

**CORRECTIVE ACTION SUMMARY REPORT
JACK'S SERVICE
FACILITY #1771
DELTA JUNCTION, ALASKA**

April 1999

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Underground Storage Tanks — FAP**

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**CORRECTIVE ACTION SUMMARY REPORT
JACK'S SERVICE, FACILITY #1776
DELTA JUNCTION, ALASKA**

1.0 PROJECT DESCRIPTION

1.1 Purpose and Scope

This report documents the passive vapor extraction (PVE) system installation and biocell construction, and presents the results of [off-gas] air-quality monitoring and biocell remediation effectiveness at Jack's Service in Delta Junction, Alaska. This corrective action work was funded in part by the Alaska Department of Environmental Conservation (ADEC) Underground Storage Tank (UST) Financial Assistance Program, *Grant # 15177622, for Tank Continuation Cleanup at Jack's Service, Facility #1776*. Our work was performed in general accordance with our corrective action plan approved by the ADEC on April 7, 1998.

Shannon & Wilson and our subcontracts performed the following scope of work at the site:

June through August, 1998

- We drilled six auger borings ranging in depth from 19 to 24 feet, classified soils, and installed a 4-inch-diameter vapor-extraction well in each borehole. The annular space around each well was backfilled with silica sand and capped with a bentonite seal to maintain well integrity. (This brought the total number of vapor extraction wells to eight.)
- We dug a series of 4-foot-deep trenches and connected 4-inch-diameter PVC pipe runs to ventilation pipes (installed by others at the time of tank closure work) and the eight vapor extraction wells (installed by Shannon & Wilson), backfilled the trenches, and repaired asphalt where necessary. Each discrete ventilation pipeline was routed to a vertical vent stack fixed to one of two on-site buildings. Each vent stack was equipped with a turbine ventilator above the rooftop.
- We constructed a lined biocell, similar in size to the existing stockpile cell, in a clearing at the northeast corner of the site. The upper foot of contaminated stockpile soil was excavated

and transferred to the biocell, where it was spread on the liner. The exposed soil in both the biocell and stockpile was landfarmed with fertilizer and tilling. The biocell was dewatered as necessary.

July 1998 through March 1999 (Monitoring)

- We performed periodic monitoring of the PVE system to assess subsurface volatilization and biodegradation effectiveness. Vent stack hydrocarbon emissions were periodically measured with a photoionization detector (PID). Quarterly air-quality samples were also collected from three of the vent stacks. These samples were submitted to CT&E Environmental Services, Inc. (CT&E) for analytical testing for gasoline range organics (GRO) and BTEX (benzene, toluene, ethylbenzene, and xylene) compounds.
- In September 1998 we evaluated biocell landfarming effectiveness on the first "soil lift" transferred from the stockpile. We dug fifteen holes to one foot across the biocell, performed soil field-screening with a PID, and collected five soil samples for laboratory analyses for GRO, diesel range organics (DRO), and BTEX. One soil sample was further analyzed for polynuclear aromatics.
- We prepared progress summary reports documenting monitoring results at the site.
- We prepared this corrective action report summarizing the comprehensive results of our fiscal year 1998 fieldwork and presenting our conclusions and recommendations.

1.2 Site Description

Jack's Service, Facility No. 1776, is located at mile 266.5 Richardson Highway in Delta Junction, Alaska. The property is described as Lots 7, 9, and 10, USS-2770, and that portion of Lots 85 and 86 east of the Richardson Highway. The Richardson Highway access road borders the property on the west. The general property location is given as the northeast ¼ of the northwest ¼ of Section 23, Township 10 South, Range 10 East, Fairbanks Meridian, Alaska. Jack's Service dispenses regular and super unleaded gasoline and diesel fuel from two 12,000-gallon double-

walled tanks. PVE vent stacks are fixed to Jack's office/service garage building and the adjacent Jack's Liquor store.

1.3 Background

Contaminated soil removed during the 1995 UST closure work was stockpiled east of the office/service garage building in a bermed and lined stockpile measuring approximately 90 feet by 90 feet by 8 feet in height. A series of perforated ventilation pipes were horizontally spaced within the stockpile 2 feet above the base; the stockpile was reportedly augmented with urea fertilizer. Not all of the fuel-contaminated soil was removed from the dispenser island excavation before backfilling. Consequently, three horizontal and perforated ventilation pipes were installed in the dispenser island subsurface to promote natural attenuation of remaining petroleum hydrocarbons. The horizontal runs were connected to vertical risers; however, the risers were not completed to the surface. The 1997 Shannon & Wilson release investigation predicated corrective action at this site.

Release Investigation Summary

Shannon & Wilson drilled soil borings and collected soil samples as part of our release investigation work at Jack's Service in July 1997. Analytical results and findings were presented in our Release Investigation report dated January 1998. Two vapor extraction test wells were subsequently installed to evaluate bioventing/vapor extraction potential. Based on those findings and previously reported information, the following conclusions and recommendations were made:

- 1) Soil containing petroleum hydrocarbon concentrations in excess of the ADEC cleanup levels for GRO, DRO, and benzene remained in the subsurface at the dispenser island and UST excavations.
- 2) Results of microbiological analyses suggested low potential for hydrocarbon recovery related to bioactivity in the subsurface. However, performance evaluation of a vapor recovery pilot test on the subsurface ventilation pipes indicated good potential for removal of volatilized hydrocarbons through aggressive vapor extraction. Passive vapor extraction was considered as an alternate remedial method.

- 3) Soil in the stockpile also contained petroleum hydrocarbons exceeding the ADEC cleanup levels. Conditions unsuitable for natural attenuation of contaminants included limited ventilation piping, stockpile height, high basal moisture concentrations, and degree soil compactness. The construction of an adjacent biocell was recommended for landfarm treatment of the stockpiled soils in lifts.

2.0 CORRECTIVE ACTION ACTIVITIES

Corrective action activities were performed during the summer and fall of 1998. This work consisted of upgrading the underground ventilation system to the PVE system and proactive treatment of the existing contaminated soil stockpile. A plan view of the site is shown in Figure 1. The PVE system layout is shown in Figure 2. Figure 3 illustrates the soil transfer and landfarming scheme applied to the stockpiled soils. Dennis Filler, an engineer with Shannon & Wilson, supervised the PVE system installations and the construction of a biocell for landfarming treatment. Copper Valley Enterprises, Incorporated (CVE) was subcontracted to perform trenching, pipework installations, earth moving, and asphalt replacement activities. Shannon & Wilson personnel performed subsequent operation and maintenance (O&M), monitoring, and soil sampling activities to date.

2.1 Passive Vapor Extraction System

In the summer of 1995, Oil Spill Technology installed two ventilation circuits of perforated and wrapped horizontal pipes as a short-term measure for soil gas venting to the surface. The horizontal runs were embedded between 15 and 17 feet in depth within the dispenser island excavation. The circuits are identified as VP-E and VP-W in Figure 2. Venting was to have occurred to the surface through vertical risers at points b, c, d, f, and g in the figure. The following discussion describes our upgrade of this ventilation piping to a PVE remediation system.

Between June 22 and 24, 1998, Shannon & Wilson drilled six 8-inch-diameter hollow-stem auger borings to depths of 19 to 24 feet. We installed vapor extraction wells VE-1, VE-2, VE-3, VE-4, VE-5, and VE-8 in these boreholes at the locations shown in Figure 2. (Vapor extraction wells VE-6 and VE-7 were previously installed for the vapor recovery pilot test during our release investigation work.) Soils encountered in five of the borings consisted of 0.5 to 1 feet of sandy gravel fill above 15 to 16 feet of silt, underlain by interbedded sandy and coarse gravel with cobbles. Slight to moderate hydrocarbon odors were noted within the silty soils retrieved at VE-1, VE-3, and VE-4. The boring at VE-5 was drilled within clean pea-gravel and coarse gravel backfill (aggregates used to backfill the dispenser island excavation in 1995) to the

maximum penetration depth of 20 feet. A copy of the field logs for these six auger borings is included in Appendix B.

After each auger boring was completed, a 4-inch-diameter vapor extraction well was installed. Depending upon the embedment depth, the bottom 2 to 23.5 feet of each well was screened with 0.02-inch machine-slotted PVC; the uppermost few feet are solid-stem PVC blanks. The sections were screwed together, and each well was completed with an end cap at the bottom and locking plug at the top. The annular space around each well was backfilled with silica sand to 1 foot above the top of screen. A 1-foot-thick bentonite seal was then poured and mixed with water above the silica sand. Excavated soil was used to complete the backfilling at each well. The well installations were finished with metal monuments, seated flush with the ground surface.

Ventilation pipe modifications and vent stack installations were performed between June 29 and July 3, 1998. CVE excavated 4-foot deep trenches for installation of the horizontal pipe modifications. A common trench was dug between vapor extraction well VE-8 and the southwest corner of Jack's Service garage. Three 4-inch-diameter PVC pipelines were aligned parallel to each other in this trench. One pipeline connects vapor extraction well VW-5 with vertical vent stack VS-1 (Figure 2). Another connects vapor extraction well VE-8 with vent stack VS-3. The dispenser island ventilation pipes (VP-E and VP-W) were connected to vent stack VS-2 via a common pipeline through connection points b, c, and d (Figure 2). All pipe sections were connected to PVC or ABS straight and T-couplers, or 45 and 90 degree elbows, with compatible cement-glue. The newly installed horizontal pipe runs are sloped between their respective vapor extraction well or [1995] ventilation pipe connections and the vent stacks. Another ventilation pipe network was similarly constructed between vapor extraction wells VE-1, VE-4, VE-6, and VE-7 and vents stacks VS-4, VS-5, and VS-6 (VE-6 and VE-7 are connected to VS-5 with a Y-union at point "a" in Figure 2). A third network connects VE-2 and VE-3 to VS-8 and VS-7, respectively.

Eight vent stacks abut Jack's Service Garage and Jack's Liquor Store at the locations shown in Figure 2. Each vent stack extends above the rooftop at least 3.5 feet to prevent snow obstruction in the turbine ventilators. The vent stacks are fitted with 4-inch, galvanized steel, externally

braced, turbine ventilators. These ventilators are rated to draw 126 cubic-feet-per-minute with a 4-mile-per-hour wind. The vent stacks are secured to the roofs with metal or wood connector strips and copper hanging strap. Monitoring ports were installed in the vent stacks for off-gas sampling and monitoring.

2.2 Stockpile Characterization

As part of our July 1997 release investigation work Shannon & Wilson dug four test pits and collected eight soil samples from 1.5 to 6 feet in depth within the contaminated soil stockpile. The samples were laboratory-analyzed for GRO, DRO, benzene, and total BTEX compounds. A summary comparison of these and previously reported soil analytical results was made to characterize contamination remaining in the soil stockpile. Each of the eight samples from the stockpile exceeded the ADEC cleanup for GRO and BTEX; seven samples exceeded the ADEC cleanup level for benzene, and six samples exceeded the ADEC cleanup level for DRO. Little overall reduction in contaminant levels was realized from stockpile venting through the single layer of pipes embedded near the base. The comparative analytical results are presented below. Landfarming of the stockpiled soil was recommended.

Date Reported	Contaminant Concentrations in mg/kg				Comments
	GRO	DRO	Benzene	Total BTEX	
Sept. 1994 (OST, Inc. site assessment)	11537-19511	1200-1416	138-153	1244-1504	Soil samples from UST and dispenser island excavations; soil ultimately comprising the soil stockpile.
Sept. 1995 (OST, Inc. [closure] site assessment)	164-9099	70-2479	0-75	18-2060	
Jan. 1998 (S&W, Inc.)	109-16800	54-2040	0-201	30-4328	Soil samples from 1.5 and 6 feet in depth within soil stockpile.

2.3 Biocell Construction

A biocell, similar in area to the stockpile cell, was constructed during the week of July 7, 1998, at the northeast corner of the property (Figure 1). A thin layer of sandy gravel was first graded and leveled across the ground as a "bedding layer" for liner protection. A perimeter berm of clean pit-run gravel was then constructed approximately 1.5 feet high. A 100-foot by 100-foot

polyethylene liner was laid across the base and draped over the perimeter berm to complete the biocell. The liners function is to restrict seepage contamination from leaching to the natural subsurface. After biocell completion, CVE removed and transferred the top foot of stockpiled soil to the biocell as the first "soil lift" for landfarming treatment. The biocell design and landfarming scheme is illustrated in Figure 3.

2.4 Landfarming

Landfarming is the bioremediation process in which affected soils are spread over an area (within a treatment cell in this case) to enhance naturally occurring processes. By fertilizing and tilling the soils, aeration, volatilization, and biodegradation are further enhanced. CVE applied 20-10-10 nutrient enriched fertilizer in the biocell and over the newly exposed stockpile surface after the first soil transfer was complete. A rototiller was used on both surfaces to mix in the fertilizer and agitate the soils. Soils in the biocell and on the stockpile were tilled twice, on July 6 and August 25, 1998.

2.5 Systems Monitoring, Operation, and Maintenance

Water that pooled in the biocell corners was pumped and drummed on August 25, 1998, before the second tilling event. A sample of this water was collected and laboratory analyzed for BTEX parameters according to EPA Method 602. Soil in the biocell (the first soil lift) was field-screened, sampled, and laboratory-tested in September 1998 to evaluate landfarming effectiveness. Monitoring of the PVE system included monthly screening and quarterly air-quality sampling and testing of the vent stack off-gas streams.

2.5.1 Soil Sampling

On September 25, after two months of landfarming, Shannon & Wilson personnel field-screened soils at fifteen locations within the biocell (Figure 4). A hand shovel was used to excavate shallow holes to 1 foot in depth. Each sample was collected using nitrile gloves and a clean stainless steel spoon, placed in a resealable plastic bag, agitated by finger manipulation, and headspace analyzed for total hydrocarbons with a photoionization detector (PID). Based on the field-screening results, four soil samples (plus one duplicate sample) were then collected in sample jars from locations A3, B1, B2, and C1 (Figure 4), representative of the highest hydrocarbon concentrations encountered. These analytical samples were placed in a cooler with

ice substitute, refrigerated, and transferred to CT&E's on September 28. CT&E analyzed the soil samples for DRO using Alaska Method AK 102, and GRO/BTEX compounds using Alaska Method AK 101/EPA 8021B. One sample was further analyzed for polynuclear aromatic (PNA) analytes using EPA Method SW846-8310.

2.5.2 Vent Stacks and Air-Quality Monitoring

Monitoring of the PVE system included periodic hydrocarbon screening of the vent stacks and quarterly air-quality sampling and testing. A sampling hole was drilled into each vent stack about 4 feet above the ground and fitted with a 1/4-inch steel, square-head plug. The plug was unscrewed, and a Photovac 2020 PID probe was inserted at the sampling port to measure total hydrocarbons in the off-gas streams. The eight vent stacks were field-screened on July 31, August 25, September 25, and November 27, 1998, and on January 6 and March 11, 1999. Weather conditions and operating conditions of the turbine ventilators were noted on each sampling day.

Quarterly air-quality sampling for analytical testing was performed on September 25, 1998, January 6, 1999, and March 11, 1999. Stainless steel sample cylinders were provided by CT&E at negative pressure (under vacuum). By opening a valve at either end of the cylinder, a gas sample can be drawn in. Because of atmospheric conditions and turbine ventilator mechanics, the vent stacks may also exert a low vacuum. To overcome this negative pressure in the stack and provide a representative soil-gas sample, an electric vacuum pump was used to draw air from the stack and through the cylinder. The cylinders were connected with tygon tubing at each end. The free ends of the tubing were then connected, one to the stack and the other to the vacuum pump. Valves on the cylinder were opened, and a sample of the off-gas stream was drawn through the cylinder. After a period of 2 minutes, the cylinder valves were closed and the pump turned off. This method was used on one vent stack from each vent stack grouping (Figure 2) representative of the three subsurface treatment regions. (Typically, the vent stack exhibiting the highest level of hydrocarbons from field-screening was sampled.) These samples were submitted to CT&E for GRO and BTEX analyses.

2.5.3 Quality Assurance/Quality Control

Standard quality control (QC) for [biocell] soil sampling consisted of the collection of a field duplicate sample(s) and the summary statistic of relative percent difference (RPD) between the duplicate and its counterpart field sample. Furthermore, soil and air-quality samples were analyzed in accordance with the laboratory's Quality Assurance Program Plan (QAPP) on file with the ADEC. Quality control for biocell soil sampling is further discussed in Section 4.0.

2.5.4 Operation and Maintenance

Operation and maintenance (O&M) at the site incorporated periodic inspection of the vent stack turbine ventilators, monitoring of the PVE system for effectiveness, off-gas monitoring, inspection of the stockpile and biocell, and biocell dewatering as necessary. During each vent stack monitoring and air-quality sampling event the turbine ventilators were inspected for obstructions and integrity. The stockpile and biocell liners, visible along the perimeter berms, were inspected for integrity.

The biocell was dewatered once on August 25, 1998, after heavy rains. A centrifugal pump was used to transfer the water into two 55-gallon drums. A single sample of this water was collected and laboratory analyzed for BTEX compounds according to EPA Method 602 before disposal. This procedure will be used for future biocell dewatering [as necessary] throughout the landfarming operation.

3.0 SUMMARY RESULTS

3.1 Biocell Water

According to the laboratory analytical data for the biocell water sample (X-0911-082698-POL1), no individual BTEX compound was measured in excess of 0.001 mg/L. At this level, the biocell water is not considered contaminated according to the ADEC 18 AAC 75, Oil and Hazardous Substances Pollution Control Regulations (adopted January 22, 1999) Table C Groundwater Cleanup Levels. (The groundwater cleanup levels for benzene, toluene, ethylbenzene, and total xylenes are 0.005, 1.0, 0.7, and 10.0 mg/L, respectively.) The drummed water was consequently dumped onto the ground.

3.2 Off-Gas Emissions

A summary of the PVE system monitoring results is presented in Table 1. Vent stacks VS-1, VS-2, and VS-3 discharge soil gas from the dispenser island ventilation pipes and two vapor extraction wells. Vent stacks VS-4, VS-5, and VS-6 discharge soil gas from four vapor extraction wells installed in and around the southern half of the original UST excavation area. The remaining two extraction wells off-gas from the north end of the original UST locations to vent stacks VS-7 and VS-8.

The Table 1 PID field-screened results reflect elevated total hydrocarbon concentrations (greater than 900 ppm) off-gassing from vapor extraction wells VS-1, VS-2, VS-5, VS-6, and VS-8 during the summer of 1998. Concentrations above 500 ppm were recorded in three of these vent stacks through November. Hydrocarbon off-gas concentrations less than 200 ppm were measured in vent stacks VS-3, VS-4, and VS-7. Low-level hydrocarbon degradation (less than 100 ppm) was evidenced from the PID measurements collected in January 1999. However, on March 11, 1999, field-screening results indicated a marked increase in hydrocarbon volatilization in the subsurface. Hydrocarbon concentrations between 100 and 500 ppm were recorded in five of the eight [vent stack] off-gas streams. PID measurements from vent stacks VS-2, VS-5, and VS-6 exhibited 858, 1653, and 2000+ ppm hydrocarbons in the soil gas streams.

The quarterly air-quality monitoring results for the three sampling events are also summarized in Table 1. From the September 25, 1998, sampling event, GRO, benzene, and toluene

concentrations were reported at 32.9, 2.19, and 2.54 ppm, respectively, in the VS-7 off-gas stream. The benzene concentration in the VS-5 off-gas stream was reported at less than 20 ppm. Otherwise, BTEX constituents were measured at less than 1 ppm in off-gas emissions. (The sample 911-92598-VS2 results are not considered comparable because of a modified sampling technique associated with an irregular cylinder configuration.) GRO concentrations of 62.1, 67.7, and 92.5 ppm were reported in the VS-2, VS-6, and VS-8 off-gas streams, respectively, for the January 6, 1999, sampling event. Toluene and total xylenes were reported at 1.93 and 3.65 ppm in the VS-2 vapor stream; respective concentrations of 2.21 and 3.91 ppm were reported at VS-6. Furthermore, toluene, ethylbenzene, and total xylenes were reported at 4.54, 1.12, and 6.66 ppm, respectively, in the VS-8 vapor stream. Otherwise, January 6, 1999, BTEX constituents were reported at less than 1 ppm in the off-gas emissions.

3.3 Biocell Soil

A summary of the analytical results for the first soil lift to undergo landfarming is presented in Table 2; the biocell field-screening results are reported in Figure 4. The five analytical soil samples (including one duplicate) were reported to contain DRO and GRO concentrations ranging from 56.8 to 250 mg/kg and 6.02 to 81.1 mg/kg, respectively. Benzene was not reported higher than 0.311 mg/kg in any of the soil samples. Ethylbenzene and toluene constituents reportedly did not exceed 0.9 mg/kg. Total xylenes ranged from 0.398 to 7.22 mg/kg in the CT&E results.

A comparison is made in Table 3 of the highest reported DRO (sample 911-92598-C1) and GRO (sample 911-92598-B1) concentrations in the biocell soils with the ADEC 18AAC75, Articles 3 and 9 cleanup standards. EPA risk-based concentrations and soil screening levels are also considered for sample 911-92598-B1 PNA comparisons. The analytical results indicated that none of the soils tested contained DRO, GRO, or BTEX analytes in excess of the ADEC cleanup standards for inhalation. The PNA concentrations reported do not exceed the EPA Region III risk-based concentrations for transfer from soil to air for the analytes listed in Table 3.

4.0 DISCUSSION AND CONCLUSIONS

Based on the monitoring results, the upgraded PVE system is exhibiting periods where low to high levels of hydrocarbons are being volatilized from remaining soil contamination at the site. The original ventilation pipe network, together with extraction wells VE-5 and VE-8, is effectively removing hydrocarbons from the dispenser island subsurface. Similar results have been realized for the other two extraction well/pipe networks straddling the original USTs excavation area.

Generally, the field-screening results are qualitative indicators of the overall hydrocarbon degradation occurring with the PVE system at any given time. The air-quality analytical results are quantitative in that they are a measure of specific contaminant concentrations within the vented vapor streams. No direct correlation can be made between the two types of results for a couple of reasons. First, total hydrocarbon emissions from the subsurface are comprised of those degraded (through bioactivity and volatilization) from petroleum contaminants and biogenic decay of other natural organics. Existing laboratory testing methodology does not adequately differentiate between the two. Second, biodegradation and volatilization rates vary with temperature and pressure in the subsurface. Also, without wind, hydrocarbons may accumulate within horizontal pipe runs and not readily move through the networks. Sudden turbine ventilator acceleration/deceleration can produce variable hydrocarbon concentrations at the sampling ports. Although there is little correlation between the analytical results and field-screening measurements, a pattern is hypothesized consistent with the evidence of subsurface hydrocarbon degradation.

The different levels of hydrocarbon emissions from the subsurface appear to be more a function of vapor pressure and extraction flow rate variability, rather than seasonal changes in weather. First, consider that the whole of the UST excavation area and surrounding parking lot was surfaced with asphalt in September 1998. Consequently, all of the PVE treatment area is essentially covered with relatively impermeable surfacing. During periods of low or no wind, the turbine ventilators have little influence on subsurface hydrocarbon volatilization. Conversely, with moderate to high winds, the turbine ventilators induce a pressure differential

across the surface "impermeable boundary". If the wind period is long enough, air flow through the subsurface is induced from the lateral boundaries of the treatment regime. Hydrocarbon volatilization can be expected to increase with dynamic [air] flow through petroleum contaminated porous media. The data collected since August 1998 at Jack's Service supports this hypothesis.

The onset of winter will have some diminishing effect on the rate of subsurface remediation at this site. With the inception of freezing air temperatures, the ground begins to freeze from the surface downward. As the "freeze-front" moves progressively down through the treatment regime, the upper realm of contaminated soil freezes. Consequently, hydrocarbon volatilization will generally be restricted to that portion of the subsurface that remains unfrozen.

With a lined biocell containing petroleum-contaminated soils, human exposure by inhalation is of primary concern rather than the migration to groundwater pathway. The ADEC 18 AAC 75, Articles 3 and 9, Tables B1 and B2 (for inhalation) soil cleanup levels were approved in our *Corrective Action Plan* (report dated April 8, 1998). Under this standard, the soil cleanup levels for GRO, DRO, and benzene are 1400, 12500, and 9 mg/kg, respectively. The analytical results for the soil samples indicate that the first lift of biocell soils do not exceed the Table B1 and Table B2 ADEC-approved soil cleanup standards for GRO, DRO, benzene, and BTEX compounds. Consequently, we provided the ADEC with a copy of the analytical results and received their approval to remove the soil from the biocell. This approval implies that the ADEC is satisfied that the applicable cleanup criteria have been met for the soil presently in the biocell.

We intend to remove the remediated soil from the biocell after it thaws and before the next soil lift is transferred from the stockpile. At this time, the owners have not identified a location for the treated soil. Prior to final disposition, we will request approval from the ADEC.

It is our opinion that PVE treatment will continue to be effective in remediating remaining soil contamination at Jack's Service. Our next quarterly air-quality sampling event is scheduled for June 1999; we will continue to monitor the site according to the continuation cleanup grant requirements. Weather permitting, we anticipate effective landfarming of two to three more soil

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lifts in the biocell September through October 1999. At this rate, the stockpile may be successfully bioremediated by the summer of 2001.

5.0 LIMITATIONS

The conclusions we have presented in this report are based on our observations and monitoring, and the CT&E reported analytical results for biocell soils and PVE system air-quality sampling. They should not be construed as a guarantee of any soil or air quality at the site. Our soil sampling was intended to confirm the presence or absence of selected contaminants at the biocell locations sampled. Our air-quality sampling was intended for remediation system and off-gas evaluations only. Therefore, conclusions cannot be drawn on the presence or absence of contaminants for which laboratory analyses were not run. Nor can conclusions be construed about the magnitude of remaining subsurface contamination. Consequently, the analysis and sampling performed can only provide you with our judgment of system treatment efficacy and the environmental characteristics of the biocell soil, and in no way guarantees that an agency or its staff will reach the same conclusions.

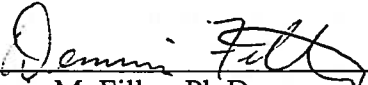
Changes in site conditions can occur with time because of natural forces or human activity. The data presented in this report should be considered representative only of the time the data were collected. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

This report was prepared for the exclusive use of Mr. Bill Adams and the Alaska Department of Environmental Conservation for the corrective action of fuel contamination at Jack's Service, UST Facility #1776, in Delta Junction, Alaska. Our work was performed in accordance with the approved scope of work.

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If this report is made available to others, it should be for information on factual data only and not as a warranty of described conditions, such as those interpreted from the discussions of biocell soil and subsurface conditions included in this report.

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Dennis M. Filler, Ph.D.
Engineer


Reviewed by 
David M. McDowell
Senior Associate

TABLE 1
PASSIVE VAPOR EXTRACTION SYSTEM MONITORING RESULTS
(concentrations in parts per million - ppm)

Vent Stack	Date*	PID	Air Quality Sample No. •	GRO	Benzene	Toluene	Ethylbenzene	Total Xylenes
VS-1	Jul. 31, 1998	1180						
	Aug. 25, 1998	1152						
	Sept. 25, 1998	900						
	Nov. 27, 1998	611						
	Jan. 6, 1999	0						
	Mar. 11, 1999	235						
VS-2	Jul. 31, 1998	1307						
	Aug. 25, 1998	1602						
	Sept. 25, 1998	1580	911-92598-VS2	<20	<0.78	<0.66	<0.58	<1.34
	Nov. 27, 1998	1040						
	Jan. 6, 1999	8.1	911-010699-VS2	62.1	<0.78	1.93	<0.58	3.65
	Mar. 11, 1999	858	911-031199-VS2	577	11.2	9.56	<0.58	4.09
VS-3	Jul. 31, 1998	481						
	Aug. 25, 1998	235						
	Sept. 25, 1998	5						
	Nov. 27, 1998	165						
	Jan. 6, 1999	0						
	Mar. 11, 1999	129						
VS-4	Jul. 31, 1998	137						
	Aug. 25, 1998	79						
	Sept. 25, 1998	170						
	Nov. 27, 1998	149						
	Jan. 6, 1999	0						
	Mar. 11, 1999	148						
VS-5	Jul. 31, 1998	2000+						
	Aug. 25, 1998	2000+						
	Sept. 25, 1998	305	911-92598-VS5	<20	<0.78	<0.66	<0.58	2.95
	Nov. 27, 1998	998						
	Jan. 6, 1999	136						
	Mar. 11, 1999	1653						
VS-6	Jul. 31, 1998	1161						
	Aug. 25, 1998	2000+						
	Sept. 25, 1998	6						
	Nov. 27, 1998	414						
	Jan. 6, 1999	223	911-010699-VS6	67.7	<0.78	2.21	0.68	3.91
	Mar. 11, 1999	2000+	911-031199-VS6	2080	154	145	4.23	20.68
VS-7	Jul. 31, 1998	97						
	Aug. 25, 1998	112						
	Sept. 25, 1998	13	911-92598-VS7	32.9	2.19	2.54	<0.58	<1.16
	Nov. 27, 1998	34						
	Jan. 6, 1999	0						
	Mar. 11, 1999	107						
VS-8	Jul. 31, 1998	1168						
	Aug. 25, 1998	998						
	Sept. 25, 1998	3						
	Nov. 27, 1998	175						
	Jan. 6, 1999	0	911-010699-VS8	92.5	<0.78	4.54	1.12	6.66
	Mar. 11, 1999	465	911-031199-VS8	253	20.9	27.5	1.27	6.80

* Weather: Jul. 31, 1998 - wind <5 mph, overcast and 78°F; Aug. 25, 1998 - wind 15-20 mph, partly cloudy and 78°F; Sept. 25, 1998 - wind <5 mph, overcast and 50°F; Nov. 27, 1998 - wind 10-15 mph, clear and -5°F; Jan. 6, 1999 - wind <1 mph, overcast and -15°F; Mar. 11, 1999 - wind 10-15 mph, partly cloudy and 22 °F.

• Analyzed using CT&E Method 8015M/8021B (modified EPA Method 8015/8020).

TABLE 2
SUMMARY OF BIOCELL SOIL ANALYTICAL RESULTS
(concentrations in mg/kg unless otherwise specified)

	Sample ID:	911-92598-A3	911-92598-B2	911-92598-C1	911-92598-B1	911-92598-B6
	Fig.4 location:	A3	B2	C1	B1	(duplicate
	Date:	9/25/98	9/25/98	9/25/98	9/25/98	of
	Depth (ft.):	0.7 – 1.0	0.7 – 1.0	0.7 – 1.0	0.7 – 1.0	911-92598-B1)
Parameter	PID (ppm):	36	42	52	55	
DRO*		150	99.3	250	56.8	115
GRO*		6.02	19.2	15.7	81.1	11
Benzene*		<0.05	<0.04	<0.04	<0.32	<0.04
Total BTEX*		<0.7	<1.5	<1.2	<9.1	<0.9
<i>Polynuclear Aromatics*</i> :						
Naphthalene					<0.31	
Acenaphthylene					<0.31	
Acenaphthene					2.2	
Fluorene					0.045	
Phenanthrene					0.18	
Anthracene					0.024	
Fluoranthene					0.021	
Pyrene					0.057	
Benzo (a) anthracene					<0.007	
Chrysene					0.032	
Benzo (b) fluoranthene					0.021	
Benzo (k) fluoranthene					<0.008	
Benzo (a) pyrene					0.012	
Dibenzo (a,h) anthracene					<0.0031	
Benzo (g,h,l) perylene					0.018	
Indeo (1,2,3-c,d) pyrene					<0.0031	

* DRO analysis by Method AK102, GRO/BTEX analyses by Methods AK101/EPA 8021B

* Polynuclear aromatics analysis by EPA Method SW846-8310

TABLE 3
MAXIMUM SOIL CONCENTRATIONS AND CLEANUP LEVELS
 (concentrations in mg/kg)

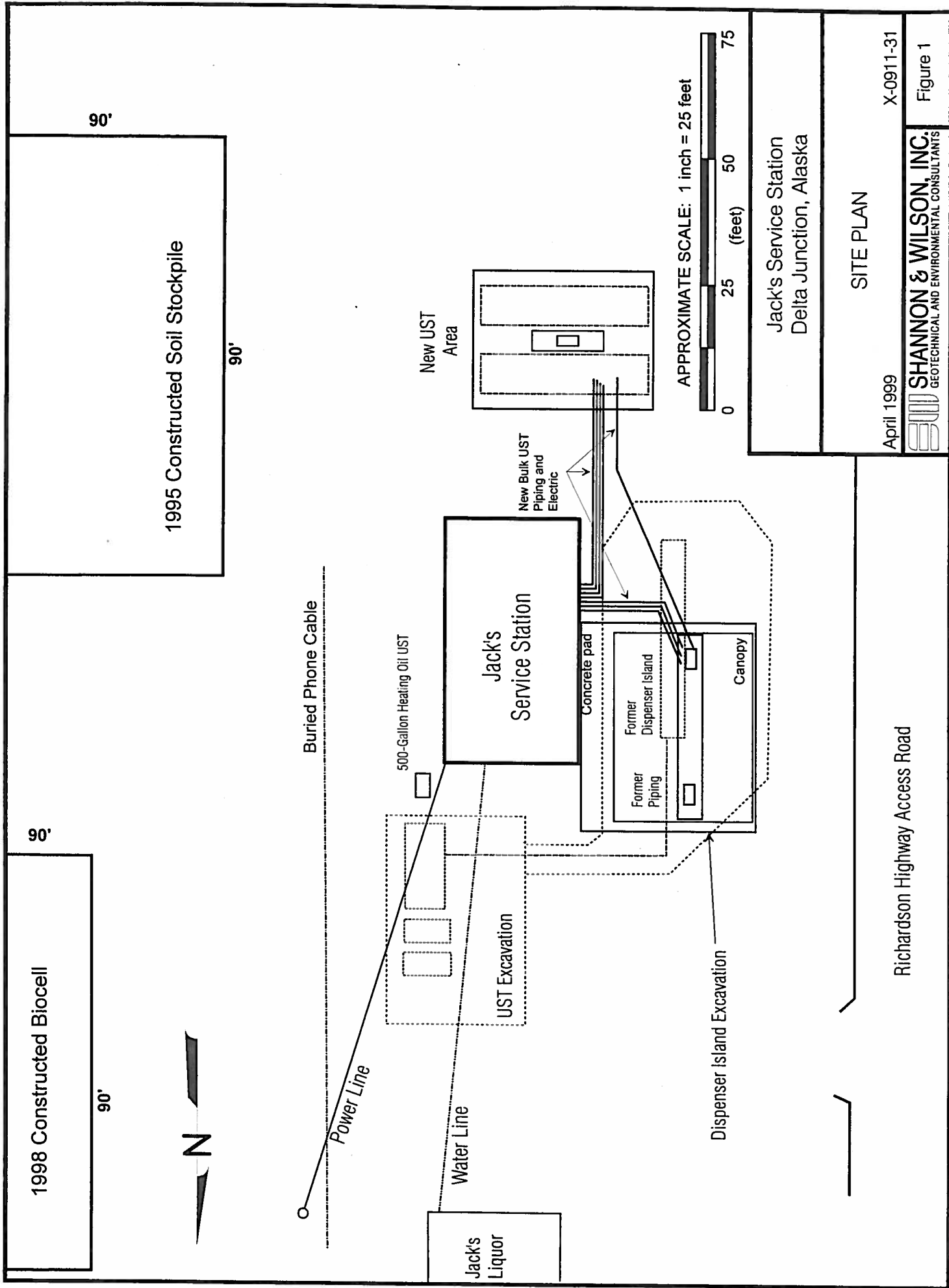
Analyte	Biocell Sample 911-92598-B1	EPA Risk-Based Concentrations Soil Ingestion		EPA Soil Screening Levels Transfers from Soil to:		ADEC 18 AAC75, Articles 3 and 9 (Jan. 22, 1999), Under 40-inch Zone*		
		Industrial	Residential	Air	GW	Ingestion	Inhalation	Migration to Groundwater
Acenaphthene	2.20E+00	1.20E+05	4.70E+03	1.20E+02	2.00E+02	6.10E+03	na	2.10E+02
Acenaphthylene	<0.31	na	na	na	na	na	na	na
Anthracene	2.40E-02	6.10E+05	2.30E+04	6.80E+00	4.30E+03	3.00E+04	na	4.30E+03
Benzo (a) anthracene	<0.007	7.80E+00	8.80E-01	2.70E+01	7.00E-01	1.10E+01	na	6.00E+00
Benzo (a) pyrene	1.20E-02	7.80E-01	8.80E-02	1.10E+01	4.00E+00	1.00E+00	na	3.00E+00
Benzo (b) fluoranthene	2.10E-02	7.80E+01	8.80E+00	0.00E+00	4.00E+00	1.10E+01	na	2.00E+01
Benzo (g,h,i) perylene	1.80E-02	na	na	na	na	na	na	na
Benzo (k) fluoranthene	<0.008	7.80E+01	8.80E+00	0.00E+00	4.00E+00	1.10E+02	na	2.00E+02
Crysene	3.20E-02	7.80E+02	8.80E+01	3.60E+00	1.00E+00	1.10E+03	na	6.20E+02
Dibenzo (a,h) anthracene	<0.0031	7.80E-01	8.80E-02	7.20E+00	1.10E+01	1.00E+00	na	6.00E+00
Fluoranthene	2.10E-02	8.20E+04	3.10E+03	6.80E+01	9.80E+02	4.10E+03	na	2.10E+03
Fluorene	0.045	8.20E+04	3.10E+03	8.90E+01	1.60E+02	4.10E+03	na	2.70E+02
Indeo (1,2,3-c,d) pyrene	<0.0031	7.80E+00	8.80E-01	2.80E+02	3.50E+01	1.10E+01	na	5.40E+01
Naphthalene	<0.31	8.20E+04	3.10E+03	1.80E+01	3.00E+01	4.10E+03	na	4.30E+01
Phenanthrene	0.18	na	na	na	na	na	na	na
Pyrene	0.057	6.10E+04	2.30E+03	5.60E+01	1.40E+03	3.00E+03	na	1.50E+03
Benzene	<0.32	2.00E+02	2.20E+01	5.00E-01	2.00E-02	2.90E+02	9.00E+00	2.00E-02
Toluene	0.875	4.10E+05	1.60E+04	5.20E+02	5.00E+00	2.03E+04	1.80E+02	5.00E+00
Ethylbenzene	0.617	2.00E+05	7.80E+03	2.60E+02	5.00E+00	1.00E+04	8.90E+01	6.00E+00
Xylenes	7.22	1.00E+06	1.60E+05	3.20E+02	7.40E+01	2.03E+05	8.10E+01	7.80E+01
Gasoline Range Organics	81.1	na	na	na	na	1400***	1400***	300***
Diesel Range Organics	250**	na	na	na	na	10250***	12500***	250***

Notes: na - not available

* Table B1, Method Two

** Sample 911-92598-C1 (highest DRO concentration reported among biocell soil samples from first lift)

*** Table B2, Method Two



April 1999

X-0911-31

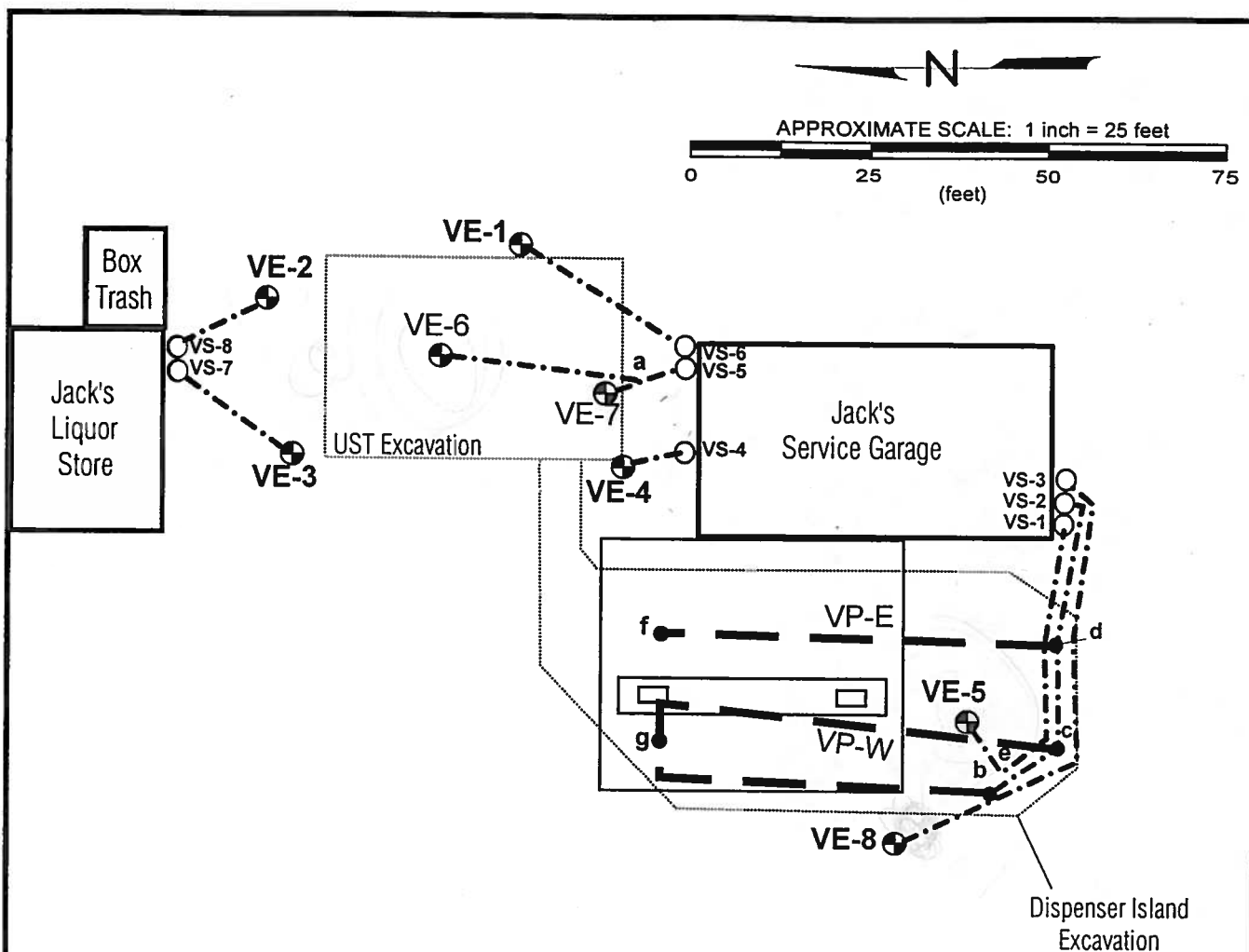
SITE PLAN

Jack's Service Station
Delta Junction, Alaska

Richardson Highway Access Road

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



Location Invert Depth Below Grade (inches)

VE-1	40
VS-6	29
VE-2	36
VS-8	15
VE-3	34
VS-7	15
VE-4	17
VS-4	12
VE-5	40
e	36
VS-1	18
VE-6	48
a	36
VS-5	31
VE-7	36
VE-8	44
VS-3	18
b	33
c	30
d	26
VS-2	18

LEGEND:

- Horizontal ventilation piping installed during 1995 UST closure activity
- Horizontal ventilation piping installed during 1998 vapor extraction system modification activity
- VE-6 Vertical vapor extraction well installed during 1997 Release Investigation
- VE-2 Vertical vapor extraction well installed during 1998 vapor extraction system corrective action
- VS-6 Vent stack equipped with turbine ventilator

Jack's Service Station
Delta Junction, Alaska

PASSIVE VAPOR EXTRACTION SYSTEM

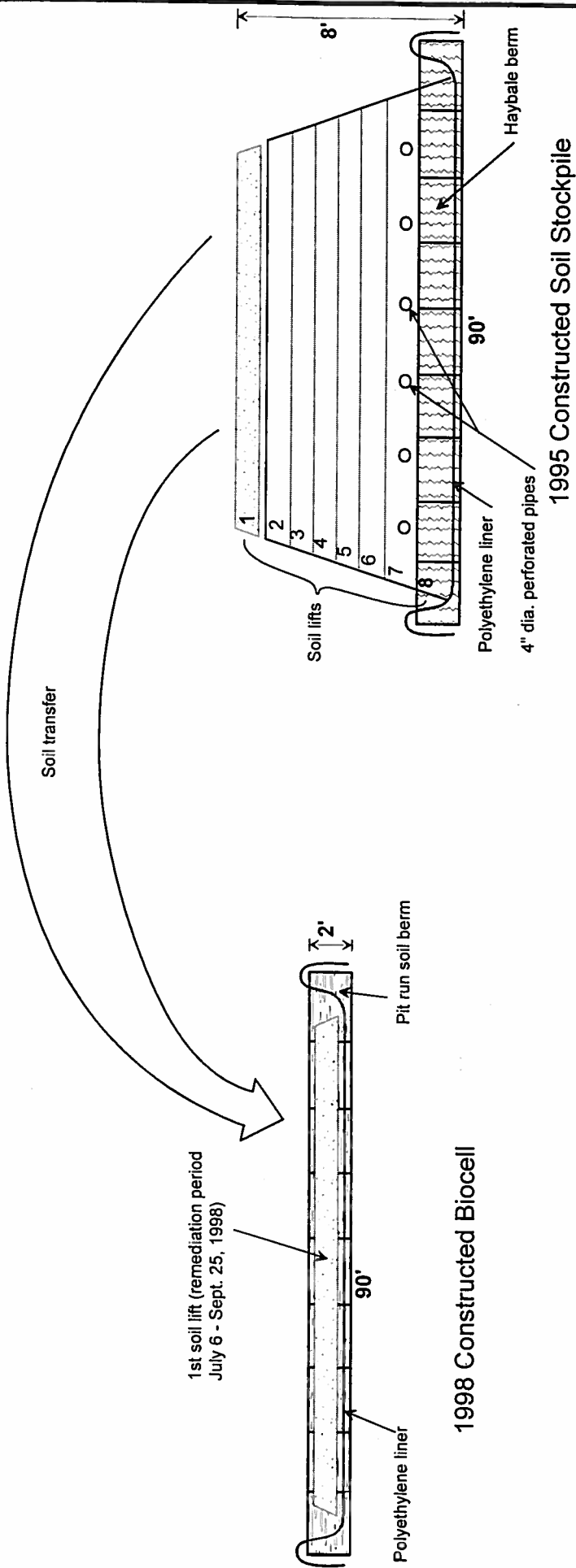
April 1999

X-0911-31

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Figure 2

Not to Scale



Note: After each soil lift is transferred, tilling and fertilization is applied at both the biocell and original stockpile (landfarming).

Jack's Service Station
Delta Junction, Alaska

LANDFARMING SCHEME

April 1999

X-0911-31

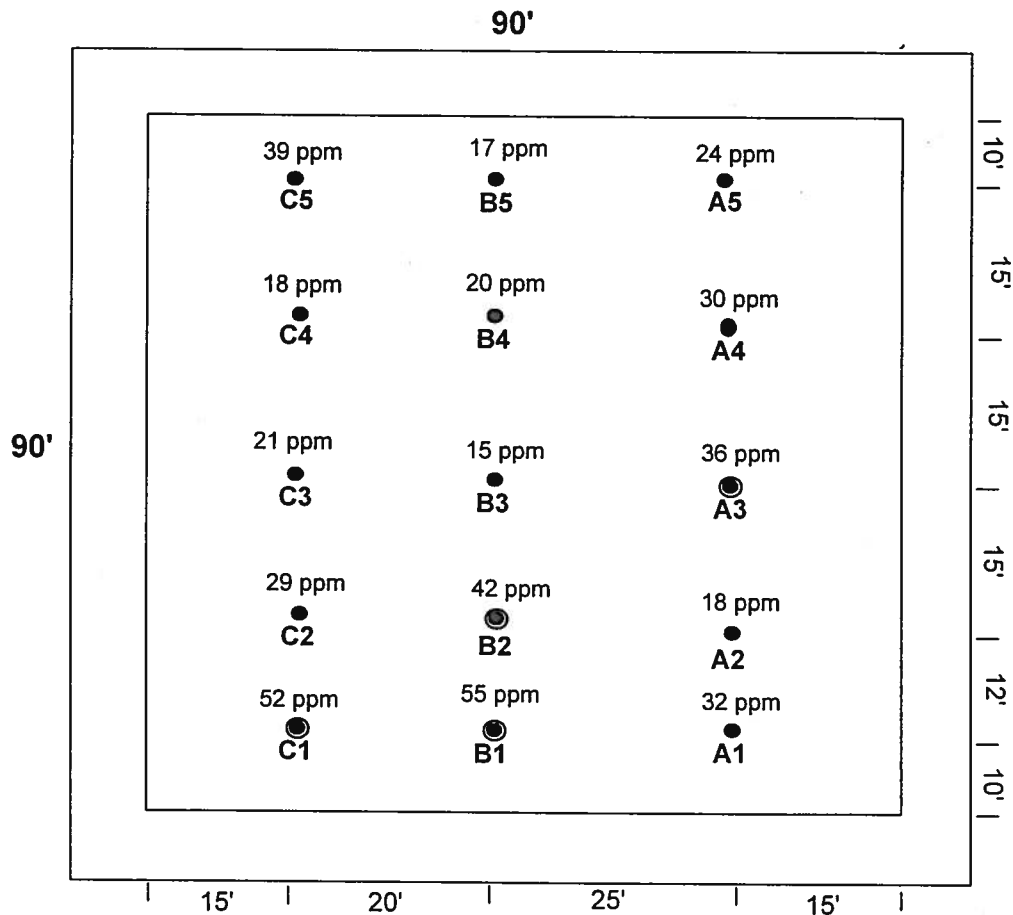


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Figure 3



Not to Scale



Biocell for Landfarming

Legend

- C1 Soil sample and field screen location
- 35 ppm (PID results given in ppm)
- A1 Field screen location

Note: Soil samples collected from the first soil lift on Sept. 25, 1998, after two months of landfarming treatment.

Jack's Service Station
Delta Junction, Alaska

BIOCELL SOIL SAMPLE LOCATIONS

April 1999

X-0911-31



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Figure 4



Typical vapor extraction well installation (July 1998).



Completed vapor extraction well (July 1998).

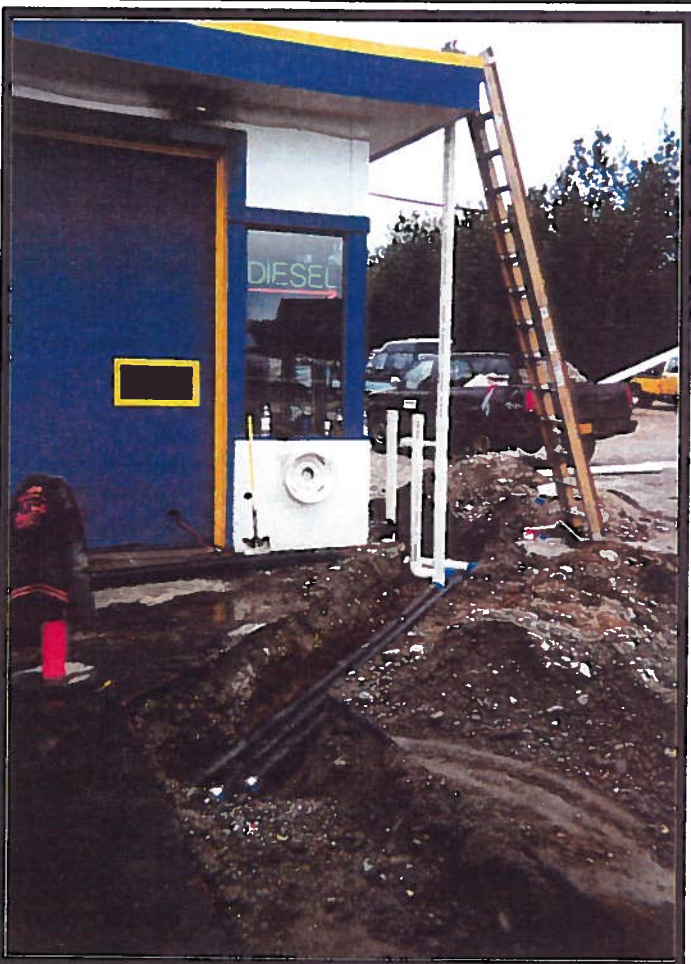


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Appendix A



Installation of vapor extraction pipe runs.



Underground pipe runs to vent stacks.



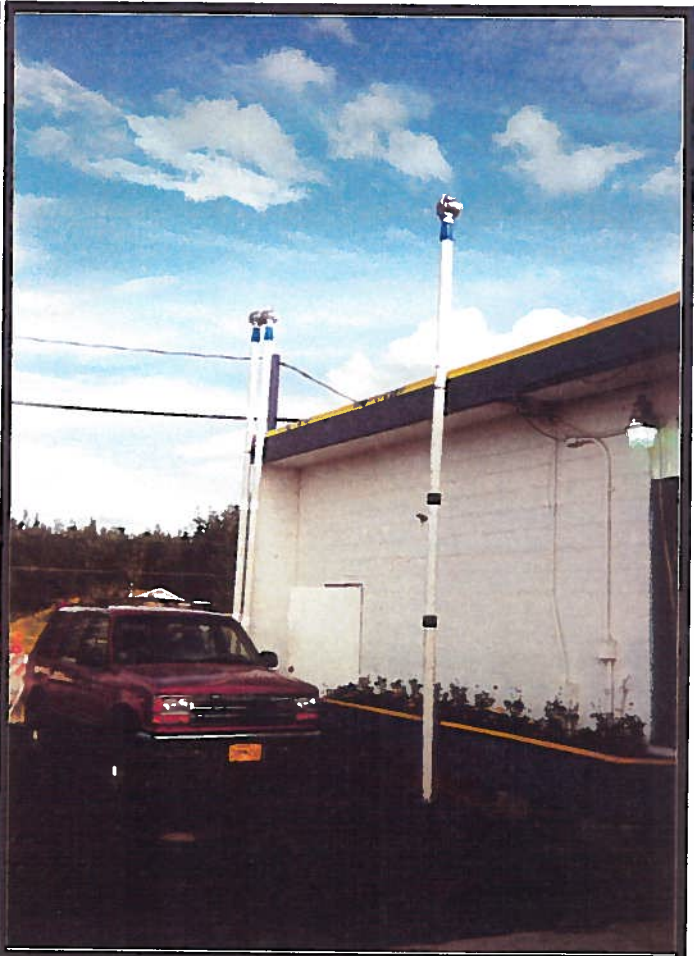
Compacting backfilled pipe network trench excavation.



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Completed vent stacks VS-7 and VS-8.



Completed vent stacks VS-4, VS-5, and VS-6..



Biocell with first soil lift tilled and fertilized (July 1998).



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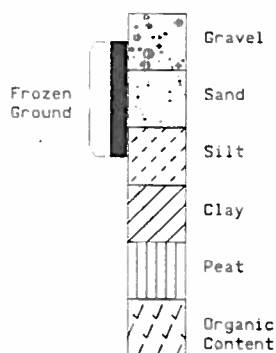
Appendix A

SOIL DESCRIPTION	FROZEN	GRAPHIC LOG	DEPTH	SAMPLE	GROUND WATER	DEPTH	PENETRATION RESISTANCE (300 lb weight, 30 in drop) ▲ Blows per Foot
Surface Elevation:							0 20 40
Sandy gravel (fill)			1.0			0.0	
Brown to dark brown silt; hydrocarbon odor; frozen from 6 to 7 feet.					Bentonite	5.0	
						10.0	
						15.0	
Dark brown sandy gravel with cobbles.			16.0		Silica sand		
			19.0			20.0	
						25.0	
						30.0	
						35.0	
						40.0	
						45.0	

Bottom of Boring
Boring Completed June 23, 1998

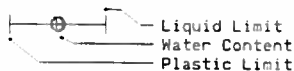
Auger refusal at 19.0 ft
Vapor extraction well details:
4-inch PVC
Set to 19.0 ft
Flushmount with helmet top
Screened from 4-19 ft
Machine slotted, 0.02 in
Silica sand from 4-19 ft
Bentonite seal from 3-4 ft

LEGEND



- Impervious Seal
- Water Level
- Screened Interval
- Thermistor
- 3 in O.D. Split Spoon Sample
- 3 in O.D. Thin-wall Sample
- Grab Sample
- 3 in O.D. Dry Core Run
- Nx Rock Core
- Sample Not Recovered

ATTERBERG LIMITS



Note: Stratification lines represent approximate boundaries between soil types and transition may be gradual.

Jack's Service Station
Delta Junction, Alaska

Log of Vapor Extraction Well VE-1

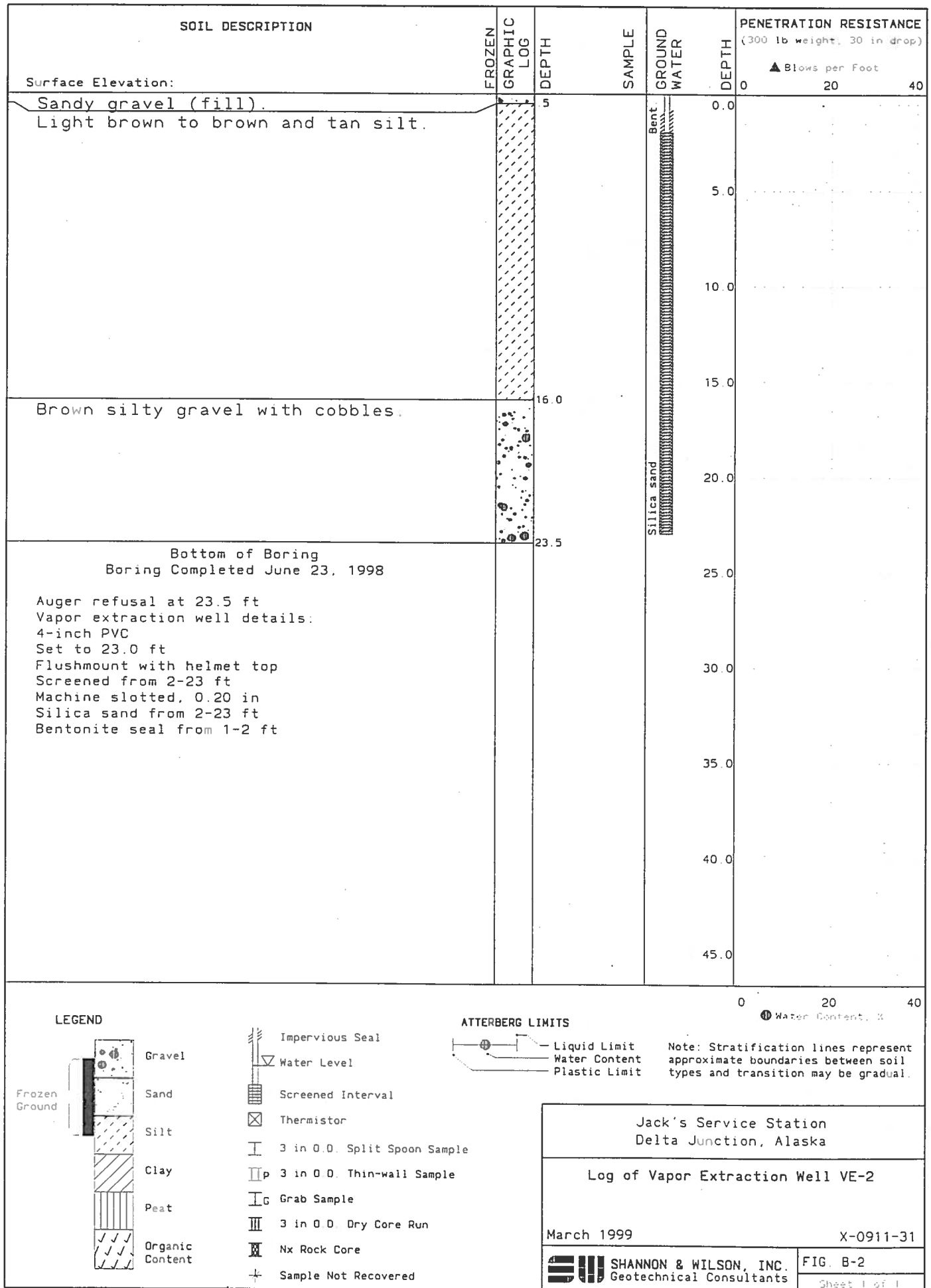
March 1999

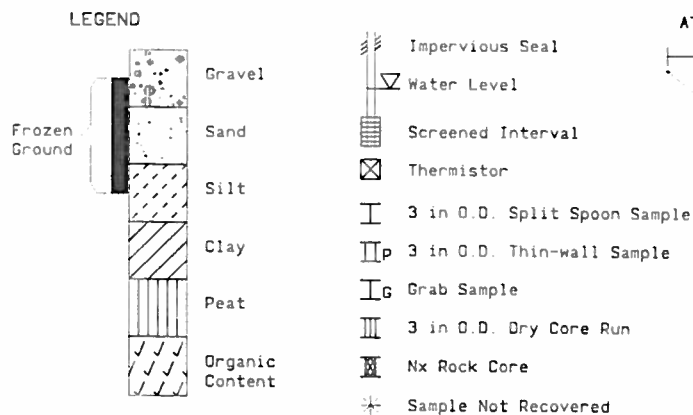
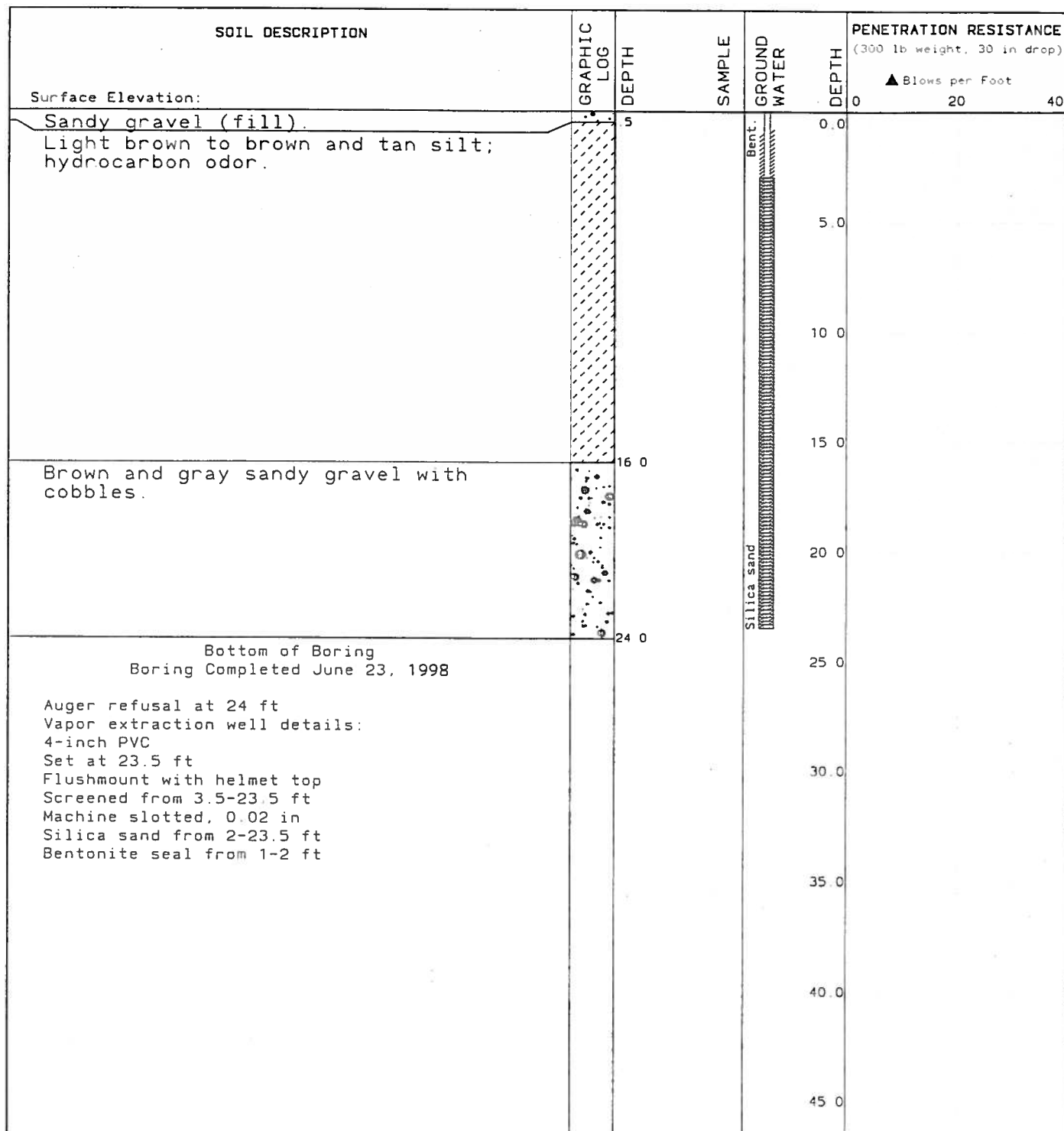
X-0911-31

SHANNON & WILSON, INC.
Geotechnical Consultants

FIG. B-1

Sheet 1 of 1





ATTERBERG LIMITS



Note: Stratification lines represent approximate boundaries between soil types and transition may be gradual.

Jack's Service Station
Delta Junction, Alaska

Log of Vapor Extraction Well VE-3

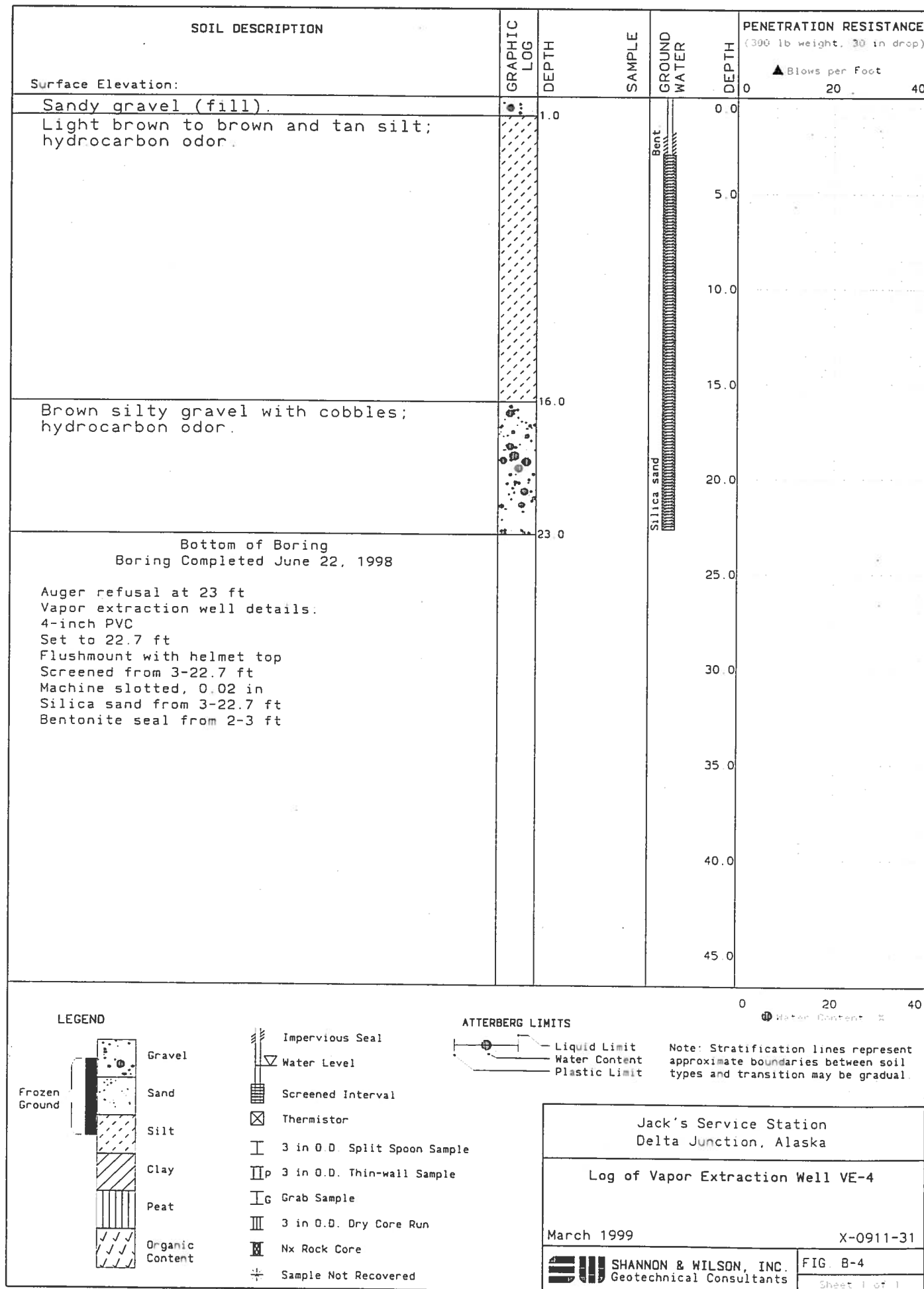
March 1999

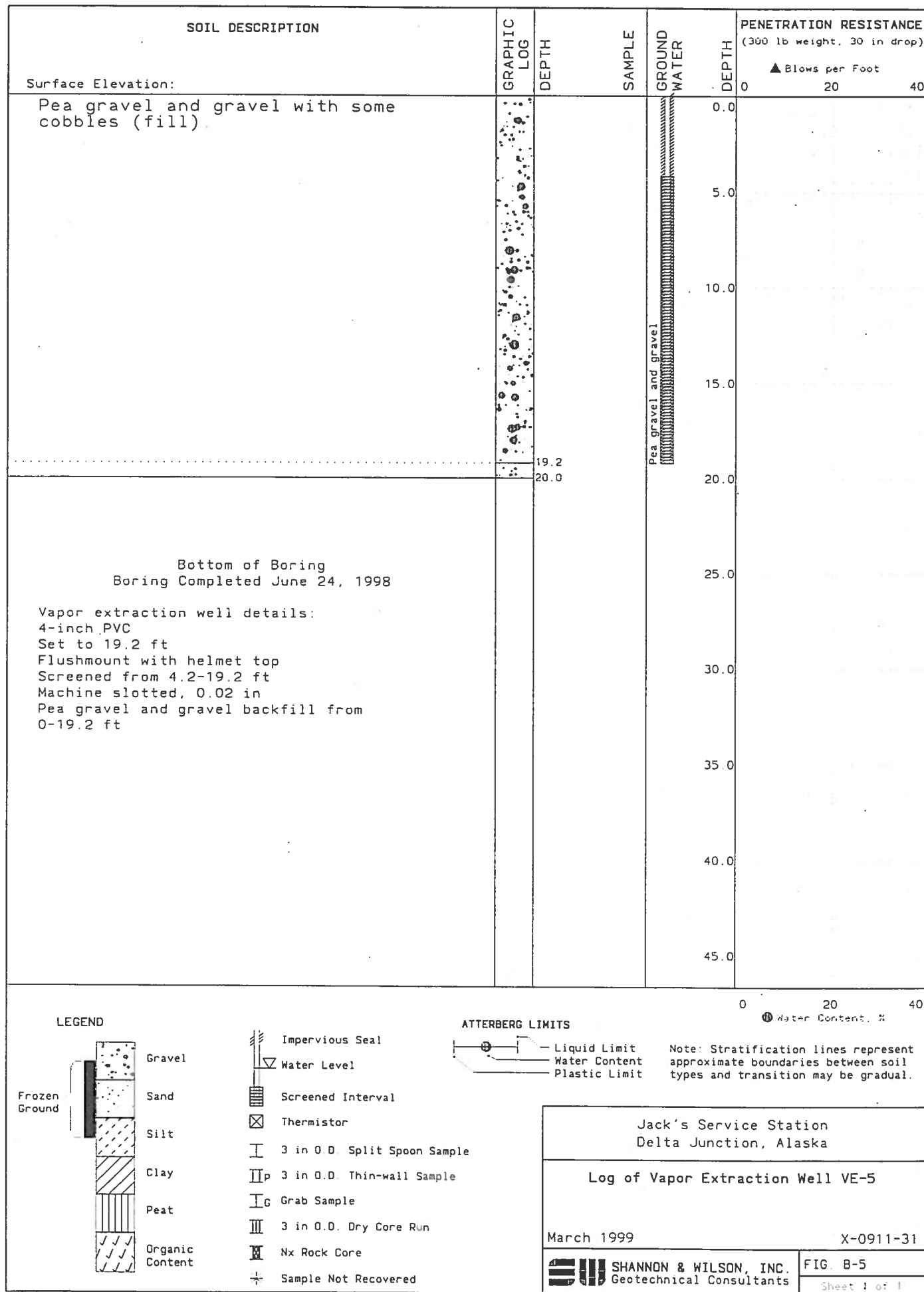
X-0911-31

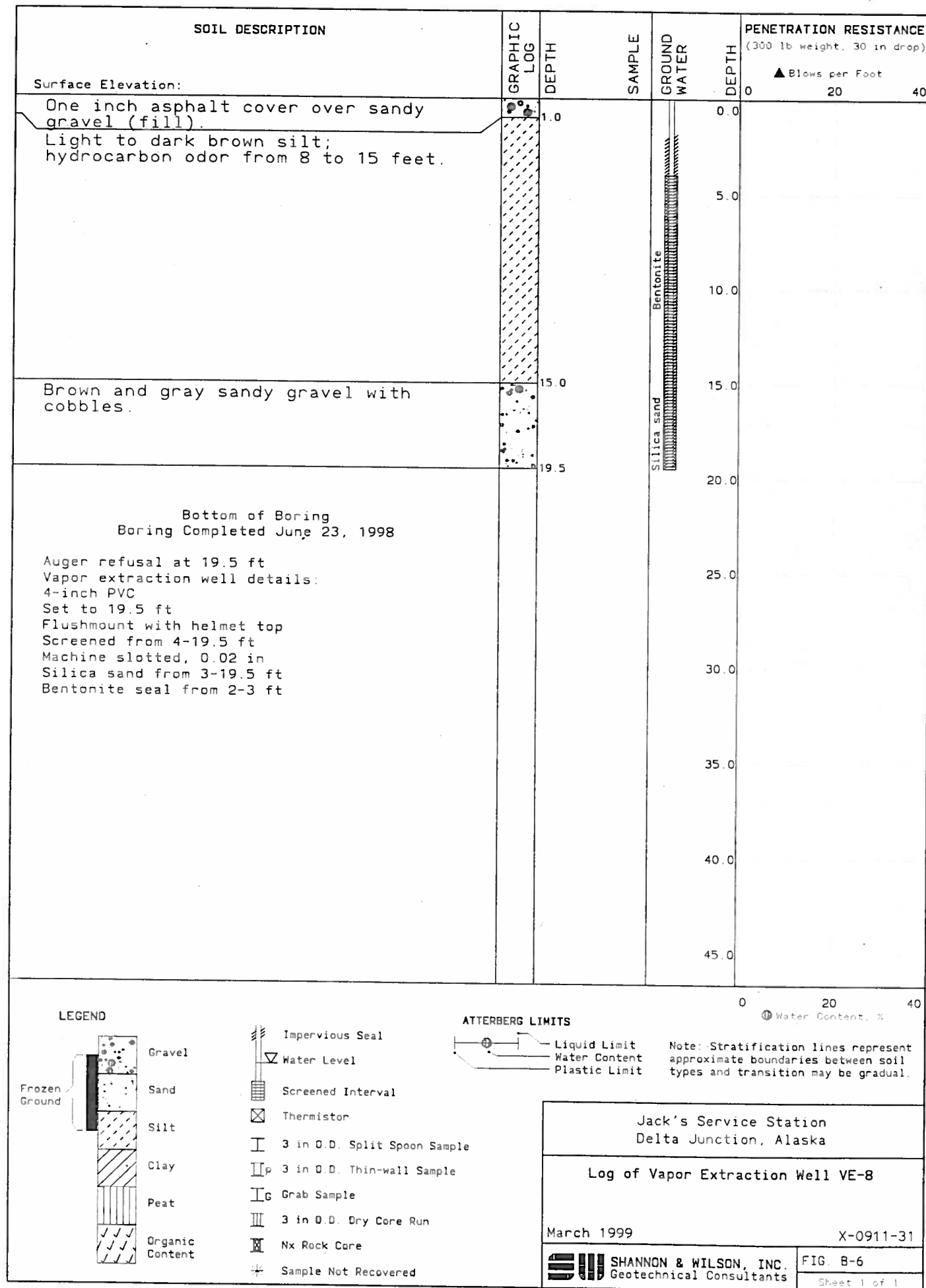
SHANNON & WILSON, INC.
Geotechnical Consultants

FIG. B-3

Sheet 1 of 1









CT&E Environmental Services Inc.

Laboratory Division

Laboratory Analysis Report

September 01, 1998

DENNIS FILLER
Shannon & Wilson-Fairbanks
2055 HILL ROAD
Fairbanks, AK 99707

Client Name	Shannon & Wilson-Fairbanks
Project ID	X-0911-13 JACK'S SERV. STATION [984283]
Printed	September 01, 1998

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 Environmental Services Inc.

CT&E Ref.# 984283001
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911-13 JACK'S SERV. STATION
Client Sample ID 911-082698-POL1
Matrix Water (Surface, Eff., Ground)
Ordered By
PWSID

Client PO#
Printed Date/Time 09/01/98 14:08
Collected Date/Time 08/26/98 09:10
Received Date/Time 08/27/98 09:46
Technical Director: Stephen C. Ede

Released By *Sharon Proctor*

Sample Remarks:

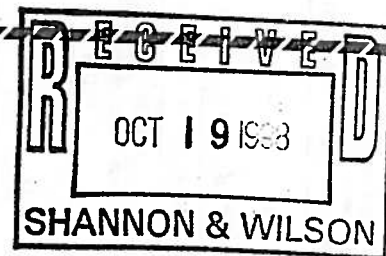
Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
BTEX								
Benzene	0.0010 U	0.0010	mg/L	BTEX EPA 602		08/31/98	08/31/98	WAA
Toluene	0.0010 U	0.0010	mg/L	BTEX EPA 602		08/31/98	08/31/98	WAA
Ethylbenzene	0.0010 U	0.0010	mg/L	BTEX EPA 602		08/31/98	08/31/98	WAA
P & M Xylene	0.0010 U	0.0010	mg/L	BTEX EPA 602		08/31/98	08/31/98	WAA
o-Xylene	0.0010 U	0.0010	mg/L	BTEX EPA 602		08/31/98	08/31/98	WAA
Surrogates								
1,4-Difluorobenzene <Surr>	95.9		%	BTEX EPA 602	(50-150)	08/31/98	08/31/98	



CT&E Environmental Services Inc.

Laboratory Division

Laboratory Analysis Report



October 12, 1998

DENNIS FILLER
Shannon & Wilson-Fairbanks
2055 HILL ROAD
Fairbanks, AK 99707

Client Name	Shannon & Wilson-Fairbanks
Project ID	X-0911 JACKS [985408]
Printed	October 12, 1998

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.# 985408001
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598A3
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 10/12/98 13:14
Collected Date/Time 09/25/98 11:40
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Released By *Shane Patton*

Sample Remarks:

DRO - Pattern consistent with weathered middle distillate.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	80.4		%	SM18 2540G			09/29/98	SKW
GRO/8021 Combo								
Gasoline Range Organics	6.02	1.66	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Benzene	0.0415 U	0.0415	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Toluene	0.135	0.0415	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Ethylbenzene	0.0540	0.0415	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
P & M -Xylene	0.252	0.0415	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
o-Xylene	0.146	0.0415	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Surrogates								
4-Bromofluorobenzene <Surr>	102		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
1,4-Difluorobenzene <Surr>	95.4		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
AK102								
Diesel Range Organics	150	4.31	mg/Kg	AK102 DRO		09/30/98	10/01/98	MMP
Surrogates								
5a Androstane <surr>	99.5		%	AK102 DRO	(50-150)	09/30/98	10/01/98	



CT&E Ref.# 985408002
 Client Name Shannon & Wilson-Fairbanks
 Project Name/# X-0911 JACKS
 Client Sample ID 91192598B1
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 10/12/98 13:14
 Collected Date/Time 09/25/98 11:45
 Received Date/Time 09/28/98 09:15
 Technical Director: Stephen C. Ede

Released By *Shane Proton*

Sample Remarks:

DRO - Pattern consistent with weathered middle distillate.
 GRO/BTEX - Surrogates do not meet QC goals due to matrix interference.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	84.6		%	SM18 2540G			09/29/98 SKW	
Polynuclear Aromatics								
Naphthalene	0.31 U	0.31	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Acenaphthylene	0.31 U	0.31	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Acenaphthene	2.2	0.31	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Fluorene	0.045	0.031	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Phenanthrene	0.18	0.16	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Anthracene	0.024	0.016	mg/Kg	SW846-8310		10/02/98	10/08/98 SPM	
Fluoranthene	0.021	0.0075	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Pyrene	0.057	0.016	mg/Kg	SW846-8310		10/02/98	10/08/98 SPM	
Benzo(a)Anthracene	0.0069	0.0031	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Chrysene	0.032	0.016	mg/Kg	SW846-8310		10/02/98	10/08/98 SPM	
Benzo[b]Fluoranthene	0.021	0.0031	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Benzo[k]fluoranthene	0.0079	0.0031	mg/Kg	SW846-8310		10/02/98	10/08/98 SPM	
Benzo[a]pyrene	0.012	0.0016	mg/Kg	SW846-8310		10/02/98	10/08/98 SPM	
Dibenzo[a,h]anthracene	0.0031 U	0.0031	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Benzo[g,h,i]perylene	0.018	0.0016	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Indeno[1,2,3-c,d] pyrene	0.0031 U	0.0031	mg/Kg	SW846-8310		10/02/98	10/06/98 SPM	
Surrogates								
2-Fluorobiphenyl <Surr>	84.2		%	SW846-8310	(31-119)	10/02/98	10/06/98	
P-Terphenyl <Surr>	132		%	SW846-8310	(25-179)	10/02/98	10/06/98	



CT&E Ref.# 985408002
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598B1
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 10/12/98 13:14
Collected Date/Time 09/25/98 11:45
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
GRO/8021 Combo								
Gasoline Range Organics	81.1	1.44	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Benzene	0.311	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Toluene	0.875	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Ethylbenzene	0.617	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
P & M -Xylene	4.92	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
o-Xylene	2.30	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98	WAA
Surrogates								
4-Bromofluorobenzene <Surr>	162		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
1,4-Difluorobenzene <Surr>	99		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
AK102								
Diesel Range Organics	56.8	4.19	mg/Kg	AK102 DRO		09/30/98	10/01/98	MMP
Surrogates								
5a Androstane <surr>	73.2		%	AK102 DRO	(50-150)	09/30/98	10/01/98	



CT&E Ref.# 985408003
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598B2
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 10/12/98 13:14
Collected Date/Time 09/25/98 11:55
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Released By *Sharon Proton*

Sample Remarks:
DRO - Pattern consistent with weathered middle distillate.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	86.6		%	SM18 2540G			09/29/98 SKW	
GRO/8021 Combo								
Gasoline Range Organics	19.2	1.44	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Benzene	0.0411	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Toluene	0.163	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Ethylbenzene	0.158	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
P & M -Xylene	0.731	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
o-Xylene	0.360	0.0360	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Surrogates						09/25/98	10/01/98 WAA	
4-Bromofluorobenzene <Surr>	149		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
1,4-Difluorobenzene <Surr>	97		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
AK102								
Diesel Range Organics	99.3	4.09	mg/Kg	AK102 DRO		09/30/98	10/01/98 MMP	
Surrogates								
5a Androstane <surr>	87.6		%	AK102 DRO	(50-150)	09/30/98	10/01/98	



CT&E Ref.# 985408004
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598B6
Matrix Soil
Ordered By
PWSID

Client PO#
Printed Date/Time 10/11/98 17:22
Collected Date/Time 09/25/98 11:50
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Released By *Sharon Proton*

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
DRO - Heavier hydrocarbons contributing to diesel range quantitation.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	88.1		%	SM18 2540G			09/29/98 SKW	
GRO/8021 Combo								
Gasoline Range Organics	11.0	1.32	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Benzene	0.0329 U	0.0329	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Toluene	0.153	0.0329	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Ethylbenzene	0.0773	0.0329	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
P & M -Xylene	0.368	0.0329	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
o-Xylene	0.217	0.0329	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Surrogates								
4-Bromofluorobenzene <Surr>	110		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
1,4-Difluorobenzene <Surr>	96.1		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
AK102								
Diesel Range Organics	115	4.43	mg/Kg	AK102 DRO		09/30/98	09/30/98 MMP	
Surrogates								
5a Androstane <surr>	76.2		%	AK102 DRO	(50-150)	09/30/98	09/30/98	



CT&E Ref.# 985408005
 Client Name Shannon & Wilson-Fairbanks
 Project Name/# X-0911 JACKS
 Client Sample ID 91192598C1
 Matrix Soil
 Ordered By
 PWSID

Client PO#
 Printed Date/Time 10/11/98 17:22
 Collected Date/Time 09/25/98 12:00
 Received Date/Time 09/28/98 09:15
 Technical Director: Stephen C. Ede

Released By *Shane Patten*

Sample Remarks:
 DRO/RRO - Pattern consistent with weathered middle distillate.
 DRO - Heavier hydrocarbons contributing to diesel range quantitation.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Total Solids	83.7		%	SM18 2540G			09/29/98 SKW	
GRO/8021 Combo								
Gasoline Range Organics	15.7	1.33	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Benzene	0.0395	0.0332	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Toluene	0.314	0.0332	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Ethylbenzene	0.0749	0.0332	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
P & M -Xylene	0.457	0.0332	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
o-Xylene	0.267	0.0332	mg/Kg	AK101/8021B		09/25/98	10/01/98 WAA	
Surrogates							09/25/98 10/01/98 WAA	
4-Bromofluorobenzene <Surr>	119		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
1,4-Difluorobenzene <Surr>	92.4		%	AK101/8021B	(50-150)	09/25/98	10/01/98	
AK102								
Diesel Range Organics	250	4.26	mg/Kg	AK102 DRO		09/30/98	10/01/98 MMP	
Surrogates								
5a Androstane <surr>	152		%	AK102 DRO	(50-150)	09/30/98	10/01/98	



CT&E Ref.# 985408006
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598VS7
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 10/11/98 17:22
Collected Date/Time 09/25/98 10:02
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Released By *Shawn Proctor*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Gasoline Range Organics	32.9	20.0	ppm	CTE 8015M/8021B		09/30/98	09/30/98	WAA
Benzene	2.19	0.780	ppm	CTE 8015M/8021B		09/30/98	09/30/98	WAA
Toluene	2.54	0.660	ppm	CTE 8015M/8021B		09/30/98	09/30/98	WAA
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	WAA
P & M -Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	WAA
o-Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	WAA



CT&E Environmental Services Inc.

CT&E Ref.# 985408007
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598VSS
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 10/11/98 17:22
Collected Date/Time 09/25/98 10:15
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Released By *Shane Proton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Gasoline Range Organics	20.0 U	20.0	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
Toluene	0.660 U	0.660	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
P & M -Xylene	2.35	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
o-Xylene	0.600	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS



CT&E Environmental Services Inc.

CT&E Ref.# 985408008
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 JACKS
Client Sample ID 91192598VS2
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 10/11/98 17:22
Collected Date/Time 09/25/98 10:30
Received Date/Time 09/28/98 09:15
Technical Director: Stephen C. Ede

Released By *Shawn Proton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Gasoline Range Organics	20.0 U	20.0	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
Toluene	0.660 U	0.660	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
P & M -Xylene	0.760	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS
o-Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/30/98	09/30/98	BLS

985408

Shannon & Wilson, Inc.
 400 N. 34th Street, Suite 100 11500 Olive Blvd., Suite 276
 Seattle, WA 98103 St. Louis, MO 63141
 (206) 632-9020 (314) 872-8170

2655 Hill Road
 Fairbanks, AK 99707
 (907) 479-0600

Chain of Custody Record

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

Comp. Grab Date Sampled
 500 AK102 PNA 0310 9001876X AK101

Sample Identity	Lab No.	Time	Date Sampled	Comp. Grab	Total Number of Containers	Remarks/Matrix
91192598 A3	01	1140		✓	1	2
91192598 B1	02	1145		✓	1	3
91192598 B2	03	1155		✓	1	2
91192598 B6	04	1150		✓	1	2
91192598 C1	05	1200		✓	1	2
ATRCYLINDERS						
91192598 VS7	06	1002		✓	1	1
91192598 VS5	07	1015		✓	1	1
91192598 VS2	08	1030		✓	1	1
						14

Project Information		Sample Receipt	
Project Number: 4-0911	Total Number of Containers		
Project Name: INKs	COC Seals/Intact? Y/N/NA		
Contact: Dennis Fillion	Received Good Cond./Cold		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method:		
Sampler: Dm	(attach shipping bill, if any)		

Instructions	
Requested Turn Around Time: STD	
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: Melody Debenham	Time: 0920	Signature: Kelley Hatch	Time: 1630	Signature:	Time:
Printed Name: Melody Debenham	Date: 9/28/98	Printed Name: KELLEY HATCH	Date: 9/28/98	Printed Name:	Date:
Company: Shannon + Wilson		Company: CTFE		Company:	
Received By: 1.		Received By: 2.		Received By: 3.	
Signature: Kelley Hatch	Time: 0915	Signature: J Wondelbank	Time: 1800	Signature:	Time:
Printed Name: KELLEY HATCH	Date: 9/28/98	Printed Name: J Wondelbank	Date: 9/28/98	Printed Name:	Date:
Company: CTFE		Company: CTFE Anch		Company:	

Page 1 of 1
 Laboratory CTFE
 Attn:



CT&E Environmental Services Inc.

Laboratory Division

Laboratory Analysis Report

January 12, 1999

DENNIS FILLER
Shannon & Wilson-Fairbanks
2055 HILL ROAD
Fairbanks, AK 99707

Client Name	Shannon & Wilson-Fairbanks
Project ID	X0911 Jacks [990004]
Printed	January 12, 1999

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 Environmental Services Inc.

CT&E Ref.# 990004001
Client Name Shannon & Wilson-Fairbanks
Project Name/# X0911 Jacks
Client Sample ID 911-010699-VS8
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 01/12/99 10:20
Collected Date/Time 01/06/99 11:40
Received Date/Time 01/06/99 15:50
Technical Director: Stephen C. Ede

Released By *Shane Proton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Gasoline Range Organics	92.5	20.0	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Toluene	4.54	0.660	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Ethylbenzene	1.12	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
P & M -Xylene	4.95	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
o-Xylene	1.71	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA



CT&E Environmental Services Inc.

CT&E Ref.# 990004002
Client Name Shannon & Wilson-Fairbanks
Project Name/# X0911 Jacks
Client Sample ID 911-010699-VS6
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 01/12/99 10:20
Collected Date/Time 01/06/99 11:50
Received Date/Time 01/06/99 15:50
Technical Director: Stephen C. Ede

Released By *Shane Proton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Gasoline Range Organics	67.7	20.0	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Toluene	2.21	0.660	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Ethylbenzene	0.680	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
P & M -Xylene	2.61	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
o-Xylene	1.30	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA



CT&E Environmental Services Inc.

CT&E Ref.# 990004003
Client Name Shannon & Wilson-Fairbanks
Project Name/# X0911 Jacks
Client Sample ID 911-010699-VS2
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 01/12/99 10:20
Collected Date/Time 01/06/99 12:00
Received Date/Time 01/06/99 15:50
Technical Director: Stephen C. Ede

Released By *Shane Patten*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Gasoline Range Organics	62.1	20.0	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Toluene	1.93	0.660	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
P & M -Xylene	2.49	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA
o-Xylene	1.16	0.580	ppm	CTE 8015M/8021B		01/11/99	01/11/99	WAA

Channon & Wilson, Inc.

400 N. 34th Street, Suite 100
Seattle, WA 98103
(206) 632-8020

2055 Hill Road
Fairbanks, AK 99707

Chain of Custody Record

[illegible]

Attn:

00 N. JAY 98103
Seattle, WA 98103
(206) 632-8020

5430 Fairbanks Street, Suite 3
Anchorage, AK 99518
(907) 561-2120

16/99

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Sample Identity	Lap No.	Time	Date	COC/8/74		Total Number of Containers	Remarks/Matrix
				Comp	Grab		
911-010698 ¹ -VS8	1	11:40	1/6/99	X	✓	1	Air
911-010698 ² -VS6	2	11:50	1/6/99	X	✓	1	Air
911-010698 ³ -VS2	3	12:00	1/6/99	X	✓	1	Air
(NND)							

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity

Time: 11:40
Date: 1/6/99

Remarks/Matrix

Project Information	Sample Receipt	
	Total Number of Containers	COC Seals/Intact? Y/N/NA
Project Number: X0911		
Project Name: JACK S		
Contact: Dennis Filer		
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		
Sampler: MD		

911-010699 - Sample Identity



CT&E Environmental Services Inc.

Laboratory Division

Laboratory Analysis Report

March 19, 1999

Dennis Filler
Shannon & Wilson-Fairbanks
2055 HILL ROAD
Fairbanks, AK 99707

Client Name
Project ID
Printed

Shannon & Wilson-Fairbanks
X-0911 Jack's Serv. [990071]
March 19, 1999

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 Environmental Services Inc.

CT&E Ref.# 990071001
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 Jack's Serv.
Client Sample ID 911-031199-VS2
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 03/19/99 14:43
Collected Date/Time 03/11/99 13:05
Received Date/Time 03/11/99 15:43
Technical Director: Stephen C. Ede

Released By *Shane Proton*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
GRO/602 Combo								
Gasoline Range Organics	577	59.8	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Benzene	11.2	0.780	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Toluene	9.56	0.660	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
P & M -Xylene	2.88	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
o-Xylene	1.21	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR



CT&E Environmental Services Inc.

CT&E Ref.# 990071002
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 Jack's Serv.
Client Sample ID 911-031199-VS6
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 03/19/99 14:43
Collected Date/Time 03/11/99 13:18
Received Date/Time 03/11/99 15:43
Technical Director: Stephen C. Ede

Released By *Shane Patten*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
GRO/602 Combo								
Gasoline Range Organics	2080	59.8	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Benzene	154	0.780	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Toluene	145	0.660	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Ethylbenzene	4.23	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
P & M -Xylene	16.0	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
o-Xylene	4.68	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR



CT&E Environmental Services Inc.

CT&E Ref.# 990071003
Client Name Shannon & Wilson-Fairbanks
Project Name/# X-0911 Jack's Serv.
Client Sample ID 911-031199-VS8
Matrix Gas & Air
Ordered By
PWSID

Client PO#
Printed Date/Time 03/19/99 14:43
Collected Date/Time 03/11/99 13:30
Received Date/Time 03/11/99 15:43
Technical Director: Stephen C. Ede

Released By *Shawn Prater*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
GRO/602 Combo								
Gasoline Range Organics	253	59.8	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Benzene	20.9	0.780	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Toluene	27.5	0.660	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
Ethylbenzene	1.27	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
P & M -Xylene	5.10	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR
o-Xylene	1.70	0.580	ppm	CTE 8015M/8021B		03/17/99	03/17/99	DAR



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Laboratory CIE
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