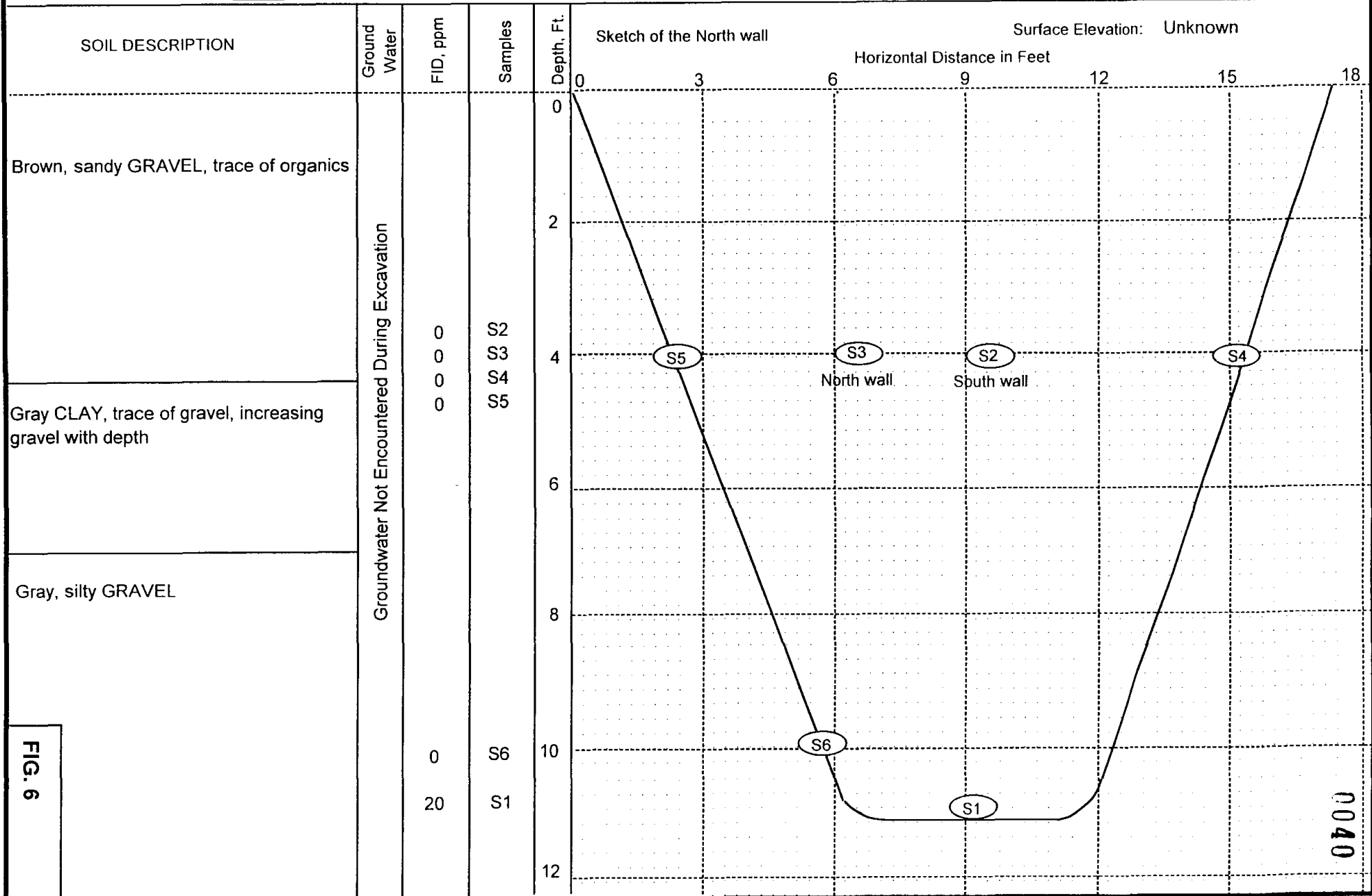


FIG. 6

0040

LOG OF TEST PIT TP-E

PROJECT: C Street & 15th Avenue

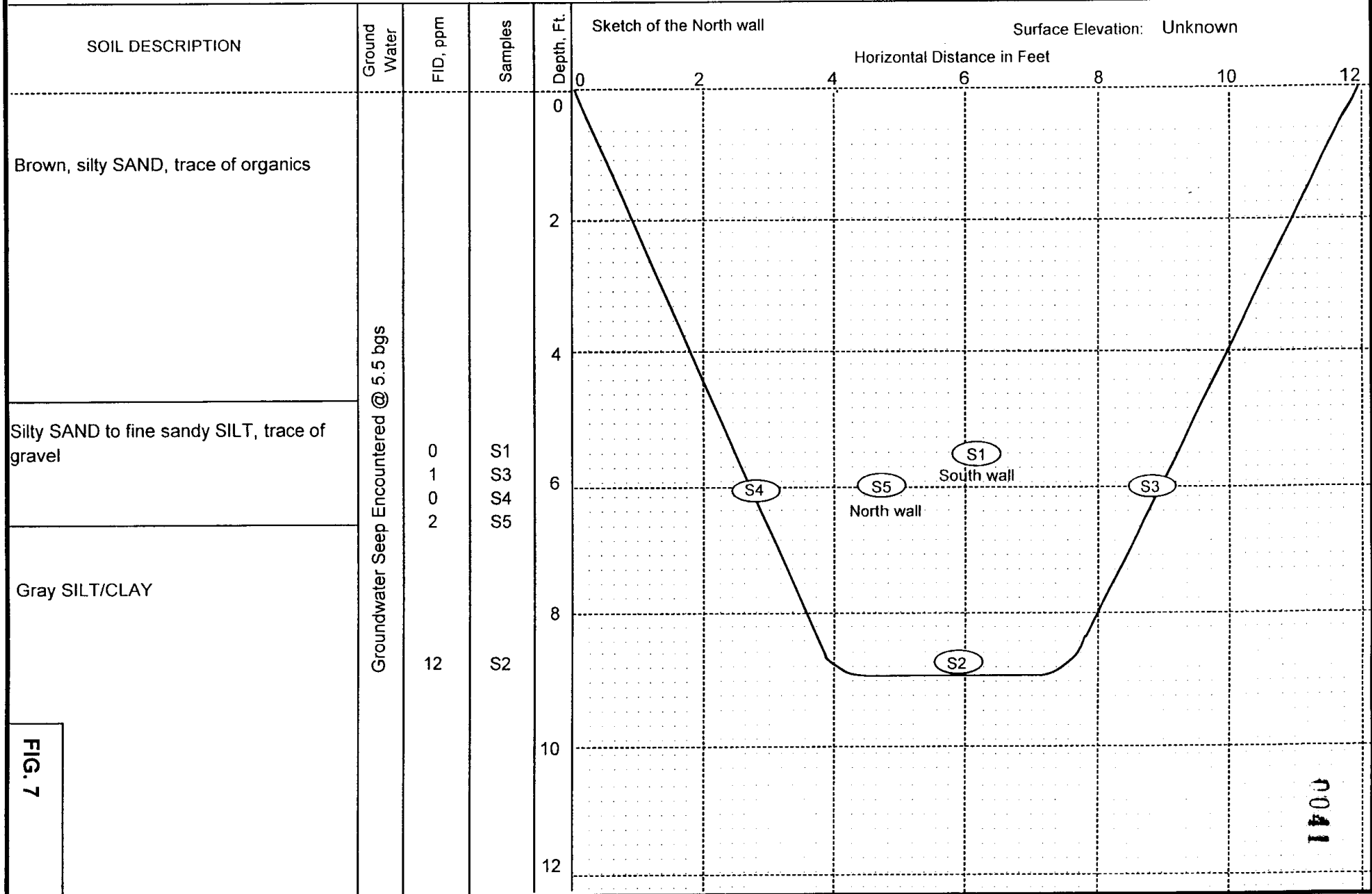


FIG. 7

0041

LOG OF TEST PIT TP-F

PROJECT: C Street & 15th Avenue

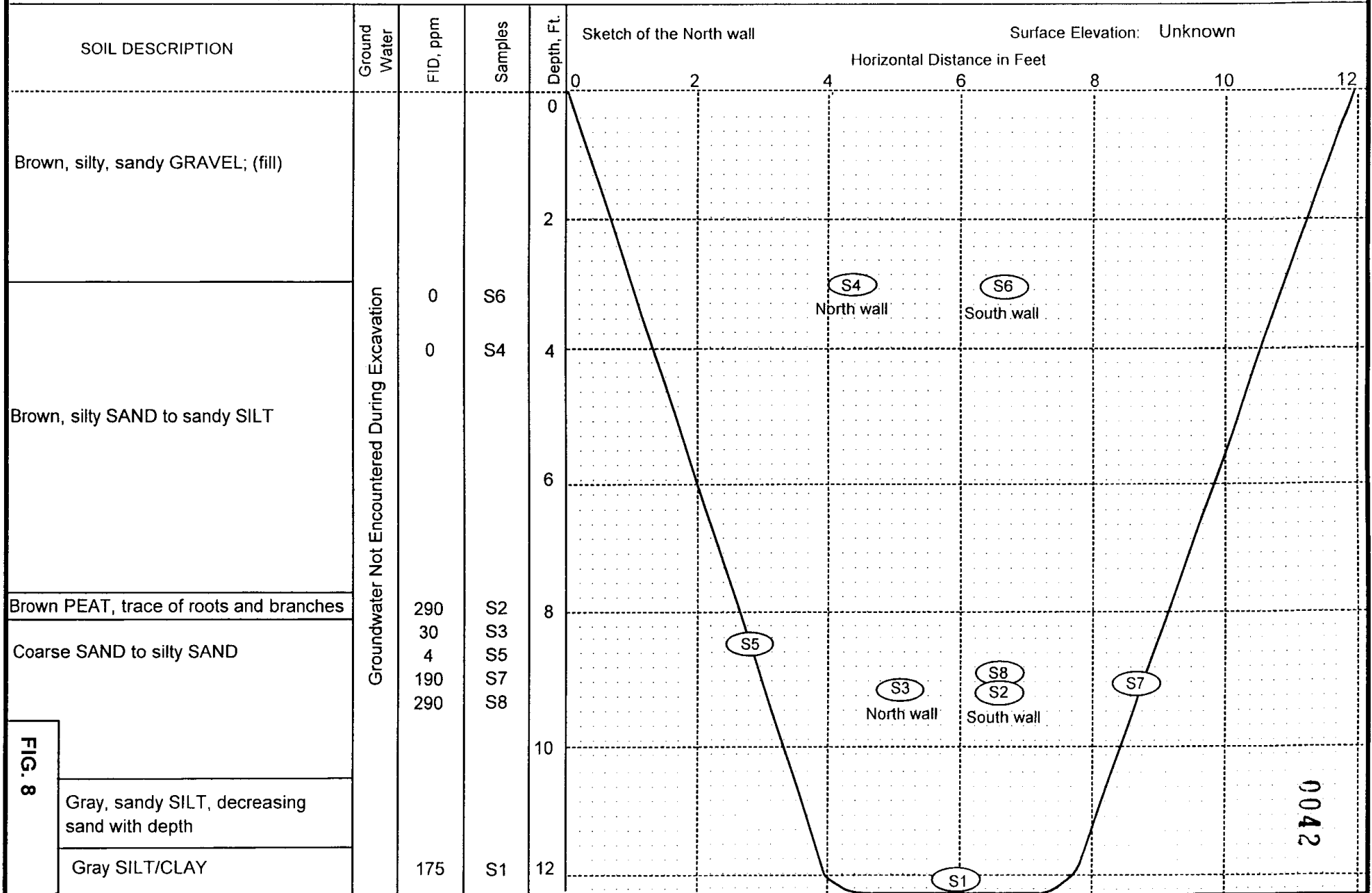


FIG. 8

0042

LOG OF TEST PIT TP-G

PROJECT: C Street & 15th Avenue

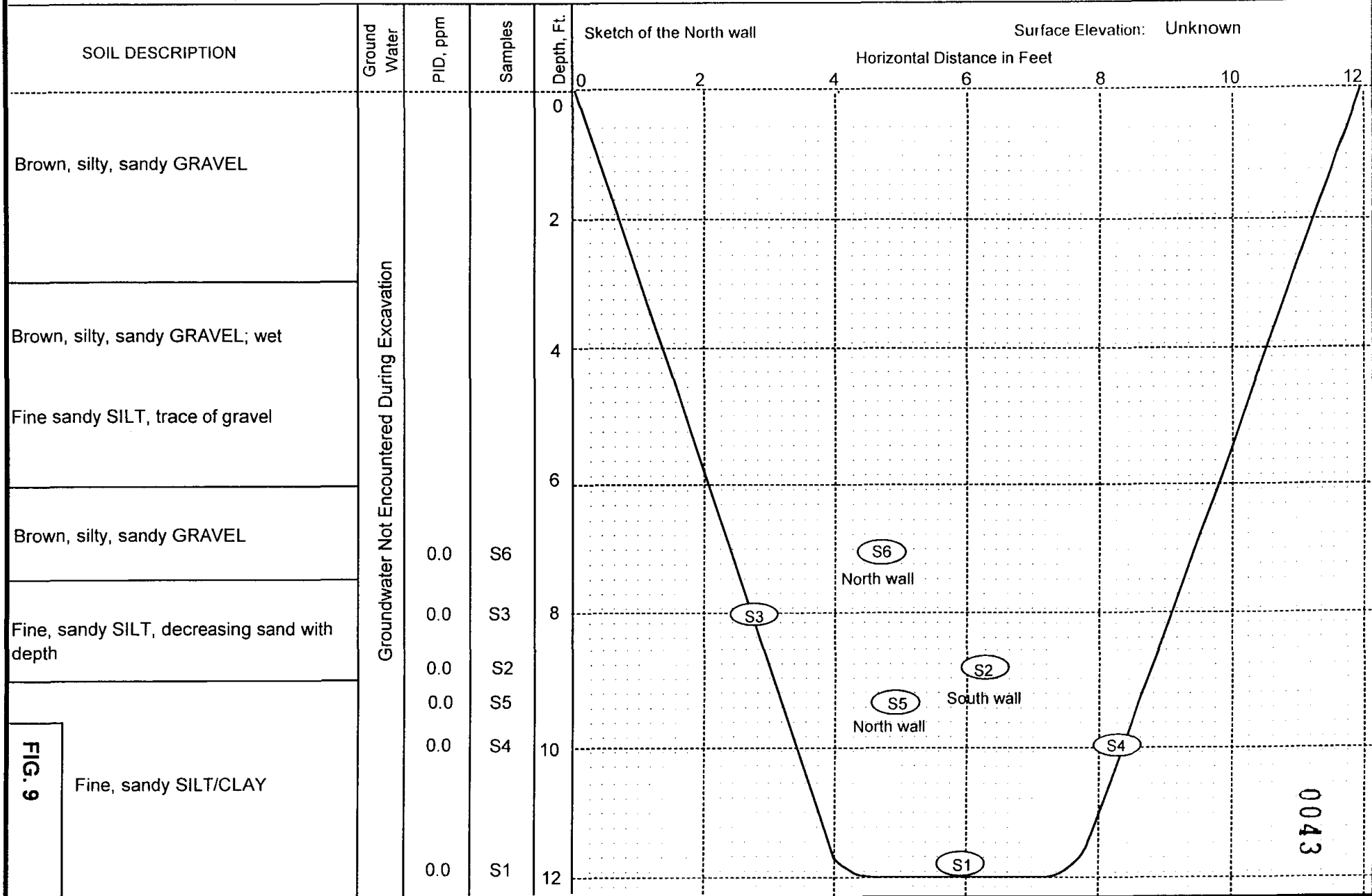


FIG. 9

0043

LOG OF TEST PIT TP-H

PROJECT: C Street & 15th Avenue

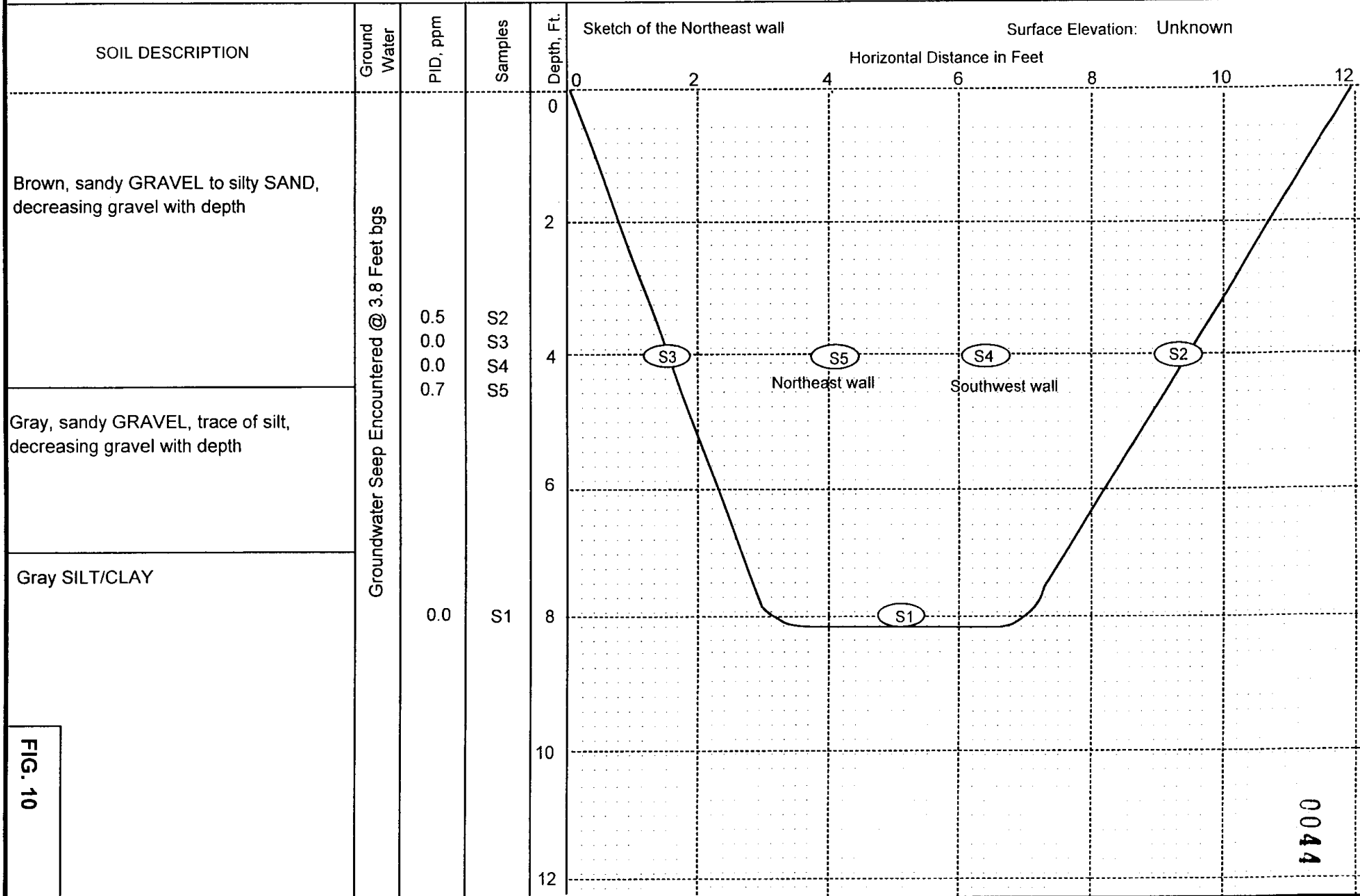


FIG. 10

0044

LOG OF TEST PIT TP-1

PROJECT: C Street & 15th Avenue

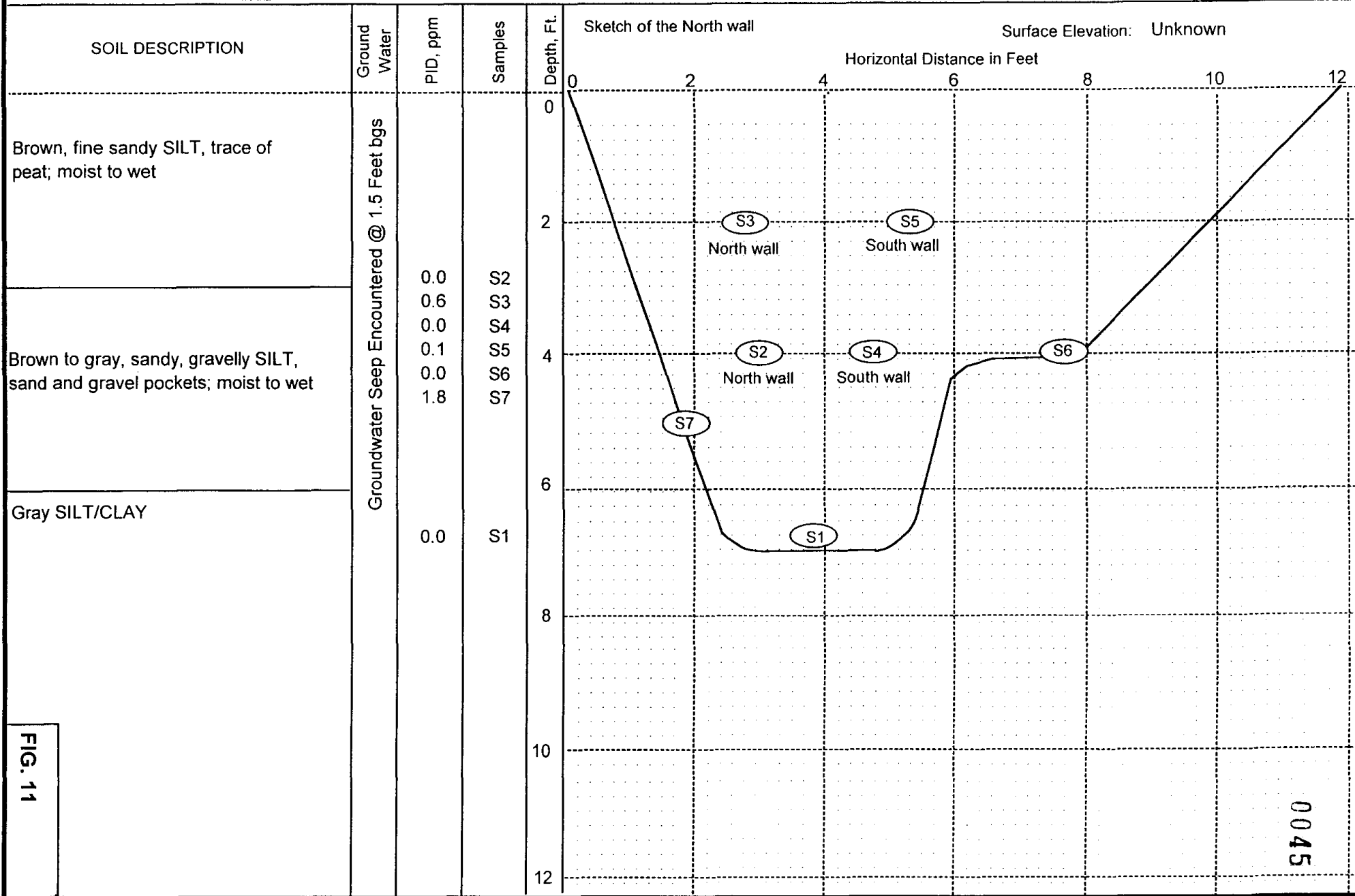


FIG. 11

0045

LOG OF TEST PIT TP-J

PROJECT: C Street & 15th Avenue

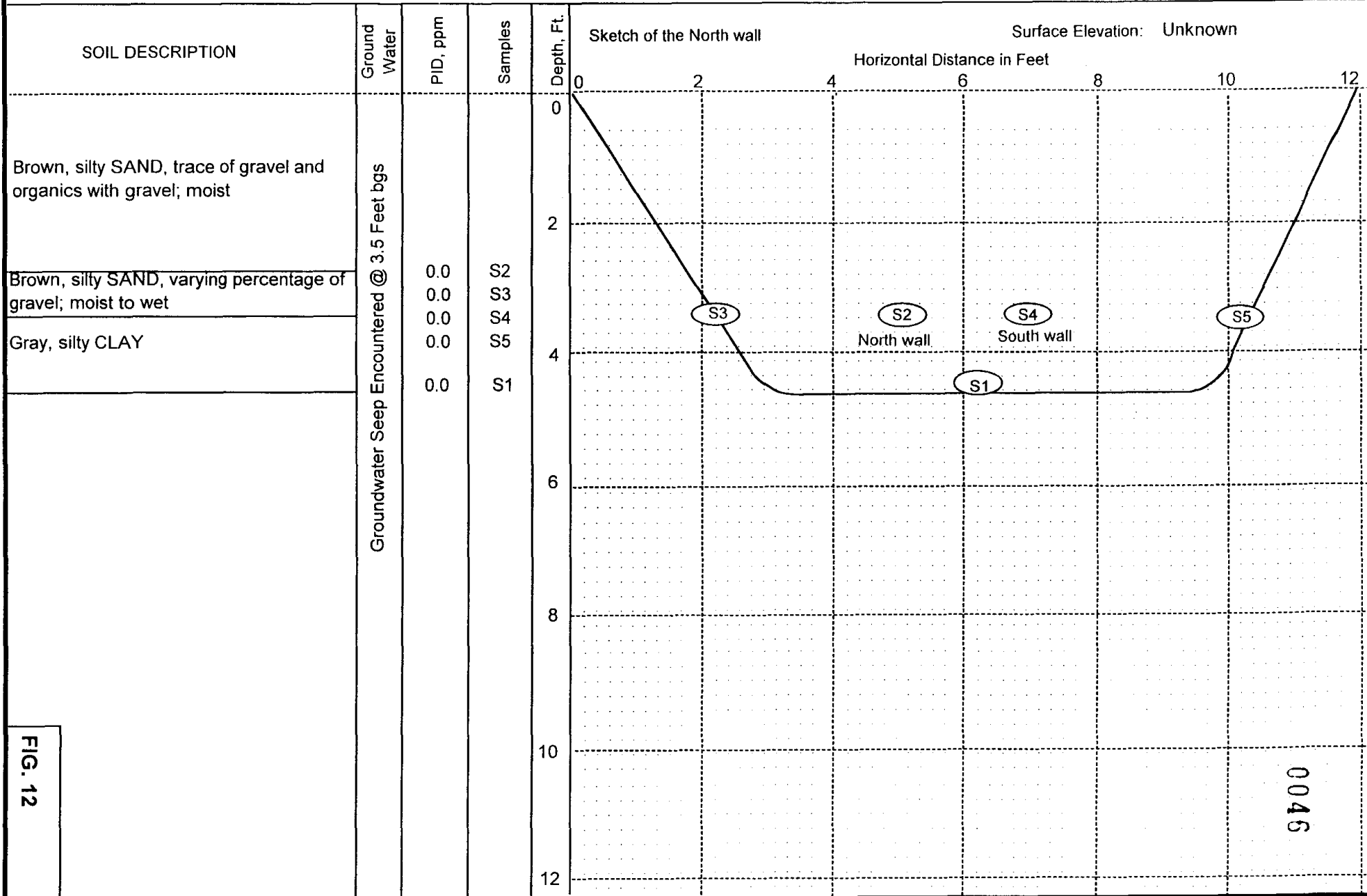


FIG. 12

0046

LOG OF TEST PIT TP-K

PROJECT: C Street & 15th Avenue

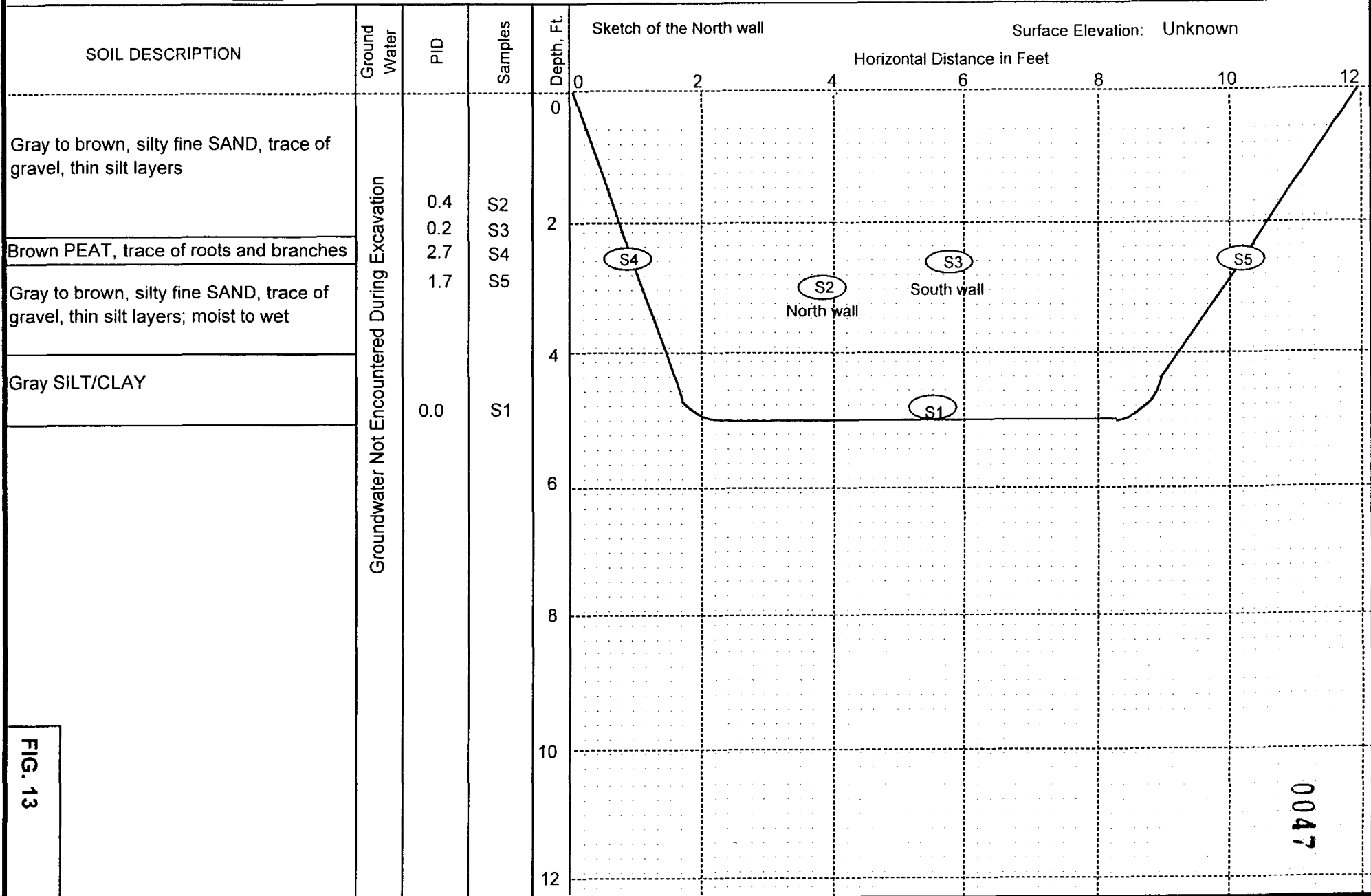


FIG. 13

0047

LOG OF TEST PIT TP-L

PROJECT: C Street & 15th Avenue

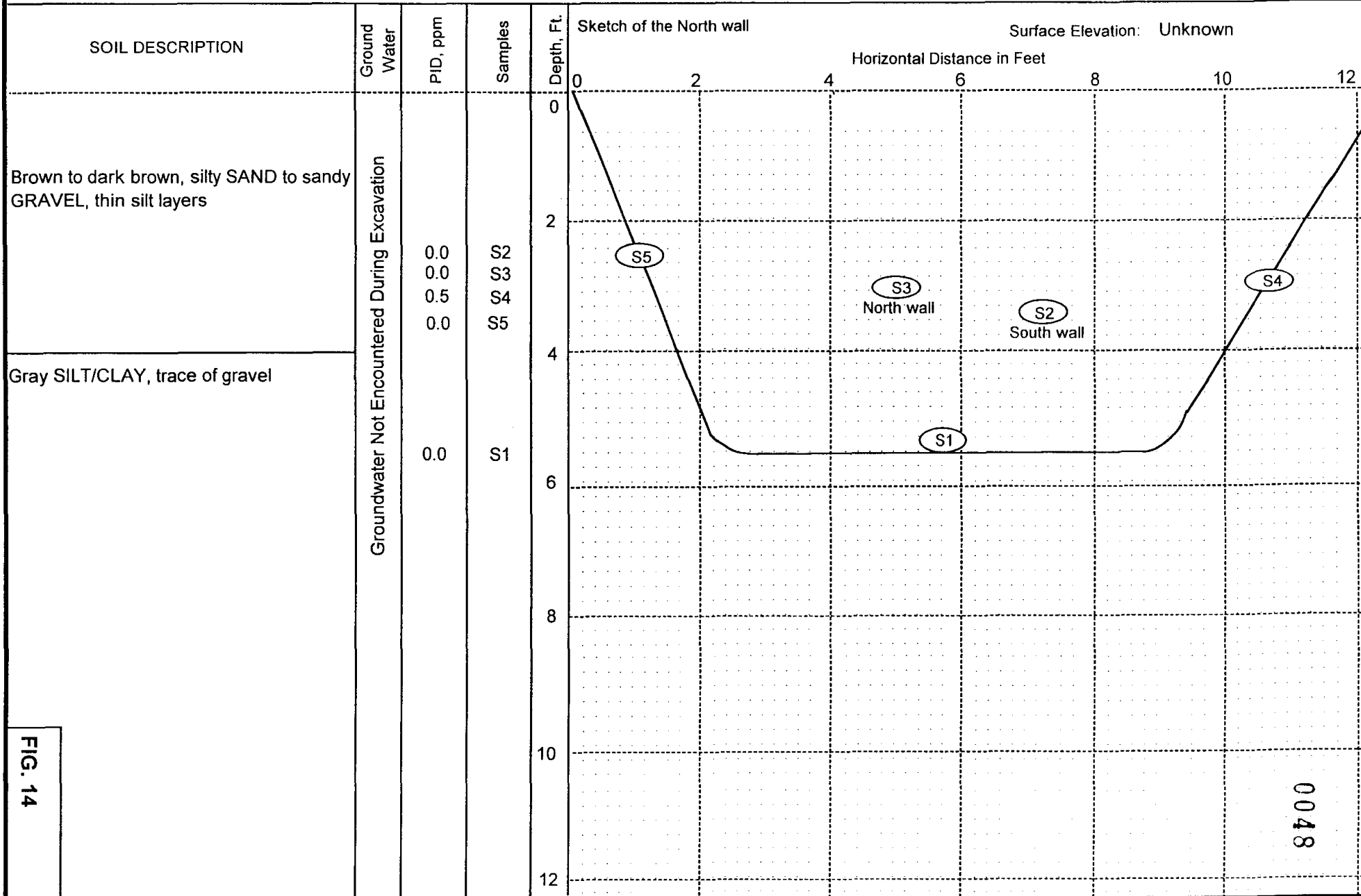


FIG. 14

0048

APPENDIX A
PHOTOGRAPHS

0050



Photo 1: Test Pit TP-A during excavation; note Monitoring Well MW-18 to the left; looking northwest. (December 1997)



Photo 2: Test Pit TP-C during excavation; note Monitoring Well MW-16 to the left; looking north. (December 1997)

West 15th Avenue & C Street
Anchorage, Alaska

PHOTOGRAPHS 1 AND 2

March 1998

Y-5778-3



SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig.
A-1



Photo 3: Test Pits TP-H and TP-J with respect to Monitoring Well MW-17 location; Test Pit TP-H location in the center of the Photo; Test Pit TP-J during excavation in background; looking east-northeast. (December 1997)

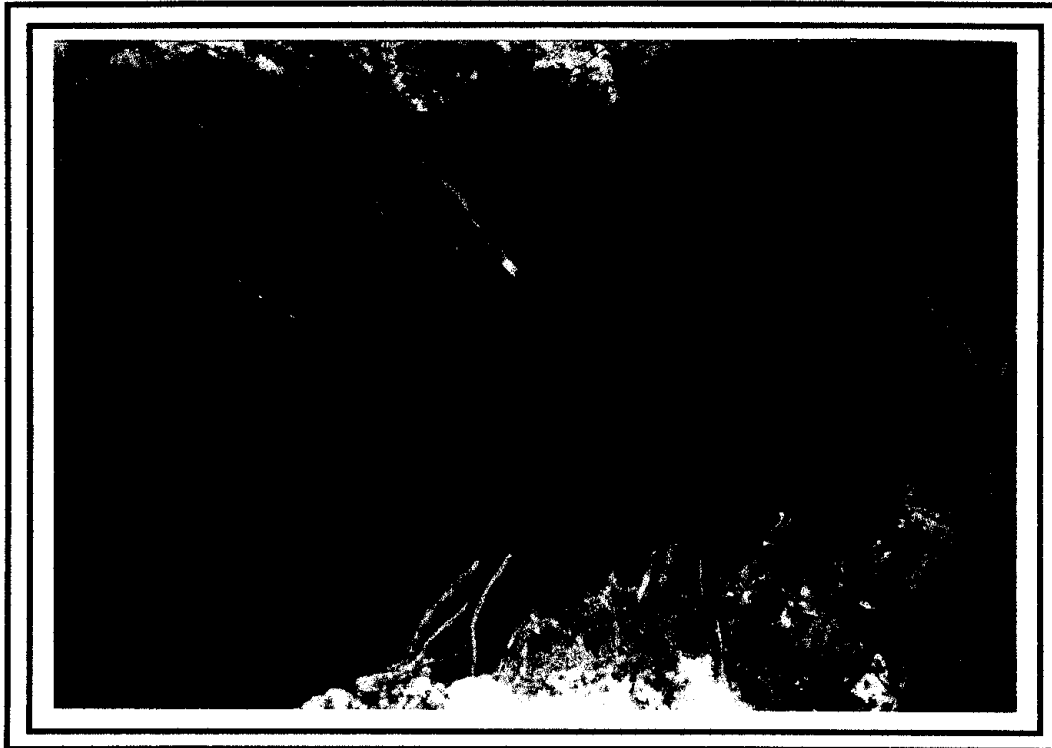


Photo 4: The silty layer and the gray silt/clay contact; note the surficial materials and absence of fill material on top. (December 1997)

West 15th Avenue & C Street
Anchorage, Alaska

PHOTOGRAPHS 3 AND 4

March 1998

Y-5778-3



SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig.
A-2

APPENDIX B

RESULTS OF ANALYTICAL TESTING PERFORMED BY

CT&E ENVIRONMENTAL SERVICES INC. OF ANCHORAGE, ALASKA



Laboratory Analysis Report

December 17, 1997

Haydar Turker
Shannon & Wilson Inc.
5430 Fairbanks St Ste 3
Anchorage, AK 99518

Client Name	Shannon & Wilson Inc.
Project ID	Y-5778-3 C St & W 15th [977373]
Printed	December 17, 1997

Enclosed are the analytical results associated with the above project.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by CT&E. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your CT&E Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

- U - Indicates the compound was analyzed for but not detected.
- J - Indicates an estimated value that falls below PQL, but is greater than the MDL.
- B - Indicates the analyte is found in the blank associated with the sample.
- * - The analyte has exceeded allowable limits.
- GT - Greater Than
- D - Secondary Dilution
- LT - Less Than
- ! - Surrogate out of range



CT&E Ref.# 977373005
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-16-S2
 Matrix Soil A
 Ordered By H.C.
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 11:40
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Sharon Foster*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	79.1		%	SM18 2540G			12/10/97	MCM
Lead	17.0	2.63	mg/Kg	SW846-7421		12/15/97	12/16/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	0.853 U	0.853	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.107	0.0213	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0266	0.0213	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0463	0.0213	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	66		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	89.1		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977373006
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-16-S4
 Matrix Soil A.H.C.
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 11:50
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Stephen Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	82.0		%	SM18 2540G			12/10/97	MCM
Lead	7.94	2.24	mg/Kg	SW846-7421		12/15/97	12/16/97	KGf
GRO/8020 Combo								
Gasoline Range Organics	6.89	1.37	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	3.67	0.0343	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0457	0.0343	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0343 U	0.0343	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0343 U	0.0343	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0343 U	0.0343	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	74.7		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	105		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977373007
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-17-S2
 Matrix Soil ^B K.C.
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 12:45
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Sharon Peden*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable	Prep	Analysis		
					Limits	Date	Date	Init	
Total Solids	84.8		%	SM18 2540G			12/10/97	MCM	
Lead	7.51	1.80	mg/Kg	SW846-7421		12/15/97	12/16/97	kgf	
GRO/8020 Combo									
Gasoline Range Organics	1.27 U	1.27	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM	
Benzene	0.0318 U	0.0318	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM	
Toluene	0.0318 U	0.0318	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM	
Ethylbenzene	0.0318 U	0.0318	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM	
P & M -Xylene	0.0318 U	0.0318	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM	
o-Xylene	0.0318 U	0.0318	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM	
Surrogates									
4-Bromofluorobenzene <Surr>	66.2		%	AK101/8020	(50-150)	12/04/97	12/10/97		
1,4-Difluorobenzene <Surr>	91.5		%	AK101/8020	(50-150)	12/04/97	12/10/97		



CT&E Ref.# 977373009
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-17-S6
 Matrix Soil *S.H.C.*
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 12:48
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Shawn Peterson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	81.6		%	SM18 2540G			12/10/97	MCM
Lead	9.01	1.75	mg/Kg	SW846-7421		12/15/97	12/16/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.22 U	1.22	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.0305 U	0.0305	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0345	0.0305	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0305 U	0.0305	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0305 U	0.0305	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0305 U	0.0305	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	64.2		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	90.5		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977373001
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St & W 15th
Client Sample ID Y-5778-TP-43-S2
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 12/17/97 11:36
Collected Date/Time 12/04/97 13:48
Received Date/Time 12/05/97 09:48
Technical Director: Stephen C. Ede

Released By [Signature]

Sample Remarks:

Table with 10 columns: Parameter, Results, PQL, Units, Method, Allowable Limits, Prep Date, Analysis Date, Init. Rows include Total Solids, Lead, GRO/8020 Combo (Gasoline Range Organics, Benzene, Toluene, Ethylbenzene, P & M -Xylene, o-Xylene), and Surrogates (4-Bromofluorobenzene, 1,4-Difluorobenzene).



CT&E Ref.# 977373002
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-13-S3
 Matrix Soil
 Ordered By *C*
 PWSID *H.C*

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 13:53
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Sharon Foster*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	90.2		%	SM18 2540G			12/10/97	MCM
Lead	5.84	2.58	mg/Kg	SW846-7421		12/15/97	12/16/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.00 U	1.00	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.0251 U	0.0251	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0251 U	0.0251	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0251 U	0.0251	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0251 U	0.0251	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0251 U	0.0251	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	79.3		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	88.3		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977373010
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-13-S6
 Matrix Soil C
 Ordered By *cl. r.*
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 14:00
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Shawn Patten*

Sample Remarks:
 GRO/BTEX - Unknown Hydrocarbon contributing to GRO recovery (not a gasoline pattern).

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	100		%	SM18 2540G			12/10/97	WAA
GRO/8020 Combo								
Gasoline Range Organics	3.20	2.00	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	91		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	93.7		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977373003
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-14-S1
 Matrix Soil D H.C.
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 15:30
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Sharon Peterson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	87.5		%	SM18 2540G			12/10/97	MCM
Lead	5.06	2.53	mg/Kg	SW846-7421		12/15/97	12/16/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.06 U	1.06	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.0265 U	0.0265	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0265 U	0.0265	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0265 U	0.0265	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0265 U	0.0265	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0265 U	0.0265	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	69.6		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	101		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977373004
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-TP-14-S5
 Matrix Soil ^D H.C.
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:36
 Collected Date/Time 12/04/97 15:40
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Sharon Proton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	90.5		%	SM18 2540G			12/10/97	MCM
Lead	6.88	2.59	mg/Kg	SW846-7421		12/15/97	12/16/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.04 U	1.04	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.0260 U	0.0260	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0260 U	0.0260	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0260 U	0.0260	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0260 U	0.0260	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0260 U	0.0260	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	71.6		%	AK101/8020	(50-150)	12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	89.4		%	AK101/8020	(50-150)	12/04/97	12/10/97	



CT&E Ref.# 977584001
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-E-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/16/97 11:38
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	86.2		%	SM18 2540G			12/19/97	WDW
Lead	15.7	10.2	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	0.909 U	0.909	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.0194 J	0.0227	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0227 U	0.0227	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0227 U	0.0227	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0227 U	0.0227	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0227 U	0.0227	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	66		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	87.1		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584002
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-E-S5
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/16/97 11:45
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
^								
Total Solids	84.8		%	SM18 2540G			12/19/97	WDW
Lead	8.01	1.80	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.37 U	1.37	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.118	0.0342	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	69		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	87.6		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584003
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St. and 15th Ave.
Client Sample ID Y-5778-TP-F-S1
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 01/08/98 09:01
Collected Date/Time 12/16/97 13:18
Received Date/Time 12/17/97 16:35
Technical Director: Stephen C. Ede

Released By [Signature]

Sample Remarks:

Table with columns: Parameter, Results, PQL, Units, Method, Allowable Limits, Prep Date, Analysis Date, Init. Rows include Total Solids, Lead, GRO/8020 Combo, Gasoline Range Organics, Benzene, Toluene, Ethylbenzene, P & M -Xylene, o-Xylene, Surrogates, 4-Bromofluorobenzene, 1,4-Difluorobenzene.



CT&E Ref.# 977584004
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St. and 15th Ave.
Client Sample ID Y-5778-TP-F-S2
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 01/08/98 12:45
Collected Date/Time 12/16/97 13:22
Received Date/Time 12/17/97 16:35
Technical Director: Stephen C. Ede

Released By [Signature]

Sample Remarks:

Table with 10 columns: Parameter, Results, PQL, Units, Method, Allowable Limits, Prep Date, Analysis Date, and Init. Rows include Total Solids, Lead, and a list of 20 chemical compounds with their respective results and analysis dates.



CT&E Ref.# 977584004
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-F-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/16/97 13:22
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
2-chloroethylvinyl ether	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloromethane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dibromomethane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dichlorodifluoromethane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
cis-1,3-Dichloropropene	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
trans-1,3-Dichloropropene	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,1,2-Tetrachloroethane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,2-Trichloroethane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Trichlorofluoromethane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2,3-Trichloropropane	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Vinyl chloride	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Benzene	0.624	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Ethylbenzene	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Toluene	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
P & M -Xylene	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
o-Xylene	0.0575 U	0.0575	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Surrogates								
4-Bromofluorobenzene <Surr>	94.2		%	8010/8020	(65-109)	12/19/97	12/19/97	
1,4-Difluorobenzene <Surr>	83.2		%	8010/8020	(80-120)	12/19/97	12/19/97	
GRO/8020 Combo								
Gasoline Range Organics	5.38	1.59	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	2.85	0.0398	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0398 U	0.0398	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0398 U	0.0398	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0398 U	0.0398	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0398 U	0.0398	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM



CT&E Environmental Services Inc.

CT&E Ref.# 977584004
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-F-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/16/97 13:22
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

<u>Parameter</u>	<u>Results</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Allowable Limits</u>	<u>Prep Date</u>	<u>Analysis Date</u>	<u>Init</u>
Surrogates								
4-Bromofluorobenzene <Surr>	72		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	93.9		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584005
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-F-S8
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/16/97 13:20
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	85.3		%	SM18 2540G			12/19/97	WDW
Lead	5.67	2.44	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	5.68	1.44	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	2.80	0.0360	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0360 U	0.0360	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0360 U	0.0360	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0360 U	0.0360	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0360 U	0.0360	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	74.3		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	92.5		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584006
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-G-S3
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/16/97 14:14
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Stephen Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	87.1		%	SM18 2540G			12/19/97	WDW
Lead	6.47	2.00	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.30 U	1.30	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.0325 U	0.0325	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0325 U	0.0325	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0325 U	0.0325	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0325 U	0.0325	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0325 U	0.0325	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	73.2		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	87.5		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Environmental Services Inc.

CT&E Ref.# 977584007
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-G-S6
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/16/97 14:35
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Stephen Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	81.9		%	SM18 2540G			12/19/97	WDW
Lead	9.80	1.92	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.21 U	1.21	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.0302 U	0.0302	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0302 U	0.0302	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0302 U	0.0302	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0302 U	0.0302	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0302 U	0.0302	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	68		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	86.7		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584008
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-H-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/16/97 15:16
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Sharon Patton*

Sample Remarks:

8010 - Unidentified peak identified by GC/MS analysis as cis-1,2-dichloroethene at 0.454 mg/Kg.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
^								
Total Solids	60.1		%	SM18 2540G			12/19/97	WDW
Lead	4.32	1.42	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
GRO/8020 Combo								
Gasoline Range Organics	1.99 U	1.99	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.0405 J	0.0498	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0498 U	0.0498	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0498 U	0.0498	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0498 U	0.0498	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0498 U	0.0498	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	50.1		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	84.4		%	AK101/8020	(50-150)	12/16/97	12/18/97	
Halogenated Volatile Organics								
1,1-Dichloroethene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Methylene chloride	0.739 U	0.739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
trans-1,2-Dichloroethene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1-Dichloroethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloroform	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,1-Trichloroethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Carbon tetrachloride	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS



CT&E Ref.# 977584008
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-H-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/16/97 15:16
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
1,2-Dichloroethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Trichloroethene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,2-Dichloropropane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromodichloromethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Tetrachloroethene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Dibromochloromethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chlorobenzene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromoform	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,2,2-Tetrachloroethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,3-Dichlorobenzene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,4-Dichlorobenzene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,2-Dichlorobenzene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromomethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloroethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
2-chloroethylvinyl ether	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloromethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
cis-1,3-Dichloropropene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
trans-1,3-Dichloropropene	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,2-Trichloroethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Trichlorofluoromethane	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Vinyl chloride	0.0739 U	0.0739	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Surrogates								
4-Bromofluorobenzene <Surr>	68.5		%	SW846-8010A	(65-109)	12/19/97	12/19/97	



CT&E Ref.# 977584009
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-H-S5
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/16/97 15:28
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Sharon Feltner*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	85.6		%	SM18 2540G			12/19/97	WDW
Lead	4.38	2.55	mg/Kg	SW846-7421		12/19/97	12/22/97	KGF
8010/8020 Combo								
1,1-Dichloroethene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Methylene chloride	0.571 U	0.571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
trans-1,2-Dichloroethene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1-Dichloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloroform	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,1-Trichloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Carbon tetrachloride	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2-Dichloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Trichloroethene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2-Dichloropropane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromodichloromethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Tetrachloroethene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dibromochloromethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chlorobenzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromoform	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,2,2-Tetrachloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,3-Dichlorobenzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,4-Dichlorobenzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2-Dichlorobenzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromobenzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromomethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS



CT&E Ref.# 977584009
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-H-S5
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/16/97 15:28
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
2-chloroethylvinyl ether	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloromethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dibromomethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dichlorodifluoromethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
cis-1,3-Dichloropropene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
trans-1,3-Dichloropropene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,1,2-Tetrachloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,2-Trichloroethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Trichlorofluoromethane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2,3-Trichloropropane	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Vinyl chloride	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Benzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Ethylbenzene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Toluene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
P & M -Xylene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
o-Xylene	0.0571 U	0.0571	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Surrogates								
4-Bromofluorobenzene <Surr>	93		%	8010/8020	(65-109)	12/19/97	12/19/97	
1,4-Difluorobenzene <Surr>	85.2		%	8010/8020	(80-120)	12/19/97	12/19/97	
GRO/8020 Combo								
Gasoline Range Organics	1.53 U	1.53	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.0850	0.0382	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0382 U	0.0382	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0382 U	0.0382	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0382 U	0.0382	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0382 U	0.0382	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM



CT&E Ref.# 977584009
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St. and 15th Ave.
Client Sample ID Y-5778-TP-H-S5
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 01/08/98 12:45
Collected Date/Time 12/16/97 15:28
Received Date/Time 12/17/97 16:35
Technical Director: Stephen C. Ede

<u>Parameter</u>	<u>Results</u>	<u>PQL</u>	<u>Units</u>	<u>Method</u>	<u>Allowable Limits</u>	<u>Prep Date</u>	<u>Analysis Date</u>	<u>Init</u>
Surrogates								
4-Bromofluorobenzene <Surr>	62.5		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	86.2		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584010
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St. and 15th Ave.
Client Sample ID Y-5778-TP-H-S6
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 01/08/98 09:01
Collected Date/Time 12/16/97 15:38
Received Date/Time 12/17/97 16:35
Technical Director: Stephen C. Ede

Released By *Stephen C. Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	100		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	2.00 U	2.00	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Benzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Toluene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Ethylbenzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
P & M -Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
o-Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/16/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	80.6		%	AK101/8020	(50-150)	12/16/97	12/18/97	
1,4-Difluorobenzene <Surr>	86.5		%	AK101/8020	(50-150)	12/16/97	12/18/97	



CT&E Ref.# 977584011
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St. and 15th Ave.
Client Sample ID Y-5778-TP-I-S3
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 01/08/98 09:01
Collected Date/Time 12/17/97 12:28
Received Date/Time 12/17/97 16:35
Technical Director: Stephen C. Ede

Released By: *Stephen C. Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	79.4		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	1.17 U	1.17	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0292 U	0.0292	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0292 U	0.0292	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0292 U	0.0292	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0292 U	0.0292	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0292 U	0.0292	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	57.3		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	85.6		%	AK101/8020	(50-150)	12/17/97	12/18/97	



CT&E Ref.# 977584012
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-I-S7
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 12:38
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

 Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
^								
Total Solids	80.0		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	0.818 U	0.818	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0169 J	0.0205	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0205 U	0.0205	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0205 U	0.0205	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0205 U	0.0205	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0205 U	0.0205	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	59.3		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	86.5		%	AK101/8020	(50-150)	12/17/97	12/18/97	
Halogenated Volatile Organics								
1,1-Dichloroethene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Methylene chloride	0.597 U	0.597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
trans-1,2-Dichloroethene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1-Dichloroethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloroform	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,1-Trichloroethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Carbon tetrachloride	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,2-Dichloroethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Trichloroethene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS



CT&E Ref.# 977584012
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-I-S7
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 12:38
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
1,2-Dichloropropane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromodichloromethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Tetrachloroethene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Dibromochloromethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chlorobenzene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromoform	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,2,2-Tetrachloroethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,3-Dichlorobenzene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,4-Dichlorobenzene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,2-Dichlorobenzene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromomethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloroethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
2-chloroethylvinyl ether	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloromethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
cis-1,3-Dichloropropene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
trans-1,3-Dichloropropene	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,2-Trichloroethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Trichlorofluoromethane	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Vinyl chloride	0.0597 U	0.0597	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Surrogates								
4-Bromofluorobenzene <Surr>	89.7		%	SW846-8010A	(65-109)	12/19/97	12/19/97	



CT&E Ref.# 977584013
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-J-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 10:55
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	79.9		%	SM18 2540G			12/19/97	WDW
Lead	4.79	1.79	mg/Kg	SW846-7421		12/19/97	12/22/97	KGf
8010/8020 Combo								
1,1-Dichloroethene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Methylene chloride	0.624 U	0.624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
trans-1,2-Dichloroethene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1-Dichloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloroform	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,1-Trichloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Carbon tetrachloride	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2-Dichloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Trichloroethene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2-Dichloropropane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromodichloromethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Tetrachloroethene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dibromochloromethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chlorobenzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromoform	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,2,2-Tetrachloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,3-Dichlorobenzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,4-Dichlorobenzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2-Dichlorobenzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromobenzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Bromomethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS



CT&E Environmental Services Inc.

CT&E Ref.# 977584013
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-J-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 10:55
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
2-chloroethylvinyl ether	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Chloromethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dibromomethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Dichlorodifluoromethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
cis-1,3-Dichloropropene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
trans-1,3-Dichloropropene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,1,2-Tetrachloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,1,2-Trichloroethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Trichlorofluoromethane	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
1,2,3-Trichloropropene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Vinyl chloride	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Benzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Ethylbenzene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Toluene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
P & M -Xylene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
o-Xylene	0.0624 U	0.0624	mg/Kg	8010/8020		12/19/97	12/19/97	DRS
Surrogates								
4-Bromofluorobenzene <Surr>	83.4		%	8010/8020	(65-109)	12/19/97	12/19/97	
1,4-Difluorobenzene <Surr>	81.7		%	8010/8020	(80-120)	12/19/97	12/19/97	
GRO/8020 Combo								
Gasoline Range Organics	1.10 U	1.10	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0274 U	0.0274	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0274 U	0.0274	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0274 U	0.0274	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0274 U	0.0274	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0274 U	0.0274	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM



CT&E Environmental Services Inc.

CT&E Ref.# 977584013
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-J-S2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 10:55
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Surrogates								
4-Bromofluorobenzene <Surr>	66		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	85.2		%	AK101/8020	(50-150)	12/17/97	12/18/97	



CT&E Environmental Services Inc.

CT&E Ref.# 977584014
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-J-S4
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/17/97 11:00
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Stephen C. Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	83.6		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	0.851 U	0.851	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0213 U	0.0213	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	59.3		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	85.3		%	AK101/8020	(50-150)	12/17/97	12/18/97	



CT&E Ref.# 977584015
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-K-S4
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 13:30
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	81.3		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	1.37 U	1.37	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0342 U	0.0342	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	65.8		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	85		%	AK101/8020	(50-150)	12/17/97	12/18/97	
Halogenated Volatile Organics								
1,1-Dichloroethene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Methylene chloride	0.568 U	0.568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
trans-1,2-Dichloroethene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1-Dichloroethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloroform	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,1-Trichloroethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Carbon tetrachloride	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,2-Dichloroethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Trichloroethene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS



CT&E Ref.# 977584015
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-K-S4
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 12:45
 Collected Date/Time 12/17/97 13:30
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
1,2-Dichloropropane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromodichloromethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Tetrachloroethene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Dibromochloromethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chlorobenzene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromoform	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,2,2-Tetrachloroethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,3-Dichlorobenzene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,4-Dichlorobenzene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,2-Dichlorobenzene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Bromomethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloroethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
2-chloroethylvinyl ether	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Chloromethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
cis-1,3-Dichloropropene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
trans-1,3-Dichloropropene	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
1,1,2-Trichloroethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Trichlorofluoromethane	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Vinyl chloride	0.0568 U	0.0568	mg/Kg	SW846-8010A		12/19/97	12/19/97	DRS
Surrogates								
4-Bromofluorobenzene <Surr>	85		%	SW846-8010A	(65-109)	12/19/97	12/19/97	



CT&E Ref.# 977584016
Client Name Shannon & Wilson Inc.
Project Name/# Y-5778-3 C St. and 15th Ave.
Client Sample ID Y-5778-TP-K-S5
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 01/08/98 09:01
Collected Date/Time 12/17/97 13:35
Received Date/Time 12/17/97 16:35
Technical Director: Stephen C. Ede

Released By *Sharon Palmer*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
^								
Total Solids	88.9		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	1.19 U	1.19	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0297 U	0.0297	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0297 U	0.0297	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0297 U	0.0297	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0297 U	0.0297	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0297 U	0.0297	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	73.6		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	85.5		%	AK101/8020	(50-150)	12/17/97	12/18/97	



CT&E Ref.# 977584017
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-L-S3
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/17/97 14:21
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Sharon Palmer*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
^								
Total Solids	82.8		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	1.81 U	1.81	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0452 U	0.0452	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0452 U	0.0452	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0452 U	0.0452	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0452 U	0.0452	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0452 U	0.0452	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	68.5		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	90.5		%	AK101/8020	(50-150)	12/17/97	12/18/97	



CT&E Ref.# 977584018
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Y-5778-TP-L-S4
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time 12/17/97 14:25
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Stephen C. Ede*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	94.4		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	1.13 U	1.13	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Benzene	0.0283 U	0.0283	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Toluene	0.0283 U	0.0283	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Ethylbenzene	0.0283 U	0.0283	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
P & M -Xylene	0.0283 U	0.0283	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
o-Xylene	0.0283 U	0.0283	mg/Kg	AK101/8020		12/17/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	71.1		%	AK101/8020	(50-150)	12/17/97	12/18/97	
1,4-Difluorobenzene <Surr>	92.2		%	AK101/8020	(50-150)	12/17/97	12/18/97	



CT&E Ref.# 977373011
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St & W 15th
 Client Sample ID Y-5778-Trip Blank
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/17/97 11:37
 Collected Date/Time 12/04/97 00:00
 Received Date/Time 12/05/97 09:48
 Technical Director: Stephen C. Ede

Released By *Sharon Peltan*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	100		%	SM18 2540G			12/10/97	MCM
GRO/8020 Combo								
Gasoline Range Organics	2.00 U	2.00	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Benzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Toluene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Ethylbenzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
P & M -Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
o-Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/04/97	12/10/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	86.6		%	AK101/8020		12/04/97	12/10/97	
1,4-Difluorobenzene <Surr>	85.8		%	AK101/8020		12/04/97	12/10/97	



CT&E Ref.# 977584019
 Client Name Shannon & Wilson Inc.
 Project Name/# Y-5778-3 C St. and 15th Ave.
 Client Sample ID Trip Blank-2
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 01/08/98 09:01
 Collected Date/Time
 Received Date/Time 12/17/97 16:35
 Technical Director: Stephen C. Ede

Released By *Shawn Patton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	100		%	SM18 2540G			12/19/97	WDW
GRO/8020 Combo								
Gasoline Range Organics	2.00 U	2.00	mg/Kg	AK101/8020		12/18/97	12/18/97	GSM
Benzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/18/97	12/18/97	GSM
Toluene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/18/97	12/18/97	GSM
Ethylbenzene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/18/97	12/18/97	GSM
P & M -Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/18/97	12/18/97	GSM
o-Xylene	0.0500 U	0.0500	mg/Kg	AK101/8020		12/18/97	12/18/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	77.8		%	AK101/8020	(50-150)	12/18/97	12/18/97	
1,4-Difluorobenzene <Surr>	84.1		%	AK101/8020	(50-150)	12/18/97	12/18/97	

977373

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CHAIN OF CUSTODY RECORD

Page 1 of 2
Laboratory CTIE
Attn: Sample 11112

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Analysis Parameters/Sample Container Description					Total Number of Containers	Remarks/Matrix
Y-5778-TP-13-S2		13:48	12-4-97	✓	✓	GRAB/15 MIN ALC 101 TJFAT LEAD EPA 7421					2	SOIL
Y-5778-TP-13-S3		13:53		✓	✓							
Y-5778-TP-14-S1		15:30			✓							
Y-5778-TP-14-S5		15:40			✓							
Y-5778-TP-14-S2		11:40			✓							
Y-5778-TP-14-S4		11:50			✓							
Y-5778-TP-17-S2		12:45			✓							
Y-5778-TP-17-S3		12:50			✓							
Y-5778-TP-17-S6		12:48			✓							sample of soil
Y-5778-TP-13-S6		14:00			✓						1	sample of soil

Project Information	Sample Receipt
Project Number: Y-5778-3	Total Number of Containers
Project Name: C & W 15th	COC Seals/Intact? Y/N/NA
Contact: Handjar Turker	Received Good Cond./Cold
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method:
Sampler: H. Turker	(attach shipping bill, if any)

Instructions
Requested Turn Around Time: 5 to 7 days
Special Instructions:

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>H. Turker</u> Printed Name: <u>HANDJAR TURKER</u> Company:	Signature: _____ Printed Name: _____ Company:	Signature: _____ Printed Name: _____ Company:
Time: <u>9:45</u> Date: <u>12-5-97</u>	Time: _____ Date: _____	Time: _____ Date: _____
Received By: 1.	Received By: 2.	Received By: 3.
Signature: <u>[Signature]</u> Printed Name: <u>ED [Name]</u> Company: <u>CTIE</u>	Signature: _____ Printed Name: _____ Company:	Signature: _____ Printed Name: _____ Company:
Time: <u>01:48</u> Date: <u>12/5</u>	Time: _____ Date: _____	Time: _____ Date: _____

0093

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303 Wellsian Way
Richland, WA 99352
(509) 946-6309

CHAIN OF CUSTODY RECORD

Page 2 of 2
Laboratory CT&E
Attn: Sam Wilson

Analysis Parameters/Sample Container Description (include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	Analysis Parameters/Sample Container Description (include preservative if used)					Total Number of Containers	Remarks/Matrix	
4-5778- Trip Blank			12-4-97		X	GRABSTER MK 101					1		

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: <u>4-5778-3</u>		Total Number of Containers		Signature: <u>H. Turker</u> Time: <u>9:45</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: <u>CS & W. 15th</u>		COC Seals/Intact? <u>Y/N/NA</u>		Printed Name: _____ Date: <u>12-5-97</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: <u>Hazlet Turker</u>		Received Good Cond./Cold		<u>HAZLET TURKER</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method:		Company: <u>S&W</u>		Company: _____		Company: _____	
Sampler: <u>H. Turker</u>		(attach shipping bill, if any)		Received By: 1.		Received By: 2.		Received By: 3.	
Instructions				Signature: <u>[Signature]</u> Time: <u>09:48</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Requested Turn Around Time: <u>5 to 7 days</u>				Printed Name: <u>HAZLET</u> Date: <u>12/5</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Special Instructions:				Company: <u>CT&E</u>		Company: _____		Company: _____	
Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									

0094

977584

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CHAIN OF CUSTODY RECORD

Page 1 of 2
Laboratory CTFE
Attn: Sample Custodian

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	GRAB/STEX	AK 101	TOTAL LEAD	EPA 74-21	BTEX	EPA 8020	HVO	EPA 8010	Total Number of Containers	Remarks/Matrix
Y-5778-TP-E-S2		11:38	12-16-97		✓	x	x							2	Soil
Y-5778-TP-E-S5		11:45	12-16-97			x	x							2	
Y-5778-TP-F-S1		13:18	12-16-97			x	x							2	
Y-5778-TP-F-S2		13:22	12-16-97			x	x	x	x					4	
Y-5778-TP-F-S8		13:20				x	x							2	
Y-5778-TP-G-S3		14:14				x	x							2	
Y-5778-TP-G-S6		14:35				x	x							2	
Y-5778-TP-H-S2		15:16				x	x			x				23	
Y-5778-TP-H-S5		15:28				x	x	x	x					4	
Y-5778-TP-H-S6		15:38				x								1	

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: Y-5778-3	Total Number of Containers	COC Seals/Intact? Y/N/NA		Signature: <u>H. Turker</u>	Time: <u>16:10</u>	Signature:	Time:	Signature:	Time:
Project Name: C-11 & 15th Ave	Received Good Cond./Cold	Delivery Method:		Printed Name: <u>HAYDAR TURKER</u>	Date: <u>12/17/97</u>	Printed Name:	Date:	Printed Name:	Date:
Contact: <u>Haydar Turker</u>	Delivery Method:	(attach shipping bill, if any)		Company: <u>S & W</u>		Company:		Company:	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				Received By: 1.		Received By: 2.		Received By: 3.	
Sampler: <u>H. Turker</u>				Signature: <u>E. H. Wilson</u>	Time: <u>16:55</u>	Signature:	Time:	Signature:	Time:
Instructions				Printed Name: <u>E. H. Wilson</u>	Date: <u>12/17</u>	Printed Name:	Date:	Printed Name:	Date:
Requested Turn Around Time: <u>5 to 7 days</u>				Company: <u>CTFE</u>		Company:		Company:	
Special Instructions:									

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

0095

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CHAIN OF CUSTODY RECORD

Page 2 of 2
Laboratory CT&E
Attn: Sample 101/102

Analysis Parameters/Sample Container Description
(include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	GRAB/BTEX	AK 101	TOTAL LEAD	EPA 7421	BTEX	EPA 8020	HVO	EPA 8010	Total Number of Containers	Remarks/Matrix
Y-5778-TP-I-S3		12:28	12-17-97	X	X									2	Soil
Y-5778-TP-I-S7		12:38	}		X					X				2	"
Y-5778-TP-J-S2		10:55			X	X	X	X	X					4	"
Y-5778-TP-J-S4		11:00			X					X				2	No HVO Analysis
Y-5778-TP-K-S4		13:30			X					X				2	Soil
Y-5778-TP-K-S5		13:35			X									2	"
Y-5778-TP-L-S3		14:21			X									2	"
Y-5778-TP-L-S4		14:25			X									2	"
Trip Blank-2			12-16-97		X									1	Soil

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: Y-5778-3	Total Number of Containers	COC Seals/Intact? Y/N/NA		Signature: <u>H. Turker</u>	Time: <u>16:10</u>	Signature:	Time:	Signature:	Time:
Project Name: <u>C St 15th Ave</u>	Received Good Cond./Cold	Delivery Method:		Printed Name: <u>HAYDAR TURKER</u>	Date: <u>12-17-97</u>	Printed Name:	Date:	Printed Name:	Date:
Contact: <u>Haydar Turker</u>	Sampler: <u>H. Turker</u>	(attach shipping bill, if any)		Company: <u>S & W</u>		Company:		Company:	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Instructions		Received By: 1.		Received By: 2.		Received By: 3.		
Requested Turn Around Time: <u>5 to 7 days</u>	Special Instructions:		Signature: <u>[Signature]</u>	Time: <u>16:30</u>	Signature:	Time:	Signature:	Time:	
			Printed Name: <u>[Name]</u>	Date: <u>12/17</u>	Printed Name:	Date:	Printed Name:	Date:	
Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File			Company: <u>CT&E</u>		Company:		Company:		


CT&E Environmental Services Inc.

 Laboratory Division

RECEIVED Laboratory Analysis Report

JAN 03 1998

 SHANNON & WILSON INC.
 Anchorage, Alaska

December 31, 1997

 Haydar Turker
 Shannon & Wilson Inc.
 5430 Fairbanks St Ste 3
 Anchorage, AK 99518

Client Name	Shannon & Wilson Inc.
Project ID	C St & 15th Proj. Y-5778-3 [977366]
Printed	December 31, 1997

Enclosed are the analytical results associated with the above project.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by CT&E. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your CT&E Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

- U - Indicates the compound was analyzed for but not detected.
- J - Indicates an estimated value that falls below PQL, but is greater than the MDL.
- B - Indicates the analyte is found in the blank associated with the sample.
- * - The analyte has exceeded allowable limits.
- GT - Greater Than
- D - Secondary Dilution
- LT - Less Than
- ! - Surrogate out of range



CT&E Ref.# 977366001
 Client Name Shannon & Wilson Inc.
 Project Name/# C St & 15th Proj. Y-5778-3
 Client Sample ID Y-5778-3-MW-14
 Matrix Water (Surface, Eff., Ground)
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/31/97 09:53
 Collected Date/Time 12/03/97 15:35
 Received Date/Time 12/04/97 16:50
 Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

 Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Lead	0.00568 U	0.00568	mg/L	SW846-7421		12/08/97	12/09/97	KGf
Oxidation Reduction Potential	450	10.0	mV	SM18 2580B			12/08/97	JRJ
Waters Department Analyses								
Sulfate	201	2.00	mg/L	EPA 300.0			12/06/97	RMV
Nitrate-N	1.00 U	1.00	mg/L	EPA 300.0			12/06/97	RMV
Heterotrophic Plate Count	9200		CFU/mL	SM17 9215			12/05/97	TMW
Oil Degrading Bacteria (MPN)	40		col/mL	SHEEN SCRIN			12/05/97	TMW
GRO/602 Combo								
Gasoline Range Organics	0.0400 U	0.0400	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Benzene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Toluene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Ethylbenzene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
P & M -Xylene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
o-Xylene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	91.7		%	AK101/8020	(50-150)	12/09/97	12/09/97	
1,4-Difluorobenzene <Surr>	94.6		%	AK101/8020	(50-150)	12/09/97	12/09/97	



CT&E Ref.# 977366002
 Client Name Shannon & Wilson Inc.
 Project Name/# C St & 15th Proj. Y-5778-3
 Client Sample ID Y-5778-3-MW-18
 Matrix Water (Surface, Eff., Ground)
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 12/31/97 09:53
 Collected Date/Time 12/03/97 16:20
 Received Date/Time 12/04/97 16:50
 Technical Director: Stephen C. Ede

Released By *Stephen Ede*

Sample Remarks:

GRO/BTEX - Surrogate 1,4-Difluorobenzene recovery outside QC goals due to matrix interference.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Lead	0.00750	0.00568	mg/L	SW846-7421		12/08/97	12/09/97	KGF
Oxidation Reduction Potential	493	10.0	mV	SM18 2580B			12/08/97	JRJ
Waters Department Analyses								
Nitrate-N	0.100 U	0.100	mg/L	EPA 300.0			12/05/97	RMV
Sulfate	14.9	0.200	mg/L	EPA 300.0			12/05/97	RMV
Heterotrophic Plate Count	16000		CFU/mL	SM17 9215			12/05/97	TMW
Oil Degrading Bacteria (MPN)	80		col/mL	SHEEN SCRIN			12/05/97	TMW
GRO/602 Combo								
Gasoline Range Organics	3.5	0.400	mg/L	AK101/8020		12/09/97	12/10/97	GSM
Benzene	1.90	0.010	mg/L	AK101/8020		12/09/97	12/10/97	GSM
Toluene	0.00118	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Ethylbenzene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
P & M -Xylene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
o-Xylene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Surrogates								
4-Bromofluorobenzene <Surr>	90.5		%	AK101/8020	(50-150)	12/09/97	12/09/97	
1,4-Difluorobenzene <Surr>	157		%	AK101/8020	(50-150)	12/09/97	12/09/97	



CT&E Ref.# 977366003
Client Name Shannon & Wilson Inc.
Project Name/# C St & 15th Proj. Y-5778-3
Client Sample ID Trip Blank
Matrix Water (Surface, Eff., Ground)
Ordered By
PWSID

Client PO#
Printed Date/Time 12/31/97 09:53
Collected Date/Time
Received Date/Time 12/04/97 16:50
Technical Director: Stephen C. Ede

Released By *Shannon Wilson*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
GRO/602 Combo								
Gasoline Range Organics	0.0400 U	0.0400	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Benzene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Toluene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
Ethylbenzene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
P & M -Xylene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM
o-Xylene	0.0010 U	0.0010	mg/L	AK101/8020		12/09/97	12/09/97	GSM

977366

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303 Wellsian Way Richland, WA 99352 (509) 946-6309

CHAIN OF CUSTODY RE

Page 1 of 1
Laboratory CTE
Attn: Sample Analysis

Analysis Parameters/Sample Container Description
(Include preservative if used)

Sample Identity	Lab No.	Time	Date Sampled	Analysis Parameters/Sample Container Description										Remarks/Matrix
				Comp.	Grab	GRO/STEX AK 101	Lead	EPA 7421	Hex-Plate Count	SM 179215D	Shovel Screen	MPN Method	Nitrates + Sulfates	
Y-5778-3-mw-14	(1)	15:35	12-3-97	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	Water
Y-5778-3-mw-18	(2)	16:20	12-3-97	✓	✓	✓	✓	✓	✓	✓	✓	✓	6	"
Trip Blank					✓								2	"

Project Information		Sample Receipt		Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Project Number: Y-5778-3	Total Number of Containers	COC Seals/Intact? Y/N/NA		Signature: H. Turker	Time: 16:45	Signature:	Time:	Signature:	Time:
Project Name: C-5th & 15th	Received Good Cond./Cold	Delivery Method:		Printed Name: HAYDAR TURKER	Date: 12-4-97	Printed Name:	Date:	Printed Name:	Date:
Contact: Haydar Turker	Delivery Method:	(attach shipping bill, if any)		Company: S & W		Company:		Company:	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Instructions		Received By: 1.		Received By: 2.		Received By: 3.		
Requested Turn Around Time: 5 to 7 day	Special Instructions:		Signature: Heather Hall	Time: 16:50	Signature:	Time:	Signature:	Time:	
			Printed Name: H. Hall	Date: 12/4/97	Printed Name:	Date:	Printed Name:	Date:	
			Company: CTE		Company:		Company:		

Distribution: White - w/shipment - returned to Shannon & Wilson w/ Laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - Job File

APPENDIX C

**“IMPORTANT INFORMATION ABOUT YOUR
GEOTECHNICAL/ENVIRONMENTAL REPORT”**

Important Information About Your Geotechnical/Environmental Report

More construction problems are caused by site subsurface conditions than any other factor. The following suggestions and observations are offered to help you manage your risks.

HAVE REALISTIC EXPECTATIONS.

If you have never before dealt with geotechnical or environmental issues, you should recognize that site exploration identifies actual subsurface conditions at those points where samples are taken, at the time they are taken. The data derived are extrapolated by the consultant, who then applies judgement to render an opinion about overall subsurface conditions; their reaction to construction activity; appropriate design of foundations, slopes, impoundments, recovery wells; and other construction and/or remediation elements. Even under optimal circumstances, actual conditions may differ from those inferred to exist, because no consultant, no matter how qualified, and no subsurface program, no matter how comprehensive, can reveal what is hidden by earth, rock, and time.

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Developing a proper subsurface exploration plan is a basic element of geotechnical/environmental design, which should have been accomplished jointly by the consultant and the client (or designated professional representative). This helps the parties involved recognize mutual concerns and makes the client aware of the technical options available. Clients who develop a subsurface exploration plan without the involvement and concurrence of a consultant may be required to assume responsibility and liability for the plan's adequacy.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

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Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

OBTAIN CONSTRUCTION MONITORING SERVICES.

Most experienced clients also retain their consultant to serve during the construction phase of their projects. Involvement during the construction phase is particularly important because this permits the consultant to be on hand quickly to evaluate unanticipated conditions, to conduct additional tests if required, and when necessary, to recommend alternative solutions to problems. The consultant can also monitor the geotechnical/environmental work performed by contractors. It is essential to recognize that the construction recommendations included in a report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site.

Because actual subsurface conditions can be discerned only during earthwork and/or drilling, design consultants need to observe those conditions in order to provide their recommendations. Only the consultant who prepares the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid. The consultant submitting the report cannot assume responsibility or liability for the adequacy of preliminary recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was

prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

REALIZE THAT ENVIRONMENTAL ISSUES MAY NOT HAVE BEEN ADDRESSED.

If you have requested only a geotechnical engineering proposal, it will not include services needed to evaluate the likelihood of contamination by hazardous materials or other pollutants. Given the liabilities involved, it is prudent practice to always have a site reviewed from an environmental viewpoint. A consultant cannot be responsible for failing to detect contaminants when the services needed to perform that function are not being provided.

ONE OF THE OBLIGATIONS OF YOUR CONSULTANT IS TO PROTECT THE SAFETY, PROPERTY, AND WELFARE OF THE PUBLIC.

A geotechnical/environmental investigation will sometimes disclose the existence of conditions that may endanger the safety, health, property, or welfare of the public. Your consultant may be obligated under rules of professional conduct, or statutory or common law, to notify you and others of these conditions.

RELY ON YOUR CONSULTANT FOR ADDITIONAL ASSISTANCE.

Your consulting firm is familiar with several techniques and approaches that can be used to help reduce risk exposure for all parties to a construction project, from design through construction. Ask your consultant, not only about geotechnical and environmental issues, but others as well, to learn about approaches that may be of genuine benefit.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland