SHANNON & WILSON, INC.

October 16, 2000

Municipal Light and Power
1201 East Third Avenue
Anchorage, Alaska 99501

Attn: Ms. Jacqueline Rose Fax: 263-5836

RE: AUGUST 2000 SITE ACTIVITIES AT 1201 EAST THIRD AVENUE, MUNICIPAL LIGHT AND POWER SITE 3, ANCHORAGE, ALASKA

This letter report presents the results of our August 2000 site activities at Municipal Light and Power's (ML&P) Transformer Shop, 1201 East Third Avenue, Anchorage, Alaska. This work effort is in general accordance with our November 24, 1999 proposal which was approved by Mr. Jim Pfeiffer of ML&P on December 13, 1999, and Mr. Michael Krueger of the Municipality of Anchorage (MOA) on December 14, 1999. This report includes a summary of remediation system monitoring, product recovery, and groundwater sampling performed by Shannon & Wilson.

Remediation System Monitoring

A vapor sample, designated VES2, was collected from the exhaust stack of the on-site vapor extraction system (VES) on August 28, 2000. This is the third sampling of the VES as part of this project. The previous monitoring and sampling results for the remediation system have been provided in our May/June 2000 status report. Prior to the collection of the analytical vapor sample, field measurements of the stack exhaust were collected. Temperature and flame-ionization detector (FID) readings of the stack emissions were recorded and the velocity of air movement in the stack exhaust and the individual VES lines was determined using pitot tubes. Once these parameters stabilized, the analytical sample was collected from the VES exhaust sample port in a 1-liter stainless steel cylinder provided by the laboratory. A description of the VES sample and field measurements are provided in Table 1.

An evaluation of the air injection system (AIS) and VES was conducted on June 6 and June 26, 2000, in an effort to focus remedial effort in the former area of the USTs on the south side of the building. Three vertical air injection wells, designated AIS-10, AIS-11, and AIS-12 are located in this area. It was discovered that the air flow valve for AIS-12 was shut off. Additionally, it was discovered that AIS-12 was not connected to the AIS and that Monitoring Well MW-8 was the recipient of air flow for AIS-12. Inspection of AIS-12 indicated air bubbles reaching the water surface in the well were due to the air injection at AIS-10. Based on the absence of bubbling in Monitoring Well MW-9 (located approximately 3 feet from Monitoring

Well MW-8) and the positive air flow exiting the well when opened, the air injection at Monitoring Well MW-8 appears to disperse through the unsaturated zone. The observation of bubbles entering AIS-12 suggests a reasonable degree of air injection surrounding AIS-10. Furthermore, the air injection at Monitoring Well MW-8 appears to provide subsurface air flow through the soils surrounding the well and this should enhance subsurface oxygen levels.

Product Recovery

Typically, a small amount of oily water has been removed from the Vapor Extraction well VES-4 on a quarterly basis. Because no product was found in this well in June 2000 by Alaska Pollution Control (APC), another product recovery effort was not initiated in August 2000.

Groundwater Sampling

Groundwater samples were collected from Monitoring Wells MW-3, MW-6, MW-7, and MW-9 on August 25, 2000. Monitoring Well MW-8 was dry at the time of sampling. The locations of the wells are shown in Figure 1. Prior to the collection of the groundwater samples, the four wells were each purged of a minimum of three well volumes of water using a variable-speed, submersible pump equipped with new disposable tubing. The purgewater from the five wells is being temporarily stored on-site in steel drums. The purgewater from the previous sampling events was collected by APC for treatment. At the time of sampling, temperature, specific conductance, dissolved oxygen, and pH values were measured in the groundwater collected from the five monitoring wells. Water level, purging, and sampling data for the sampling event are presented in Table 2.

Laboratory Analyses

The vapor sample from the VES discharge stack was submitted to CT&E Environmental Services, Inc. (CT&E) of Anchorage, Alaska and analyzed for aromatic volatile organics (BTEX) using EPA Method 8021B and gasoline range organics (GRO) using EPA Method 8015M.

The four groundwater samples, designated Samples MW3, MW6, MW7, and MW9 were submitted to CT&E and analyzed for diesel range organics (DRO) by Alaska Method 102 (AK 102), gasoline range organics (GRO) by AK 101, and aromatic volatile organics (BTEX) by EPA Method 8021B. In addition, Sample MW6 was analyzed for polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8310. A duplicate sample from Monitoring Well MW-9, designated Sample MW10, was analyzed for GRO, and BTEX. Monitoring Well MW-9 did not contain sufficient water to collect a DRO duplicate sample. A trip blank accompanied the samples to and from the laboratory and was analyzed for GRO and BTEX.

Analytical Results

Vapor Sample VES2 did not contain benzene, toluene, ethylbenzene, xylenes, or GRO above the laboratory reporting limit. The laboratory results of the vapor sample are summarized on Table 1 and a copy of the analytical report is included in Attachment 1. The previous samples of the VES discharge vapor, collected in September 1998, January 1999, and February 2000, did not contain detectable GRO or BTEX. The September 1999 sample contained 0.930 ppm toluene and 2.49 ppm xylenes but did not contain benzene, ethylbenzene, or GRO above the laboratory reporting limit. The May/June 2000 sample contained 0.591 ppm xylenes and did not contain benzene, toluene, ethylbenzene, or GRO above the laboratory reporting limit.

The analytical results of the groundwater samples are summarized in Table 3, while a cumulative summary of the current and previous analytical results is included in Table 4. The highest hydrocarbon concentrations were detected in Sample MW9, collected from Monitoring Well MW-9. Sample MW9 contained 36.1 ppm DRO, 47.6 ppm GRO, 9.25 ppm benzene, 8.15 ppm toluene, 0.605 ppm ethylbenzene, and 3.42 ppm xylenes. Sample MW10, a duplicate of Sample MW9, contained 67.1 ppm GRO, 12.7 ppm benzene, 11.5 ppm toluene, 0.886 ppm ethylbenzene, and 5.07 ppm xylenes.

Sample MW3, collected from Monitoring Well MW-3, was reported to contain 0.622 ppm DRO, 0.0194 ppm toluene and did not contain GRO, benzene, ethylbenzene or xylenes above the laboratory detection limit. Sample MW6, collected from Monitoring Well MW-6, did not contain DRO, GRO, or BTEX above the laboratory detection limit. Three PAH analytes were reported in Sample MW6 at levels below the applicable cleanup levels. Sample MW7, collected from Monitoring Well MW-7, did not contain DRO, GRO, or BTEX above the laboratory detection limit.

The groundwater at Monitoring Well MW-9 exceeds the ADEC cleanup levels for DRO (1.5 ppm), GRO (1.3 ppm), benzene (0.005 ppm), toluene (1.0 ppm), and ethylbenzene (0.7 ppm). The concentration of DRO and GRO in Monitoring Well MW-9 has increased, while the concentration of benzene has decreased from the previous sampling event. Based on the current analytical results, the groundwater at Monitoring Wells MW-3, MW-6, and MW-7 does not exceed the ADEC cleanup levels. As shown in Table 4, a DRO decreasing trend has been established in Monitoring Well MW-6 since the June 1999 peak. The DRO concentrations in Monitoring Well MW-3 usually range from non-detectable to 0.700 ppm, except 4.42 ppm DRO was reported in September 1999 (presumably due to biogenic matter). Monitoring Well MW-7 has a history of low or non-detectable DRO concentrations.

The laboratory noted that the DRO pattern for Sample MW3 contained an unknown hydrocarbon with several peaks. The laboratory also noted that the DRO pattern for Sample MW9 was consistent with weathered middle distillate.

A trip blank, designated TB, accompanied the sample bottles to and from the laboratory. The trip blank did not contain detectable concentrations of GRO or BTEX, indicating that cross-contamination did not occur during the handling of the samples. The individual laboratory reports for the recent sampling event are presented in Attachment 1.

Limitations

This report was prepared for the exclusive use of our client and their representatives in the monitoring of this site. The findings we have presented within this report are based on limited research and information provided by others and on the sampling and analysis that we conducted at this site. It is possible that our tests may have missed some higher levels of petroleum hydrocarbon constituents or hazardous substances. As a result, the analysis and sampling performed can only provide you with our best judgements as to the environmental characteristics of the sample locations, 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 sampling. Changes in site conditions can occur with time, because of natural forces or human activity. In addition, changes in government codes, regulation or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

Shannon & Wilson has prepared Attachment 2, "Important Information About Your Geotechnical/Environmental Report", to assist you and others in understanding the use and limitations of our report. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these finding and therefore, has not, and will not disclose the results of this study, except with your permission or as required by law.

We appreciate this opportunity to be of service and your continued confidence in our firm. If you have any questions or comments concerning this report, please call the undersigned.

Sincerely,

SHANNON & WILSON, INC.

Prepared by:

Lena Hanson
Engineer I

Reviewed by:

John Spielman, C.P.G.
Principal Hydrogeologist

Enc: Tables 1, 2, 3, & 4, Figure 1, Attachments 1 and 2

cc: Mr. Michael Krueger, MOA

TABLE 1 - SUMMARY OF VAPOR SAMPLE FIELD MEASUREMENTS AND ANALYTICAL RESULTS

		Analytical Sample Number and Collection Date (See Attachment 1)		
		VES2		
Parameter Tested	**Method***	8/28/2000		
Exhaust Stack PID Reading - ppm	Sensidyne FID	6.6		
Exhaust Stack Temperature - Fahrenheit	Thermometer	91		
Exhaust Flow Pressure - inches water	Vacuum Gauge	53		
Exhaust Differential Pressure - inches water	Pitot Tube	0.26		
Exhaust Flow Velocity - fpm	Conversion Charts†	2000		
Aromatic Volatile Organics (BTEX)				
Benzene - ppm	EPA 8021B	<0.780		
Toluene - ppm	EPA 8021B	<0.660		
Ethylbenzene - ppm	EPA 8021B	<0.580		
Xylenes - ppm	EPA 8021B	<0.580		
Gasoline Range Organics (GRO) - ppm	EPA 8015M/8021B	<20.0		
Volatile Petroleum Hydrocarbons - lbs/day	Ideal Gas Law**	<1.4		

KEY	DESCRIPTION
*	See Attachment 1 For Detection Limits
**	Using a Gas Constant of R=75.6 Pa•m^3/Kg•K
†	Flow Rates Calculated From Pitot Tube/ Manometer Conversions
<0.780	Less Than The Detection Limit of 0.780 ppm

WATER LEVEL MEASUREMENT DATA

WELL NUMBER	MW-3	MW-6	MW-7	MW-8	MW-9
DATE WATER LEVEL MEASURED	8/25/2000	8/25/2000	8/25/2000	8/25/2000	8/25/2000
TIME WATER LEVEL MEASURED	12:10	12:00	12:05	12:13	12:15
MP ELEVATION, FT	98.41	99.30	97.02	96.43	96.49
DEPTH TO WATER BELOW MP, FT	13.87	18.05	16.76	NM	6.40
WATER LEVEL ELEVATION, FT	84.54	81.30	80.41	NM	92.10

SAMPLING/PURGING DATA

WELL NUMBER	MW-3	MW-6	MW-7	MW-8	MW-9
DATE SAMPLED	8/25/2000	8/25/2000	8/25/2000	NS	8/25/2000
TIME SAMPLED	14:00	12:35	13:15	NS	15:10
DEPTH TO WATER BELOW MP, FT	13.87	18.05	16.76	NM	6.40
TOTAL DEPTH OF WELL BELOW MP, FT	20.01	24.16	20.79	7.09	9.55
WATER COLUMN IN WELL, FT	6.14	6.11	4.03	NM	3.15
GALLONS PER FOOT	0.16	0.16	0.16	0.16	0.16
GALLONS IN WELL	0.98	0.98	0.64	0.0	0.50
TOTAL GALLONS PUMPED/BAILED	3.0	3.0	2.0	0.0	1.8
TEMPERATURE, C	9.6	11.5	10.0	NM	12.8
SPECIFIC CONDUCTANCE, UMHOS/CM	695	928	916	NM	1860
pH	7.11	5.19	6.03	NM	7.33
DISSOLVED OXYGEN, PPM	3.1	1.3	2.1	NM	1.8
DIAMETER OF WELL CASING	2-inch	2-inch	2-inch	2-inch	2-inch
REMARKS					Sheen

Purging & Sampling Method: Submersible Pump
Sampling Personnel: Lena Hanson

KEY

MP = Measuring Point
NM = Not Measured
NS = Not Sampled

TABLE 3 - SUMMARY OF ANALYTICAL RESULTS

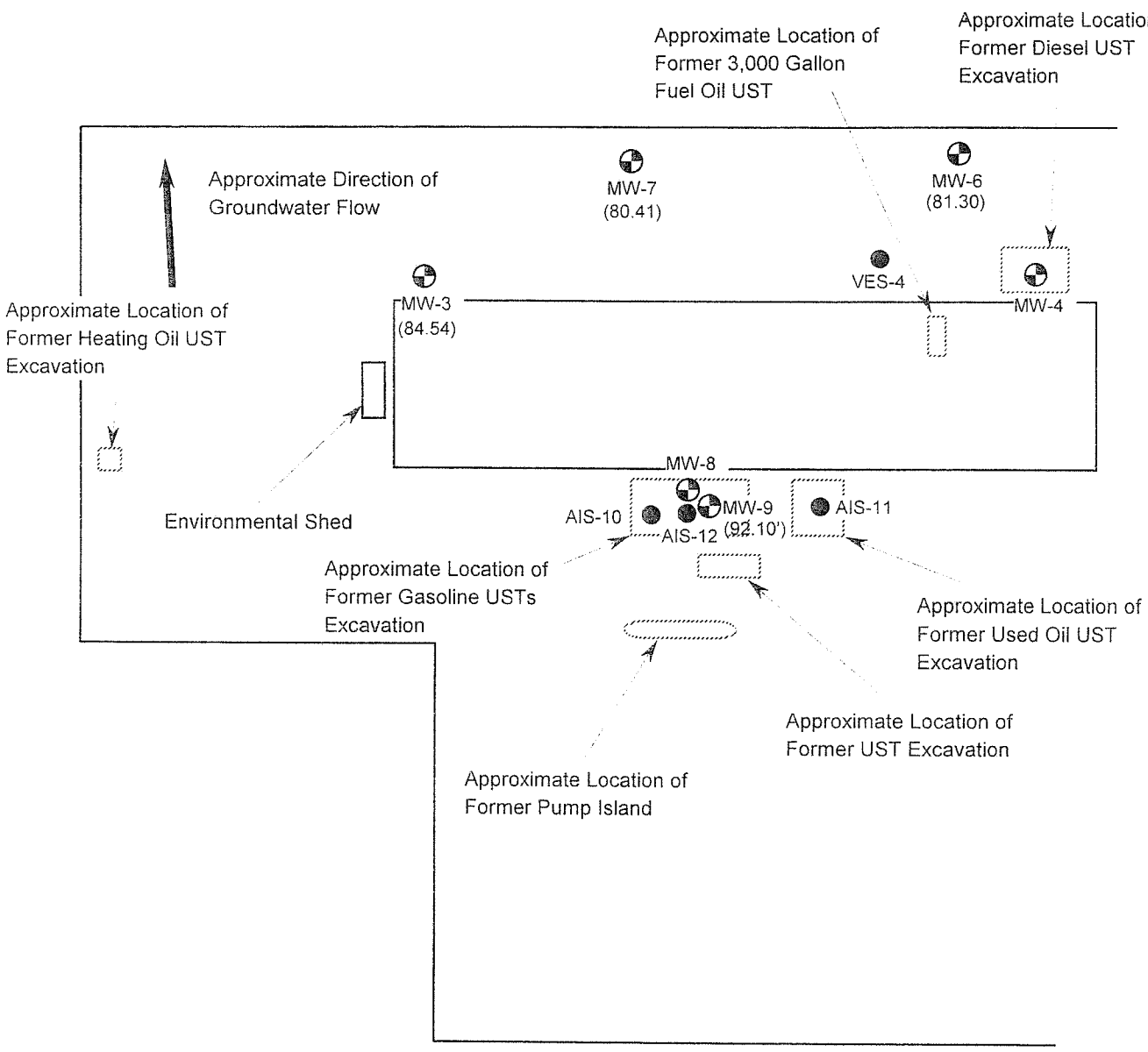
			Sample Source, Sample Number & Depth in Feet (See Table 2, Figure 1, and Attachment 1)					
			Well MW-3	Well MW-6	Well MW-7	Well MW-9		QC
		Cleanup	MW3	MW6	MW7	MW9	MW10^	TB
Parameter Tested	**Method***	**Level**	13.87	18.05	16.76	6.40	-	-
Diesel Range Organics (DRO) - ppm	AK 102	1.5	0.622	<0.323	<0.333	36.1	-	-
Gasoline Range Organics (GRO) - ppm	AK 101	1.3	<0.0900	<0.0900	<0.0900	47.6	67.1	<0.0900
Aromatic Volatile Organics (BTEX)								
Benzene - ppm	EPA 8021B	0.005	<0.000500	<0.000500	<0.000500	9.25	12.7	<0.000500
Toluene - ppm	EPA 8021B	1	0.0194	<0.00200	<0.00200	8.15	11.5	<0.00200
Ethylbenzene - ppm	EPA 8021B	0.7	<0.00200	<0.00200	<0.00200	0.605	0.886	<0.00200
Xylenes - ppm	EPA 8021B	10	<0.00200	<0.00200	<0.00200	3.42	5.07	<0.00200
Polynuclear Aromatic Hydrocarbons (PAHs)								
Fluorene - ppm	EPA 8310	1.46	-	0.000118	-	-	-	-
Phenanthrene - ppm	EPA 8310	-	-	<0.0000556	-	-	-	-
Fluoranthene - ppm	EPA 8310	1.46	-	<0.0000556	-	-	-	-
Pyrene - ppm	EPA 8310	1.1	-	<0.0000556	-	-	-	-
Benzo(a)anthracene - ppm	EPA 8310	0.001	-	<0 0000556	-	-	-	-
Chrysene - ppm	EPA 8310	0.1	-	<0.0000556	-	-	-	-
Benzo(b)fluoranthene - ppm	EPA 8310	0.001	-	<0.0000556	-	-	-	-
Benzo(k)fluoranthene - ppm	EPA 8310	0.01	-	<0.0000556	-	-	-	-
Benzo(a)pyrene - ppm	EPA 8310	0.0002	-	<0.0000556	-	-	-	-
Benzo(g,h,i)perylene - ppm	EPA 8310	-	-	<0.0000556	-	-	-	-
Indeno(1,2,3-c,d)pyrene - ppm	EPA 8310	0.001	-	<0.0000556	-	-	-	-
Naphthalene - ppm	EPA 8310	1.5	-	0.0000797				
Acenaphthene - ppm	EPA 8310	2.2		0.000180				
Other Analytes - ppm	EPA 8310	-	-	ND	-	-	-	-

KEY	DESCRIPTION
*	See Attachment 1 for compounds tested and limits of detection
QC	Quality Control
ND	Analyte not detected
-	Not applicable or sample not analyzed for parameter
<0.319	Analyte below laboratory reporting limit of 0.319 ppm
^	Duplicate of Sample MW9

TABLE 4 - CUMULATIVE SUMMARY OF ANALYTICAL RESULTS

Monitoring Well	Date	DRO ppm	GRO ppm	Benzene ppm	Total BTEX ppm
MW-3	8/27/1998	0.206	--	--	--
	12/31/1998	0.669	--	--	--
	3/19/1999	<0.333	--	--	--
	6/23/1999	0.427	--	--	--
	9/30/1999	4.42	--	--	--
	2/2/2000	<0.395	<0.0900	<0.00050	--
	5/26/2000	0.700	<0.0900	<0.00050	--
	8/25/2000	0.622	<0.0900	<0.00050	0.0194
MW-6	8/27/1998	0.282	--	--	--
	12/31/1998	0.759	--	--	--
	3/19/1999	1.21	--	--	--
	6/23/1999	2.17	--	--	--
	9/30/1999	1.43	--	--	--
	2/2/2000	0.419	<0.0900	<0.00050	--
	5/26/2000	<0.674	<0.0900	<0.00050	--
	8/25/2000	<0.323	<0.0900	<0.00050	--
MW-7	8/27/1998	<0.104	--	--	--
	12/31/1998	0.158	--	--	--
	3/19/1999	<0.309	--	--	--
	6/23/1999	<0.297	--	--	--
	9/30/1999	<0.319	--	--	--
	2/2/2000	<0.357	<0.0900	<0.00050	--
	5/26/2000	<0.674	<0.0900	<0.00050	--
	8/25/2000	<0.333	<0.0900	<0.00050	--
MW-8	6/23/1999	7.53	0.25	0.103	0.109
	9/30/1999	5.34	0.22	0.0599	0.0759
	2/2/2000	12	0.33	0.172	0.177
	5/26/2000	4.73	0.94	0.473	0.473
MW-9	5/26/2000	18.8	31	7.97	19.8
	8/25/2000	36.1	47.6	3.42	21.4

KEY	DESCRIPTION
ND	Analyte not detected
--	Sample not analyzed for parameter
<0.333	Analyte below laboratory reporting limit of 0.333 ppm



LEGEND

MW-7 (80.41) — Approximate location of Monitoring Well MW-7. Groundwater elevation in feet, measured August 2000.

AIS-11 — Approximate location of Air Injection Well AIS-11.

Note: Site Plan derived from Harding Lawson Associates, May 1993

1201 East Third Avenue
Anchorage, Alaska

SITE MAP

October 2000 Y-5954-2

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 1

ATTACHMENT 1

RESULTS OF ANALYTICAL TESTING BY

CT&E ENVIRONMENTAL SERVICES, INC.,

ANCHORAGE, ALASKA

CT&E Environmental Services Inc.
Laboratory Division

Laboratory Analysis Report

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.cteesi.com

Lena Hansen
Shannon & Wilson Inc.
5430 Fairbanks Street, Suite 3
Anchorage, AK 99518

Work Order:	1004977
	Y5954-2 1201 E 3rd Ave
Client:	Shannon & Wilson Inc.
Report Date:	September 12, 2000

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintaned 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 analyte 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.#	1004977001	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 12:35
Client Sample ID	Y5954-2-MW6	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

PAHSIM - The sample was extracted outside of hold time since original extraction had 2x surrogate added. The results confirm original quantitation. Results are not affected.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Gasoline Range Organics	0.0900 U	0.0900	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Benzene	0.000500 U	0.000500	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Ethylbenzene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
P & M -Xylene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
o-Xylene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Toluene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	81.4		%	AK101/8021B	60-120	09/03/00	09/03/00	MAH
4-Bromofluorobenzene <Surr>	78.1		%	AK101/8021B	50-150	09/03/00	09/03/00	MAH
Semivolatile Organic Fuels Department								
Diesel Range Organics	0.323 U	0.323	mg/L	AK102 DRO		08/30/00	08/31/00	MCM
Surrogates								
5a Androstane <surr>	73.3		%	AK102 DRO	60-120	08/30/00	08/31/00	MCM
Semivolatile Organic GC/MS								
Acenaphthylene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Acenaphthene	0.180	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Fluorene	0.118	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Phenanthrene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Anthracene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Fluoranthene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Pyrene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Benzo(a)Anthracene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Chrysene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Benzo[b]Fluoranthene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM

CT&E Environmental Services Inc.

CT&E Ref.#	1004977001	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 12:35
Client Sample ID	Y5954-2-MW6	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By			

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Semivolatile Organic GC/MS								
Benzo[k]fluoranthene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Benzo[a]pyrene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Indeno[1,2,3-c,d] pyrene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Dibenzo[a,h]anthracene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Benzo[g,h,i]perylene	0.0556 U	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Naphthalene	0.0797	0.0556	ug/L	PAH SIM		09/05/00	09/06/00	KWM
Surrogates								
Naphthalene-d8 <surr/IS>	48		%	PAH SIM	14-125	09/05/00	09/06/00	KWM
Acenaphthene-d10 <surr/IS>	59.6		%	PAH SIM	23-125	09/05/00	09/06/00	KWM
Chrysene-d12 <surr/IS>	87.1		%	PAH SIM	43-125	09/05/00	09/06/00	KWM

CT&E Environmental Services Inc.

CT&E Ref.#	1004977002	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 13:15
Client Sample ID	Y5954-2-MW7	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Gasoline Range Organics	0.0900 U	0.0900	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Benzene	0.000500 U	0.000500	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Ethylbenzene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
P & M -Xylene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
o-Xylene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Toluene	0.00200 U	0.00200	mg/L	AK101/8021B		09/03/00	09/03/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	81.2		%	AK101/8021B	60-120	09/03/00	09/03/00	MAH
4-Bromofluorobenzene <Surr>	78.6		%	AK101/8021B	50-150	09/03/00	09/03/00	MAH
Semivolatile Organic Fuels Department								
Diesel Range Organics	0.333 U	0.333	mg/L	AK102 DRO		08/30/00	08/31/00	MCM
Surrogates								
5a Androstane <surr>	84.8		%	AK102 DRO	60-120	08/30/00	08/31/00	MCM

CT&E Environmental Services Inc.

CT&E Ref.#	1004977003	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 14:00
Client Sample ID	Y5954-2-MW3	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

DRO - Unknown hydrocarbon with several peaks.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Gasoline Range Organics	0.0900 U	0.0900	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Benzene	0.000500 U	0.000500	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Ethylbenzene	0.00200 U	0.00200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
P & M -Xylene	0.00200 U	0.00200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
o-Xylene	0.00200 U	0.00200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Toluene	0.0194	0.00200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	83.7		%	AK101/8021B	60-120	09/04/00	09/04/00	MAH
4-Bromofluorobenzene <Surr>	77.6		%	AK101/8021B	50-150	09/04/00	09/04/00	MAH
Semivolatile Organic Fuels Department								
Diesel Range Organics	0.622	0.345	mg/L	AK102 DRO		08/30/00	08/31/00	MCM
Surrogates								
5a Androstane <surr>	101		%	AK102 DRO	60-120	08/30/00	08/31/00	MCM

CT&E Environmental Services Inc.

CT&E Ref.#	1004977004	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 15:10
Client Sample ID	Y5954-2-MW9	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

DRO - Surrogate recoveries outside controls due to matrix interference.
DRO - Pattern consistent with weathered middle distillate.
GRO/BTEX - Surrogate recovery does not meet QC goals due to sample dilution. Results are not affected.

Parameter	Results		PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department									
Gasoline Range Organics	47.6		9.00	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Benzene	9.25		0.0500	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Ethylbenzene	0.605		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
P & M -Xylene	2.31		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
o-Xylene	1.11		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Toluene	8.15		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Surrogates									
1,4-Difluorobenzene <Surr>	0	!		%	AK101/8021B	60-120	09/04/00	09/04/00	MAH
4-Bromofluorobenzene <Surr>	427	!		%	AK101/8021B	50-150	09/04/00	09/04/00	MAH
Semivolatile Organic Fuels Department									
Diesel Range Organics	36.1		0.345	mg/L	AK102 DRO		08/30/00	08/31/00	MCM
Surrogates									
5a Androstane <surr>	225	!		%	AK102 DRO	60-120	08/30/00	08/31/00	MCM

CT&E Environmental Services Inc.

CT&E Ref.#	1004977005	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 15:30
Client Sample ID	Y5954-2-MW10	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

GRO/BTEX - Surrogate recovery does not meet QC goals due to sample dilution. Results are not affected.

Parameter	Results		PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department									
Gasoline Range Organics	67.1		9.00	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Benzene	12.7		0.0500	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Ethylbenzene	0.886		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
P & M -Xylene	3.48		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
o-Xylene	1.59		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Toluene	11.5		0.200	mg/L	AK101/8021B		09/04/00	09/04/00	MAH
Surrogates									
1,4-Difluorobenzene <Surr>	0	!		%	AK101/8021B	60-120	09/04/00	09/04/00	MAH
4-Bromofluorobenzene <Surr>	396	!		%	AK101/8021B	50-150	09/04/00	09/04/00	MAH

CT&E Environmental Services Inc.

CT&E Ref.#	1004977006	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/12/2000 16:45
Project Name/#	Y5954-2 1201 E 3rd Ave	**Collected Date/Time**	08/25/2000 0:00
Client Sample ID	Y954-2-TB	**Received Date/Time**	08/25/2000 15:35
Matrix	Water (Surface, Eff., Ground)	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Benzene	0.000500 U	0.000500	mg/L	BTX SW846-8021B		09/03/00	09/04/00	MAH
Toluene	0.00200 U	0.00200	mg/L	BTX SW846-8021B		09/03/00	09/04/00	MAH
Ethylbenzene	0.00200 U	0.00200	mg/L	BTX SW846-8021B		09/03/00	09/04/00	MAH
P & M -Xylene	0.00200 U	0.00200	mg/L	BTX SW846-8021B		09/03/00	09/04/00	MAH
o-Xylene	0.00200 U	0.00200	mg/L	BTX SW846-8021B		09/03/00	09/04/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	83.3		%	BTX SW846-8021B		09/03/00	09/04/00	MAH
4-Bromofluorobenzene <Surr>	80.1		%	BTX SW846-8021B		09/03/00	09/04/00	MAH

1004977

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN OF CUSTODY RECORD

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

11500 Olive Blvd., Suite 276
St. Louis, MO 63141
(314) 872-8170

1354 N. Grandridge Blvd.
Kennewick, WA 99336
(509) 735-1280

2055 Hill Road
Fairbanks, AK 99709
(907) 479-0600

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

2412 N. 30th St., Suite 201
Tacoma, WA 98407
(206) 759-0156

Attn: Shane

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	DRO AK102	GRO AK101	BTEX EPA8021B	PAHs EPA 8310			Total Number of Containers	Remarks/Matrix
Y5954-2-MW6	1	12:35	8-25-00		X	X	X	X	X			6	H2O
Y5954-2-MW7	2	13:15	8-25-00		X	X	X	X				4	
Y5954-2-MW3	3	14:00	8-25-00		X	X	X	X				4	
Y5954-2-MW9	4	15:10	8-25-00		X	X	X	X				3	
Y5954-2-MW10	5	15:30	8-25-00		X		X	X				2	
Y5954-2-TB	6							X				2	Trip Blank

Project Information		Sample Receipt	
Project Number: Y5954-2		Total Number of Containers	
Project Name: 620 E 3d Ave		COC Seals/Intact? Y/N/NA	
Contact: Lena Hanson		Received Good Cond./Cold	
Ongoing Project? Yes ☒ No ☐		Delivery Method:	
Sampler: LVH		(attach shipping bill, if any)	

Instructions

Requested Turn Around Time: normal

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Yulena V. Hanson Time: 15:35	Signature: Time:	Signature: Time:
Printed Name: Lena Hanson Date: 8-25-00	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 15:35	Signature: Time:	Signature: Time:
Printed Name: Tia Thurnden Date: 8/25/00	Printed Name: Date:	Printed Name: Date:
Company: CT & E	Company:	Company:

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

F-19-91/UR

No.

CT&E Environmental Services Inc.

SAMPLE RECEIPT FORM

CT&E WO#: 1004977

Yes	No		
	✓	Are samples **RUSH**, priority, or *within 72 hrs* of **hold time**?	
		If yes, have you done *e-mail notification*?	
	✓	Are samples *within 24 hrs* of **hold time** or **due date**?	
		If yes, have you *spoken with* Supervisor?	
	✓	Are there any **problems** (e.g., ids, analyses)?	
	✓	Were samples preserved correctly and pH verified?	HCl was added to #4 #6 (TB) has 5 mm bubbles
		Has Project Manager been notified of problems?	
	✓	Is this an ACOE/AFCEE/ADEC project?	
	✓	Will a **data package** be required?	
		If this is for PWS, provide **PWSID**.	
		Is there a **quote** for this project?	
	✓	Will **courier** charges apply?	

Completed by (sign): [signature] (print): A Thiemann

Due Date: 9/6/00
Received Date/Time: 8/25 - 15:35
Cooler Temperature: 3.2°C
Sample Condition: (Good) / Poor

Matrix of each Sample:

1	" "	1-5
	" "	
	" "	
	" "	
1	Trip Blank	6
	MS/MSD	

Additional Sample Remarks:

_____ AK101s/_____ 8260s field pres'd?
_____ Field-filtered for dissolved_____?
_____ Lab-filter for dissolved_____?
_____ Ref Lab required?
Notes:

*** The following *must* be completed for *all* ACOE & AFCEE projects: ***

Yes	No		Notes:
		Is cooler temperature 4 ± C?	
		thermometer used:	
		Was there an airbill, etc? note #:	
		Was cooler sealed with custody seals?	
		#/where?	
		Were seals intact upon arrival?	
		Was there a COC with cooler?	
		Was the COC filled out properly?	
		Did the COC indicate ACOE/AFCEE project?	
		Did the COC and samples correspond?	
		Were samples screened with Geiger counter?	
		Were all samples packed to prevent breakage?	
		packing material:	
		Were all samples unbroken and clearly labelled?	
		Were all samples sealed in separate plastic bags?	
		Were all bottles for volatiles free of headspace?	
		Were correct container/sample sizes submitted?	
		Was client notified of problems? (specify below)	

Individual contacted: _____
Date & Time: _____ Phone/Fax #: _____

# of each Container Received:

2	950 ml amber	unpres'd
7	950 ml amber	w/ HCl
	500 ml amber	w/ H2SO4
	1L cubies	unpres'd
	1L cubies	w/ HNO3
	1L cubies	w/ H2SO4
	1L cubies	w/ NaOH + ZnAc
	120 ml coli	bottles
	60 ml	Nalg
	8 oz amber	unpres'd
	4 oz amber	unpres'd
	4 oz w/ septa	w/ MeOH
12	40 ml vials	w/ HCl
	Other (specify)	
	Other (specify)	

#/Log In Proofed by: [signature]

Form Number: F004r2
Printed: 7/12/99

CT&E Environmental Services Inc.
Laboratory Division

Laboratory Analysis Report

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.cteesi.com

Lena Hansen
Shannon & Wilson Inc.
5430 Fairbanks Street, Suite 3
Anchorage, AK 99518

Work Order:	1005024
	Y5954-2 1201 E 3rd Ave ML & P
Client:	Shannon & Wilson Inc.
Report Date:	September 01, 2000

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintaned 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 analyte 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.#	1005024001	**Client PO#**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	09/01/2000 15:06
Project Name/#	Y5954-2 1201 E 3rd Ave ML & P	**Collected Date/Time**	08/28/2000 16:00
Client Sample ID	Y5954-2-VES2	**Received Date/Time**	08/29/2000 9:53
Matrix	Gas & Air	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Fuels Department								
Gasoline Range Organics	20.0 U	20.0	ppm	CTE 8015M/8021B		09/01/00	09/01/00	MAH
Benzene	0.780 U	0.780	ppm	CTE 8015M/8021B		09/01/00	09/01/00	MAH
Toluene	0.660 U	0.660	ppm	CTE 8015M/8021B		09/01/00	09/01/00	MAH
Ethylbenzene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/01/00	09/01/00	MAH
P & M -Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/01/00	09/01/00	MAH
o-Xylene	0.580 U	0.580	ppm	CTE 8015M/8021B		09/01/00	09/01/00	MAH

1005024

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN OF CUSTODY REC(

Page 1 of 1
Laboratory CTEE
Attn: Shane

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

11500 Olive Blvd., Suite 276
St Louis, MO 63141
~~(314) 872-8170~~

1354 N. Grandridge Blvd.
Kennewick, WA 99336
(509) 735-1280

2055 Hill Road
Fairbanks, AK 99709
(907) 479-0600

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

2412 N. 30th St., Suite 201
Tacoma, WA 98407
(206) 759-0156

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

Sample Identity	Lab No	Time	Date Sampled	Comp.	Grab	BTEX EPA 8021B	GRO EPA 8015M/50 2LB					Total Number of Containers	Remarks/Matrix
Y5954-2VES2	1	16:00	8-28-00			X	X					1	Vapor

Project Information		Sample Receipt	
Project Number:	Y5954-2	Total Number of Containers	
Project Name:	1201E 3rd Ave, MLSP	COC Seals/Intact? Y/N/NA	
Contact:	Lena Hanson	Received Good Cond./Cold	
Ongoing Project?	Yes [X] No [ ]	Delivery Method:	
Sampler:	LVH	(attach shipping bill, if any)	

Instructions

Requested Turn Around Time: normal

Special Instructions:

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Time: 9:53	Signature: Time:	Signature: Time:
Lena V. Hanson		
Printed Name: Date: 8-28-00	Printed Name: Date:	Printed Name: Date:
Lena Hanson		
Company:	Company:	Company:
Shannon & Wilson		
Received By: 1.	**Received By: 2.**	**Received By: 3.**
Signature: Time: 9:53	Signature: Time:	Signature: Time:
Rebecca Tackett		
Printed Name: Date: 8-29	Printed Name: Date:	Printed Name: Date:
Rebecca Tackett		
Company:	Company:	Company:

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

F-19-91/UR

No.

CT&E Environmental Services Inc.

SAMPLE RECEIPT FORM

CT&E WO#: 1005024

Yes	No	
	✓	Are samples **RUSH**, priority, or *within 72 hrs* of **hold time**?
		If yes, have you done *e-mail notification*?
	✓	Are samples *within 24 hrs* of **hold time** or **due date**?
		If yes, have you *spoken with* Supervisor?
	✓	Are there any **problems** (e.g., ids, analyses)?
		Were samples preserved correctly and pH verified?
	✓	Has Project Manager been notified of problems?
		Is this an ACOE/AFCEE/ADEC project?
	✓	Will a **data package** be required?
		If this is for PWS, provide **PWSID**.
		Is there a **quote** for this project?
	✓	Will **courier** charges apply?

Completed by (sign): [signature] (print): EA Thenson

*** The following *must* be completed for *all* ACOE & AFCEE projects: ***

Yes	No		Notes:
		Is cooler temperature 4 ± C?	
		thermometer used:	
		Was there an airbill, etc? note #:	
		Was cooler sealed with custody seals?	
		#/where?	
		Were seals intact upon arrival?	
		Was there a COC with cooler?	
		Was the COC filled out properly?	
		Did the COC indicate ACOE/AFCEE project?	
		Did the COC and samples correspond?	
		Were samples screened with Geiger counter?	
		Were all samples packed to prevent breakage?	
		packing material:	
		Were all samples unbroken and clearly labelled?	
		Were all samples sealed in separate plastic bags?	
		Were all bottles for volatiles free of headspace?	
		Were correct container/sample sizes submitted?	
		Was client notified of problems? (specify below)	

Individual contacted:

Date & Time: Phone/Fax #:

Due Date: 9/4/00

Received Date/Time: 8/29 - 9:53

Cooler Temperature: Amb.

Sample Condition: (Good) / Poor

Matrix of each Sample:

4	" "	1
	" "	
	" "	
	" "	
	Trip Blank	
	MS/MSD	

Additional Sample Remarks:

___ AK101s/___ 8260s field pres'd?

___ Field-filtered for dissolved___?

___ Lab-filter for dissolved___?

___ Ref Lab required?

Notes:

# of each Container Received:

#	Container	Preservative
	950 ml amber	unpres'd
	950 ml amber	w/ HCl
	500 ml amber	w/ H2SO4
	1L cubies	unpres'd
	1L cubies	w/ HNO3
	1L cubies	w/ H2SO4
	1L cubies	w/ NaOH + ZnAc
	120 ml coli	bottles
	60 ml	Nalg
	8 oz amber	unpres'd
	4 oz amber	unpres'd
	4 oz w/ septa	w/ MeOH
	40 ml vials	w/ HCl
1	Other (specify)	S/S cylinder
	Other (specify)	

#/Log In Proofed by:

Form Number: F004r2
Printed: 7/12/99

ATTACHMENT 2

"IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT"

Important Information About Your Geotechnical/Environmental Report

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

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.

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.

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.

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