

**Groundwater Monitoring and Product Recovery
Former MarkAir Facility
King Salmon, Alaska
ADEC File No. 2569.38.009**

December 2011

Submitted To:
Alaska Department of Environmental Conservation
555 Cordova Street
Anchorage, Alaska 99501

By:
Shannon & Wilson, Inc.
5430 Fairbanks Street, Suite 3
Anchorage, Alaska 99518
Phone: 907-561-2120
FAX: 907-561-4483

32-1-17427-002

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION.....	1
2.0 BACKGROUND AND PROJECT DESCRIPTION	1
2.1 Background	1
2.2 Project Overview.....	2
3.0 FIELD ACTIVITIES	3
3.1 Groundwater Sampling	3
3.2 Free Product Recovery	4
3.3 Laboratory Analyses	4
4.0 DISCUSSION OF RESULTS	4
4.1 Groundwater Samples	4
4.2 Quality Assurance Samples.....	6
5.0 CONCEPTUAL SITE MODEL.....	6
5.1 Soil Direct Contact	7
5.2 Groundwater Ingestion	7
5.3 Air.....	8
5.4 Other.....	8
6.0 INVESTIGATION DERIVED WASTE.....	8
7.0 CONCLUSIONS.....	9
8.0 CLOSURE/LIMITATIONS.....	9

TABLE OF CONTENTS (cont.)

TABLES

1	Sample Locations and Descriptions
2	Well Purging and Sampling Log
3	Product Measurement Data
4	Summary of Water Analytical Results
5	Historical Groundwater Analytical Results

FIGURES

1	Vicinity Map
2	Site Plan

APPENDICES

A	Field Notes
B	Site Photographs
C	Results of Analytical Testing By SGS North America Inc. of Anchorage, Alaska and ADEC Laboratory Data Review Checklist
D	Conceptual Site Model Graphic and Scoping Forms
E	Investigation-Derived Waste Disposal Certificate
F	Important Information About Your Geotechnical/Environmental Report

**GROUNDWATER MONITORING AND PRODUCT RECOVERY
FORMER MARKAIR FACILITY
KING SALMON, ALASKA
*ADEC FILE No. 2569.38.009***

1.0 INTRODUCTION

This report presents the results of Shannon & Wilson Inc.'s (Shannon & Wilson) 2011 groundwater monitoring and product recovery activities at the former MarkAir facility in King Salmon, Alaska. Petroleum hydrocarbon constituent concentrations greater than the applicable cleanup levels have been documented in the soil and groundwater at the project site, including up to 6.15 feet of free-phase product measured in the on-site monitoring wells. The purpose of this project was to collect groundwater samples and recover free-phase product from on-site monitoring wells. The primary objective of the project activities was to evaluate the migration of the groundwater plume and recover free product that is contributing to groundwater contamination at the site.

The project was administered under Alaska Department of Environmental Conservation (ADEC) Term Contract, Division of Spill Prevention and Response No. 18-4002-12. ADEC authorization to proceed was received on May 19, 2011 with Notice to Proceed No. 18-4002-12-024. The work was conducted in general accordance with our June 30, 2011 work plan, which was approved by the ADEC via email on July 5, 2011.

2.0 BACKGROUND AND PROJECT DESCRIPTION

2.1 Background

The former MarkAir facility is located on Lot 2, Block 1 of the King Salmon Airport. The facility is located on the western side of the apron, near the northwestern end of the airport's northwest/southeast runway as shown in the vicinity map, Figure 1. A bulk fuel storage facility was previously located on an unpaved portion of the project site, as well as several other above and below ground fuel storage tanks. Contamination at the site is the result of leaks and spills from the various fuel storage tanks. A site plan showing relevant site features and monitoring well locations is provided as Figure 2.

During site characterization activities conducted by Shannon & Wilson between 2003 and 2007, impacted soil and groundwater were encountered across the former MarkAir facility and

extended off the facility towards the west and south. Free-phase petroleum product, measuring up to 6.15 feet thick (Well B9MW), has been observed in on-site Wells B4MW, B5MW, and B9MW and off-site Wells B10MW and B11MW during previous site assessments.

In January 2008, Shannon & Wilson installed passive bailers in Monitoring Wells B4MW and B5MW and a passive skimmer in Monitoring Well B9MW. As a result of the product monitoring and recovery efforts conducted during the 2008 and 2009 field seasons, approximately 50 gallons of petroleum product were recovered from Wells B4MW, B5MW, and B9MW, with most of the product generated from Well B9MW. The recovered product was disposed at an approved facility.

Shannon & Wilson's June 2009 site characterization work included advancing three borings, collecting subsurface soil samples, installing three monitoring wells (Wells B19MW, B20MW, and B21MW), conducting a survey of the wells, and groundwater sampling of eight wells. The site characterization report concluded that "target analytes were not detected in the new borings or monitoring wells, indicating that the western edge of the contaminant plume has been delineated. The leading edge of the contaminant plume lies west of Wells B17MW and B18MW, and east of the new wells".

2.2 Project Overview

The primary elements for the 2011 work included groundwater sampling and laboratory testing of ten monitoring wells; free product recovery in five monitoring wells; investigation-derived waste (IDW) disposal; and reporting. Laboratory analyses were performed by SGS North America Inc. (SGS), of Anchorage, Alaska under subcontract to Shannon & Wilson. Emerald Alaska, Inc. (Emerald) disposed the IDW.

Sampling was performed in accordance with the June 30, 2011 work plan with the following variances:

- Well B16MW was not sampled due to the presence of ponded surface water preventing access to the well; and
- Free product was not present in Well B10MW, therefore, no product was recovered from this well.

Following receipt of permission from the Airport Manager and site owners to access the project site, Shannon & Wilson implemented the field activities.

3.0 FIELD ACTIVITIES

The field activities were conducted in general accordance with 18 Alaska Administrative Code (AAC) 75 Oil and Other Hazardous Substance regulations (18 AAC 75.335, October 2008) and ADEC's May 2010 *Draft Field Sampling Guidance*. Copies of project field notes are included in Appendix A.

3.1 Groundwater Sampling

Nine existing monitoring wells, Wells B12MW through B15MW and B17MW through B21MW, were sampled to monitor the contaminant plume. Well B16MW was accessible for monitoring depth to groundwater on August 18, 2011. The well could not be accessed for purging and sampling on the following day, August 19, 2011, due to surface water ponding over the top of the well casing from overnight rainfall as shown in Photo 1 in Appendix B.

Sampling was initiated for each well using an electronic water level indicator to measure the depth to the water table, as referenced to top of each monitoring well casing (TOC). A dual-phase probe was used to measure depth to water and check for potential presence of free-phase product in the wells that previously had contained free-phase product (Wells B4MW, B5MW, B9MW, B10MW, and B11MW). Analytical groundwater samples were not collected from these five wells. Groundwater sample locations and depths are summarized in Table 1.

A submersible centrifugal pump with dedicated, vinyl tubing was used to purge the wells and recover the groundwater samples. The pump was used to purge at least three casing volumes from each well prior to sampling. Water quality parameters were measured after each casing volume. Once three casing volumes were purged and the monitoring wells had recovered to at least 80 percent of their pre-purge volumes, water samples were obtained using the pump and dedicated tubing. The project samples were sealed and labeled, and placed in chilled (4° C +/- 2° C) coolers for transport to the laboratory. Samples were handled and transported to the project laboratory, SGS, using chain-of-custody procedures. The sample coolers were shipped via air cargo to Anchorage and picked up and delivered to the project laboratory by a Shannon & Wilson representative. Purge and decontamination water was temporarily stored in labeled 55-drum(s) as shown in Photo 2 in Appendix B.

Shannon & Wilson's field representative used disposable gloves and sampled the least contaminated wells first, based on previous analytical data, to limit cross-contamination potential. Water quality parameters, including temperature, pH, and conductivity, were measured in the field with a Hanna multi-parameter instrument and dissolved oxygen was

measured with a down-hole probe. Turbidity was measured with a Hach turbidity meter. Non-disposable equipment was decontaminated between wells. The decontamination process consisted of cleaning the equipment with a solution of laboratory grade detergent and tap water, followed by tap and deionized water rinses. Well development and water quality data are provided in Table 2.

3.2 Free Product Recovery

A dual-phase probe was used to check for presence and measure thickness of free-phase product in the five wells that historically contained free-phase product (Wells B4MW, B5MW, B9MW, B10MW, and B11MW) on August 18, 2011. Measurable free-phase product was not present at the time of monitoring in Well B10MW. Passive bailers in Wells B4MW and B5MW, the passive skimmer in Well B9MW, and a disposable bailer in Well B12MW were used to remove the recoverable product from the four wells. The recovered product was placed in a labeled 55-gallon drum, pending transport for recycling/disposal. Product thickness measurements and approximate volumes of free-phase product recovered, for the current and historical monitoring events, are summarized in Table 3.

3.3 Laboratory Analyses

The groundwater samples were delivered to SGS of Anchorage, Alaska following chain-of-custody procedures. The groundwater samples from the nine wells, plus one field duplicate, were tested for benzene, toluene, ethylbenzene, and xylenes (BTEX) using Environmental Protection Agency (EPA) Method 8021 and diesel range organics (DRO) by Alaska Method (AK) 102. The trip blank was tested for BTEX. Laboratory reports are included in Appendix C.

4.0 DISCUSSION OF RESULTS

The groundwater analytical results were compared to the cleanup levels listed in the Oil and Other Hazardous Substances Pollution Control Regulations (18 AAC 75, January 2009). The applicable groundwater cleanup levels and current groundwater analytical results are listed in Table 4. The DRO and benzene concentrations for the groundwater samples are also shown in Figure 2. A historical summary of the groundwater analytical results is provided in Table 5.

4.1 Groundwater Samples

Groundwater samples were collected from Wells B12MW through B21MW, with the exception of Well B16MW which could not be accessed. DRO was reported in Well B18MW at a concentration (11.9 milligrams per liter [mg/L]) greater than the ADEC cleanup level (1.5 mg/L).

SGS noted that the AK 102 chromatograph pattern for Sample B18MW was consistent with a weathered middle distillate. DRO was also reported in the remaining wells sampled with the exception of Well B12MW at concentrations ranging from an estimated 0.219 mg/L to 0.743 mg/L. These reported concentrations are less than the applicable cleanup level.

The sample from Well B18MW also contained detectable concentrations of benzene, ethylbenzene and xylenes at levels less than the applicable cleanup levels. BTEX constituents were not reported in the samples from the remaining wells.

Wells B13MW through B15MW and B19MW through B21MW had no detectable concentrations of DRO in their prior sampling events, either June 2009 or August 2007. Each of the wells had reported concentrations of DRO less than the ADEC cleanup level during the August 2011 sampling event. The reported concentrations for four of the wells were estimated at levels less than the laboratory limit of quantitation. Further, the reported DRO concentrations in five of the wells were less than the previous sampling event laboratory reporting limit. Based on this data, it is possible that the low levels of DRO may have historically been present in the groundwater at these well locations. This includes the sentry Wells B19MW, B20MW and B21MW installed downgradient of the contaminant source(s) to monitor the leading edge of the groundwater contaminant plume.

The DRO concentration reported in Well B17MW (0.585J mg/L) is less than concentration (2.89 mg/L) reported in the June 2009 sample. The DRO concentration in Well B18MW has also decreased since June 2009 but remains greater than the cleanup level concentration.

The August 2011 BTEX results for the wells are generally consistent with the June 2009 results with the exception of Well B18MW which contains the only detectable concentrations of BTEX constituents. The benzene concentration reported in Well B18MW has decreased from a concentration above (0.00525 mg/L) to less than (0.00252 mg/L) the cleanup level. Ethylbenzene (for the first time) and xylenes are reported at estimated concentrations less than the cleanup levels in Well B18MW.

Groundwater was notably shallower than the previous sampling events conducted in the wells sampled in August 2011. The decreased contaminant concentrations compared to previous sampling events may have been influenced by the shallower water table recorded during the August 2011 sampling event.

4.2 Quality Assurance Samples

The project laboratory follows on-going quality assurance/quality control (QA/QC) procedures to evaluate conformance to applicable ADEC and EPA data quality objectives (DQO). Internal laboratory quality controls for this project include surrogates, method blanks, laboratory control sample/laboratory control sample duplicates (LSC/LSCD), and internal duplicates. If a DQO for one of the controls is not met, the laboratory provides a brief explanation in the case narrative of their report.

External quality controls include a duplicate sample set and trip blank. One duplicate water sample was collected. The field duplicate sample was submitted to the laboratory to assess sample homogeneity and sampling and analytical precision. DRO was the only compound detected at concentrations greater than the limit of quantitation (LOQ) in both the project sample and its duplicate. The relative percent difference (RPD) for DRO was 37 percent which is not within the DQO of 30 percent for water. The DRO results for the project sample and duplicate are considered estimates since the reported concentrations are less than the LOQ.

One water trip blank accompanied the sample bottles from the laboratory to the site during sampling activities and back again to SGS. The trip blank did not contain concentrations of volatile compounds greater than the laboratory reporting limit, indicating that the samples were not cross contaminated or exposed to contamination from the sample handling, storage process, or testing.

Shannon & Wilson reviewed the SGS data deliverables and completed an ADEC Laboratory Data Review Checklist for the work order. The laboratory report and review checklist are included in Appendix C. The analytical data is considered usable for the purposes of this project.

5.0 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) was developed in general accordance with the ADEC's *Policy Guidance on Developing Conceptual Site Models* (October 2010), using ADEC's CSM Human Health Graphic and Scoping Forms. Copies of the Human Health Graphic and Scoping Forms are included as Appendix D.

The CSM includes a discussion of exposure routes, potential receptors, and potentially complete or incomplete exposure pathways. The CSM is based on the current site use, our institutional knowledge of the project site, and the information available from the ADEC Contaminated Sites Database. A re-examination of potential exposure pathways may be needed if land use, access,

or other site conditions change. The narrative also includes descriptions of site-specific considerations that increase or decrease the viability of each pathway at this site.

The primary release mechanisms at the site are assumed to be historic spills and leaks associated with industrial land use of the site. Current potential human receptors include commercial workers, site visitors and trespassers. Construction workers that may be tasked with future site construction activities are considered future receptors. DRO and benzene are the known primary contaminants of concern at the site.

5.1 Soil Direct Contact

Incidental soil ingestion is a potentially complete exposure pathway for on-site commercial workers, site visitors, trespassers and/or future construction workers due to the presence of benzene in the site soil from 0 to 15 feet bgs. The concentrations of benzene in historical soil samples were compared to the applicable risk-based cleanup level listed in Table B1, 18 AAC 75.341, for the “Under 40 Inch [precipitation] Zone,” to assess whether the potentially complete pathway requires additional evaluation.

The incidental soil ingestion pathway is considered potentially complete, although Section 3.1 of the *Policy Guidance on Developing Conceptual Site Models* states that “1/10th of the Table B1 direct contact cleanup values” may be used to determine that this pathway is insignificant. The benzene concentrations found in historical samples are less than 1/10th of this cleanup standard and do not require additional evaluation.

Dermal absorption is not a potentially complete exposure pathway for on-site commercial workers, site visitors, trespassers and/or future construction workers. Arsenic has historically been documented in the site soil. The concentrations of arsenic have been attributed to naturally occurring background levels. No other soil contaminants that permeate the skin have been documented at the project site.

Inhalation of fugitive dust is not a potentially complete exposure pathway for on-site commercial workers, site visitors, trespassers and/or future construction workers. DRO and benzene are not anticipated to be present in the top 2 centimeters of exposed surface soil at the project site.

5.2 Groundwater Ingestion

The ingestion of groundwater is considered a complete exposure pathway unless a groundwater use determination is conducted in accordance with 18 AAC 75.350, and that determination finds that the groundwater is not “a currently or reasonably expected future source of drinking water.”

It is understood that a private water well, located at King Ko Inn hydraulically downgradient of the site, is used for drinking water. Further, the drinking water well has been documented to contain concentrations of benzene (0.00918 mg/L) greater than the drinking water maximum contaminant level. An on-site drinking water well located south of the PenAir Terminal was decommissioned in 2005. A second on-site drinking water well may be located along the southeast property boundary as shown in Figure 2. Based on the current water use and the contaminants identified in this assessment (including free-phase product), ingestion of groundwater and inhalation of volatile compounds in tap water are current potentially complete exposure pathways at this site.

5.3 Air

Benzene has been identified in soil samples at the site at concentrations less than 1/10th of the Table B1 “Outdoor Inhalation” (for the under 40 inches zone) cleanup levels. Therefore, inhalation of outdoor and indoor air are potentially complete pathways, but are considered insignificant for benzene.

DRO has been identified in soil samples at the site at concentrations greater than 1/10th of the Table B2 “Inhalation” (for the under 40 inches zone) cleanup levels. Evaluation of this pathway may constitute additional investigation for the project site.

5.4 Other

Other impacted media, including sediment, surface water and biota, were not identified at the subject property. Because surface water and sediment were not observed at the property, surface water and sediment exposure pathways are not considered complete.

6.0 INVESTIGATION DERIVED WASTE

IDW from this project consisted of disposable sampling equipment, disposable personal protective equipment (PPE), purge/decontamination water, and free-phase product. The disposable sampling equipment and PPE were placed in an on-site dumpster for disposal at the local landfill. Purge/decontamination water and product containing drums were transported via air cargo to Anchorage for recycling/disposal by Emerald. A copy of the IDW disposal certificate is included in Appendix E.

7.0 CONCLUSIONS

Nine existing off-site groundwater monitoring wells located west of the former MarkAir facility were sampled in August 2011 to evaluate the migration of the groundwater plume. A tenth well could not be sampled due to ponded surface water obscuring well access.

Well B18MW contained the only concentration of DRO exceeding the ADEC cleanup level. Well B18MW also contained the only detectable concentrations of benzene, ethylbenzene and xylenes at levels less than the cleanup criteria. DRO concentrations in Well B17MW decreased to less than the ADEC cleanup level in the August 2011 sampling event.

The remaining wells had concentrations of DRO reported at levels less than the cleanup criteria with the exception of cross-gradient Well B12MW which had no reported DRO. Wells B13MW through B15MW and B19MW through B21MW had no detectable concentrations of DRO in their prior sampling events, either June 2009 or August 2007. The reported concentrations for four of the wells were estimated at levels less than the laboratory LOQ in the August 2011 samples. Further, the reported DRO concentrations in five of the wells were less than the previous sampling event laboratory reporting limit. It is possible that the low levels of DRO may have historically been present in the groundwater at these well locations. The presence of DRO in these wells therefore does not necessarily indicate migration of the leading edge of the contaminant plume. Based on the August 2011 sampling data, the leading edge of the contaminant plume lies west of sentry Wells B19MW, B20MW and B21MW.

Groundwater was notably shallower than the previous sampling events conducted in the wells sampled in August 2011

Free-phase petroleum product, measuring up to 8.71 feet thick in Well B4MW, was present in four monitoring wells located on and off-site. An estimated 17.5 gallons of product were purged from the four wells with the majority of product removed from Wells B4MW (6 gallons) and B9MW (8 gallons). The measured product thickness appears to have increased in on-site Well B4MW and off-site Well B11MW from previous monitoring events in 2008 and 2009.

8.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives in the study of this site. The findings we have presented within this report are based on the limited research, sampling, and analyses that we conducted at this site. They should not be construed as definite conclusions regarding the site's soil or groundwater quality. As a result, the analysis and sampling performed can only provide you with our professional judgment as to the

SHANNON & WILSON, INC.

environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised. Shannon & Wilson has prepared the attachment in Appendix F "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 findings and therefore will not disclose the results of this study, except with your permission or as required by law.

Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, or you question the authenticity of the report please contact the undersigned.

We appreciate the opportunity to be of service. Please call the undersigned at (907) 561-2120 with questions or comments concerning this report.

SHANNON & WILSON, INC.



Haydar Turker
Principal Engineering Geologist



TABLE 1 - SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location (See Figure 2)	Depth (feet)	Sample Classification
Monitoring Well Samples				
* B12MW	8/18/2011	Monitoring Well B12MW	9.26	Groundwater
* B13MW	8/18/2011	Monitoring Well B13MW	7.65	Groundwater
* B14MW	8/19/2011	Monitoring Well B14MW	9.33	Groundwater
* B15MW	8/18/2011	Monitoring Well B15MW	10.59	Groundwater
* B17MW	8/19/2011	Monitoring Well B17MW	10.18	Groundwater
* B18MW	8/19/2011	Monitoring Well B18MW	13.12	Groundwater
* B19MW	8/18/2011	Monitoring Well B19MW	13.47	Groundwater
* B20MW	8/18/2011	Monitoring Well B20MW	9.80	Groundwater
* B21MW	8/18/2011	Monitoring Well B21MW	7.92	Groundwater
* B22MW	8/19/2011	Duplicate of B17MW	10.18	Groundwater
Quality Control Sample				
* TB	8/18/2011	Water Trip Blank	-	Organic-free water blank prepared by the laboratory

KEY	DESCRIPTION
-----	-------------

- | | |
|---|---|
| * | Sample analyzed by the project laboratory (See Table 4) |
| - | Measurement not recorded or not applicable |

TABLE 2 - WELL PURGING AND SAMPLING LOG**WATER LEVEL MEASUREMENT DATA**

Well Number	B12MW	B13MW	B14MW	B15MW	B16MW	B17MW	B18MW	B19MW	B20MW	B21MW
Date Water Level Measured	8/18/2011	8/18/2011	8/18/2011	8/18/2011	8/18/2011	8/18/2011	8/18/2011	8/18/2011	8/18/2011	8/18/2011
Time Water Level Measured	12:22	12:18	13:32	13:10	13:29	13:41	13:46	12:54	12:59	12:38
Surveyed MP Elevation above MSL, Feet	47.80	47.52	48.52	48.48	52.82	49.17	51.31	48.22	46.53	43.08
Depth to Water Below MP, Feet	9.26	7.65	9.33	10.59	13.64	10.18	13.12	13.47	9.80	7.92
Groundwater Elevation, Feet	38.54	39.87	39.19	37.89	39.18	38.99	38.19	34.75	36.73	35.16

Note: Del Norte, Inc. conducted survey on August 17, 2007. Shannon & Wilson surveyed Wells B19MW and B20MW on June 19, 2009, and Well B21MW on August 28, 2009.

DEVELOPMENT/PURGING/SAMPLING DATA

Well Number	B12MW	B13MW	B14MW	B15MW	B16MW	B17MW	B18MW	B19MW	B20MW	B21MW
Date Sampled	8/18/2011	8/18/2011	8/19/2011	8/18/2011	8/19/2011	8/19/2011	8/19/2011	8/18/2011	8/18/2011	8/18/2011
Time Sampled	18:10	19:00	10:00	17:50	-	10:45	11:30	17:20	16:40	15:50
Depth to Water Below MP, Feet	9.26	7.65	9.33	10.59	13.64	10.18	13.12	13.47	9.80	7.92
Total Depth of Well Below MP, Feet	19.46	14.85	19.25	19.95	19.90	18.95	19.95	20.23	19.95	15.03
Water Column in Well, Feet	10.20	7.20	9.92	9.36	6.26	8.77	6.83	6.76	10.15	7.11
Gallons per Foot	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Water Column Volume, Gallons	1.63	1.15	1.59	1.50	1.00	1.40	1.09	1.08	1.62	1.14
Total Volume Bailed, Gallons	5.0	3.5	5.0	4.5	-	4.5	3.5	3.5	5	3.5
Development/Purging Method	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump	-	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump
Sampling Method	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump	-	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump	Proactive Pump
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch
Remarks					Not Sampled*	Duplicate "B22MW"				Needs new monument cap

WATER QUALITY DATA

Well Number	B12MW	B13MW	B14MW	B15MW	B16MW	B17MW	B18MW	B19MW	B20MW	B21MW
pH, Standard Units	6.31	6.22	6.35	6.68	-	6.26	7.00	6.44	4.73	6.23
Specific Conductance, $\mu\text{S}/\text{cm}$	94	64	127	52	-	263	875	250	265	366
Temperature, $^{\circ}\text{C}$	3.9	5.0	5.5	4.2	-	3.6	5.3	5.6	7.4	4.5
Turbidity, NTU	456	72.2	45.1	66.9	-	2.57	12.6	66.3	4.16	492

Note: Water quality parameters were measured with Hanna and Hach instruments.

KEY DESCRIPTION

*	Well B16MW not sampled due to well casing covered with ponded water from rainfall
MP	Measuring Point
MSL	Mean Sea Level
NA	Not available due to surveying error
$\mu\text{S}/\text{cm}$	Microsiemens per centimeter
$^{\circ}\text{C}$	Degrees Celsius
NTU	Nephelometric turbidity units

TABLE 3 - PRODUCT MEASUREMENT DATA

Well Number	Date Product Measured/Purged	Time Product Measured	Depth to Product Below MP, feet	Depth to Water Below MP, feet	Product Thickness, feet	Volume Product Purged, gallons*
B4MW	10/2/2008	11:07	16.32	16.49	0.17	not recorded
	6/17/2009	10:40	17.88	19.06	1.18	not recorded
	8/27/2009	12:41	16.77	18.80	2.03	1
	8/18/2011	14:18	15.97	24.68	8.71	6
B5MW	10/2/2008	11:13	15.03	16.01	0.98	1.2
	6/17/2009	10:00	17.19	17.79	0.60	not recorded
	8/27/2009	12:14	15.94	15.95	0.01	0.3
	8/18/2011	14:24	16.11	16.61	0.50	1
B9MW	10/2/2008	-	25.68	31.83	6.15	7.5
	6/17/2009	11:21	26.45	31.72	5.27	4.8
	8/27/2009	13:23	26.11	31.87	5.76	~0.2
	8/18/2011	14:15	25.80	31.82	6.02	8
B10MW	10/2/2008	11:30	-	16.27	-	-
	6/17/2009	11:08	17.64	17.69	0.05	not recorded
	8/27/2009	11:31	-	16.71	-	-
	8/18/2011	13:53	-	16.66	-	-
B11MW	10/2/2008	11:25	12.45	12.46	0.01	not recorded
	6/17/2009	11:04	14.59	14.60	0.01	not recorded
	8/27/2009	11:37	-	13.16	-	-
	8/18/2011	13:59	12.54	15.40	2.86	2.5

KEY DESCRIPTION

MP	Measuring point
-	No measurable product present at time of monitoring
*	Volume of free-phase product removed at time of product measurement data collection

TABLE 4 - SUMMARY OF WATER ANALYTICAL RESULTS

			Sample ID Number^ and Water Depth in Feet (See Tables 1 & 2 and Figure 2)					
			Monitoring Wells					
Parameter Tested	Method*	Cleanup Level**	B12MW 9.26	B13MW 7.65	B14MW 9.33	B15MW 10.59	B17MW 10.18	B22MW~ 10.18
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	<0.376	0.639	0.743	0.477J	0.585J	0.403J
Aromatic Volatile Organics (BTEX)								
Benzene - mg/L	EPA 8021B	0.005	<0.000300	<0.000300	<0.000300	<0.000300	<0.000300	<0.000300
Toluene - mg/L	EPA 8021B	1.0	<0.000620	<0.000620	<0.000620	<0.000620	<0.000620	<0.000620
Ethylbenzene - mg/L	EPA 8021B	0.7	<0.000620	<0.000620	<0.000620	<0.000620	<0.000620	<0.000620
Xylenes - mg/L	EPA 8021B	10	<0.00186	<0.00186	<0.00186	<0.00186	<0.00186	<0.00186

			Sample ID Number^ and Water Depth in Feet (See Tables 1 & 2 and Figure 2)					
			Monitoring Wells				QC	
Parameter Tested	Method*	Cleanup Level**	B18MW 13.12	B19MW 13.47	B20MW 9.80	B21MW 7.92	TB	
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	11.9	0.237J	0.219J	0.302J	-	
Aromatic Volatile Organics (BTEX)								
Benzene - mg/L	EPA 8021B	0.005	0.00252	<0.000300	<0.000300	<0.000300	<0.000300	
Toluene - mg/L	EPA 8021B	1.0	<0.000620	<0.000620	<0.000620	<0.000620	<0.000620	
Ethylbenzene - mg/L	EPA 8021B	0.7	0.000840J	<0.000620	<0.000620	<0.000620	<0.000620	
Xylenes - mg/L	EPA 8021B	10	0.00164J	<0.00186	<0.00186	<0.00186	<0.00186	

KEY	DESCRIPTION
-----	-------------

*	See Appendix C for compounds tested, methods, and laboratory reporting limits
**	Groundwater cleanup levels are from Table C, 18 AAC 75.345 (October 2011)
^	Sample identification preceded by "17427-" on the chain of custody form
~	Field duplicate of Sample B17MW
mg/L	Milligrams per liter
<0.376	Analyte not detected; laboratory reporting limit is 0.376 mg/L
-	Not applicable or sample not tested for this analyte
11.9	Reported concentration exceeds the regulated cleanup level
QC	Quality control
0.639	Analyte detected
J	Analyte detected at an estimated concentration less than the limit of quantitation

TABLE 5 - HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Monitoring Well	Date	Depth to Water, Ft	Product Thickness, Ft	Parameter Tested* and Cleanup Level** in mg/L				
				DRO 1.5	Benzene 0.005	Toluene 1.0	Ethylbenzene 0.7	Xylenes 10
B1MW	3/17/2004	21.19	NP	9.85	0.00246	<0.00200	<0.00200	0.00331
	6/9/2004	22.06	NP	15.2	0.000748	<0.00200	<0.00200	<0.00200
	5/18/2005	20.82	NP	9.88	<0.00500	<0.0200	<0.0200	<0.0200
	10/6/2005	19.78	NP	4.35	0.00271	<0.00200	<0.00200	<0.00200
	6/16/2006	21.25	NP	7.09	0.00208	<0.00200	0.00287	<0.00200
	10/2/2006	20.83	NP	9.70	0.00202	<0.00200	<0.00200	<0.00200
	8/19/2007	21.43	NP	6.76	0.00292	<0.00200	<0.00200	<0.00200
B2MW	3/19/2004	28.15	NP	19.9	0.155	<0.00200	0.00798	0.0111
	6/9/2004	28.34	NP	32.3	0.229	0.00205	0.0518	0.0860
	5/17/2005	28.12	NP	61.0	0.189	<0.0200	0.0322	0.0246
	10/6/2005	26.84	NP	19.0	0.220	<0.00200	0.0351	0.0312
	6/16/2006	28.50	NP	23.2	0.223	<0.0200	0.0398	0.0280
	10/2/2006	27.55	NP	62.5	0.218	<0.00200	0.0439	0.0545
	8/15/2007	28.01	NP	31.6	0.170	<0.0200	0.0393	0.0245
B3MW	3/19/2004	14.72	NP	1.02	<0.000500	<0.00200	<0.00200	<0.00200
	6/9/2004	14.81	NP	1.37	<0.000500	<0.00200	<0.00200	<0.00200
	5/17/2005	13.39	NP	0.836	<0.000500	<0.00200	<0.00200	<0.00200
	10/6/2005	10.20	NP	0.840	<0.000500	<0.00200	<0.00200	<0.00200
	6/17/2006	13.20	NP	0.817	<0.000500	<0.00200	<0.00200	<0.00200
	10/2/2006	11.00	NP	1.85	<0.000500	<0.00200	<0.00200	<0.00200
	8/17/2007	12.89	NP	0.942	<0.000500	<0.00200	<0.00200	<0.00200
B4MW	3/20/2004	17.03	0.02	-	-	-	-	-
	6/9/2004	12.52	0.24	-	-	-	-	-
	5/17/2005	17.24	0.61	-	-	-	-	-
	10/6/2005	15.73	0.59	-	-	-	-	-
	6/16/2006	17.55	0.87	-	-	-	-	-
	10/2/2006	15.65	0.32	-	-	-	-	-
	8/19/2007	18.26	1.63	-	-	-	-	-
	10/2/2008	16.49	0.17	-	-	-	-	-
	6/17/2009	19.06	1.18	-	-	-	-	-
	8/18/2011	24.68	8.71	-	-	-	-	-
B5MW	3/20/2004	16.96	0.15	-	-	-	-	-
	6/9/2004	19.25	2.12	-	-	-	-	-
	5/17/2005	18.63	3.12	-	-	-	-	-
	10/6/2005	16.75	3.33	-	-	-	-	-
	6/16/2006	19.33	4.21	-	-	-	-	-
	10/2/2006	18.11	4.04	-	-	-	-	-
	8/19/2007	16.47	1.14	-	-	-	-	-
	10/2/2008	16.01	0.98	-	-	-	-	-
	6/17/2009	17.79	0.60	-	-	-	-	-
	8/18/2011	16.61	0.50	-	-	-	-	-
B6MW	3/20/2004	14.03	NP	0.569	<0.000500	<0.00200	<0.00200	<0.00200
	6/9/2004	13.43	NP	0.471	<0.000500	<0.00200	<0.00200	<0.00200
	5/17/2005	11.97	NP	0.380	<0.000500	<0.00200	<0.00200	<0.00200
	10/6/2005	8.02	NP	<0.330	<0.000500	<0.00200	<0.00200	<0.00200
	6/16/2006	11.69	NP	2.22	<0.000500	<0.00200	<0.00200	<0.00200
	10/2/2006	9.30	NP	<0.312	<0.000500	<0.00200	<0.00200	<0.00200
	8/17/2007	11.42	NP	<0.300	<0.000500	<0.00200	<0.00200	<0.00200

Symbol key and descriptions located at end of table.

TABLE 5 - HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Monitoring Well	Date	Depth to Water, Ft	Product Thickness, Ft	Parameter Tested* and Cleanup Level** in mg/L				
				DRO 1.5	Benzene 0.005	Toluene 1.0	Ethylbenzene 0.7	Xylenes 10
B7MW	6/16/2006	17.25	NP	6.43	0.00201	<0.00200	<0.00200	0.00807
	10/2/2006	16.53	NP	19.5	0.00132	<0.00200	<0.00200	0.00417
	8/15/2007	17.60	NP	9.24	0.000505	<0.00200	<0.00200	<0.00200
B8MW	6/16/2006	16.70	NP	5.66	<0.000500	<0.00200	<0.00200	<0.00200
	10/2/2006	Could not locate						
B9MW	6/16/2006	27.51	0.91	-	-	-	-	-
	10/2/2006	31.74	5.64	-	-	-	-	-
	8/19/2007	28.65	1.56	-	-	-	-	-
	10/2/2008	31.83	6.15	-	-	-	-	-
	6/17/2009	31.72	5.27	-	-	-	-	-
	8/18/2011	31.82	6.02	-	-	-	-	-
B10MW	6/16/2006	16.79	NP	21.0	0.0186	<0.00200	0.00749	0.00511
	10/2/2006	15.33	NP	30.2	0.0116	<0.00200	0.0335	0.00273
	8/19/2007	19.95	0.01	-	-	-	-	-
	10/2/2008	16.27	NP	-	-	-	-	-
	6/17/2009	17.69	0.05	-	-	-	-	-
	8/18/2011	16.66	NP	-	-	-	-	-
B11MW	6/16/2006	13.29	NP	1.10	0.0275	<0.00200	0.00936	0.00755
	10/2/2006	11.60	NP	4.71	0.00536	<0.00200	0.0798	0.0628
	8/19/2007	13.47	0.01	-	-	-	-	-
	10/2/2008	12.46	0.01	-	-	-	-	-
	6/17/2009	14.6	0.01	-	-	-	-	-
	8/18/2011	15.4	2.86	-	-	-	-	-
B12MW	8/18/2007	9.63	NP	<0.300	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	9.26	NP	<0.376	<0.000300	<0.000620	<0.000620	<0.00186
B13MW	8/18/2007	9.11	NP	<0.317	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	7.65	NP	0.639	<0.000300	<0.000620	<0.000620	<0.00186
B14MW	8/18/2007	10.84	NP	1.58	<0.000500	<0.00200	<0.00200	<0.00200
	6/19/2009	12.05	NP	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/19/2011	9.33	NP	0.743	<0.000300	<0.000620	<0.000620	<0.00186
B15MW	8/18/2007	11.31	NP	0.351	<0.000500	<0.00200	<0.00200	<0.00200
	6/18/2009	11.04	NP	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	10.59	NP	0.477J	<0.000300	<0.000620	<0.000620	<0.00186
B16MW	8/19/2007	14.51	NP	0.484	<0.000500	<0.00200	<0.00200	<0.00200
	6/18/2009	14.88	NP	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	13.64	NP	-	-	-	-	-
B17MW	8/19/2007	11.54	NP	1.00	<0.000500	<0.00200	<0.00200	<0.00200
	6/18/2009	12.69	NP	2.89	<0.000500	<0.00200	<0.00200	<0.00200
	8/19/2011	10.18	NP	0.585J	<0.000300	<0.000620	<0.000620	<0.00186

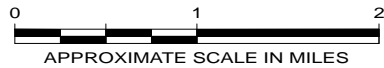
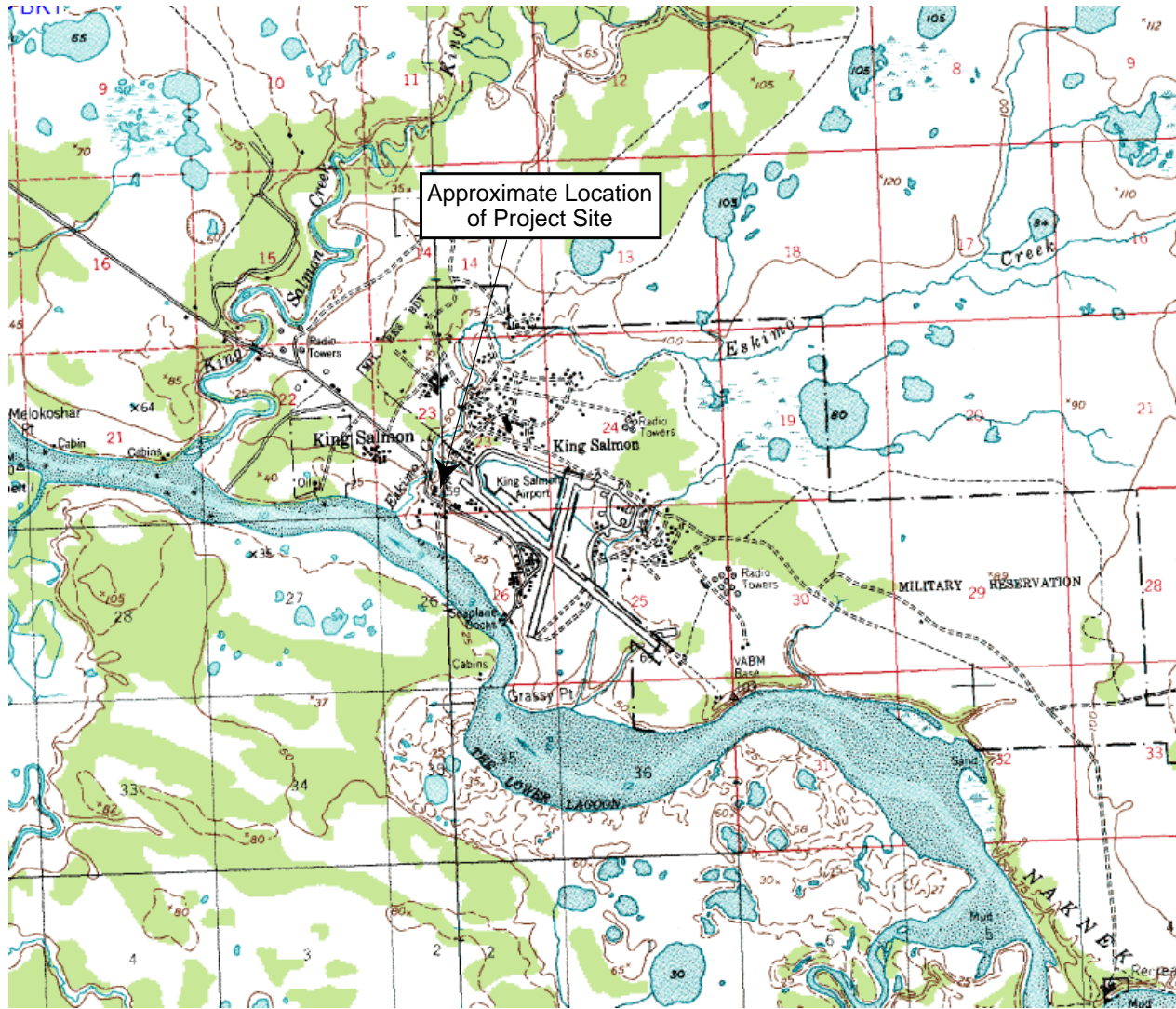
Symbol key and descriptions located at end of table.

TABLE 5 - HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Monitoring Well	Date	Depth to Water, Ft	Product Thickness, Ft	Parameter Tested* and Cleanup Level** in mg/L				
				DRO 1.5	Benzene 0.005	Toluene 1.0	Ethylbenzene 0.7	Xylenes 10
B18MW	8/19/2007	14.01	NP	12.8	0.0103	<0.00200	<0.00200	0.00419
	6/19/2009	15.02	NP	13.8	0.00526	<0.00200	<0.00200	<0.00200
	8/19/2011	13.12	NP	11.9	0.00252	<0.000620	0.000840J	0.00164J
B19MW	6/19/2009	17.90	NP	<0.833	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	13.47	NP	0.237J	<0.000300	<0.000620	<0.000620	<0.00186
B20MW	6/19/2009	17.30	NP	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	9.80	NP	0.219J	<0.000300	<0.000620	<0.000620	<0.00186
B21MW	6/20/2009	11.35	NP	<0.769	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	7.92	NP	0.302J	<0.000300	<0.000620	<0.000620	<0.00186

KEY DESCRIPTION

*	Higher result of field duplicate samples is listed
**	Groundwater cleanup levels are from Table C, 18 AAC 75.345 (October 2011)
DRO	Diesel Range Organics
Ft	Feet
mg/L	Milligrams per liter
NP	No Product
0.00419	Analyte detected
<0.000500	Analyte not detected; laboratory reporting limit is 0.000500 mg/L
13.8	Concentration exceeds cleanup level
J	Analyte detected at an estimated concentration less than the limit of quantitation
-	Not tested for this parameter



Taken from Naknek C-2 and C-3
U.S. Geological Survey Quadrangles
50 Foot Contour Interval



Former MarkAir Facility
King Salmon, Alaska

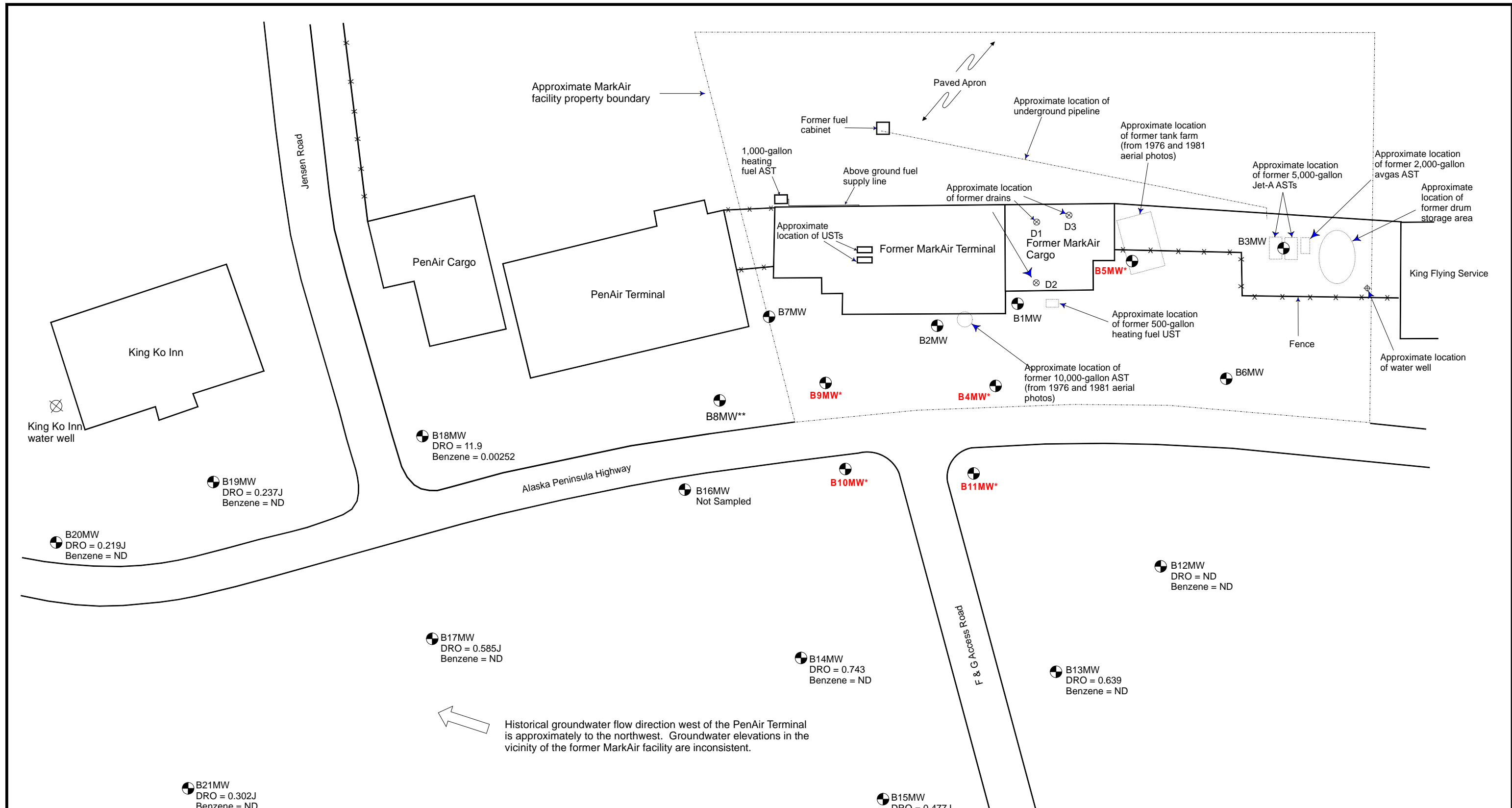
VICINITY MAP

December 2011


32-1-17427-002

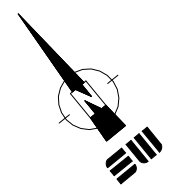
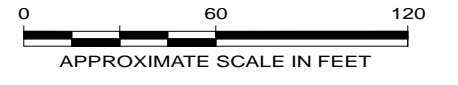
SW SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 1



LEGEND

- 
B1MW
Approximate location of Monitoring Well B1MW.
- DRO = 11.9
Benzene = 0.00252
Diesel range organics (DRO) concentration of 11.9 milligrams per liter (mg/L) and benzene concentration of 0.00252 mg/L in August 2011 groundwater sampling event.
- ND
Not detected.
- J
Analyte detected at an estimated concentration less than the limit of quantitation.
- B9MW*
Well that historically contained product.
- **
Well B8MW could not be located during October 2006 field effort (presumed destroyed by paving activities).



Former MarkAir Facility King Salmon, Alaska	
SITE PLAN	
December 2011	32-1-17427-002
 SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	
Figure 2	

APPENDIX A
FIELD NOTES



Thurs 8-18-11

8 AM Travel to Airport - Pen Air to King Salmon
 ~11 AM pick up rental truck from Bristol Bay Contractors
 \$75 per day + 10% sales tax X 2 days = \$165
 + Fill up gas tank

11:25 AM pick up cargo at Pen Air Cargo

11:32 Start water levels at Mark Air site - clean wells to dirty
 remove passive boilers first - but first get decon
 water from Antlers Inn & 55 gal open-top drum from
 Connex behind Eddies.

weather: 50s°F started to rain, hard at times after about 12:30 pm

~14:30 - finish water levels & product measurements

Do calculations of well volumes/purge requirements
 Calibrate Hanna #1 and 55550 DO meter, check
 calibration of Hach 100 Turbidimeter

Sample wells ^{in order} from historically clean to most contaminated

Sample B21mw, B20mw, B19mw, B12mw, B13mw, B15mw

(12 mi. Eskimo Creek Job - Search for MUY)

check into Antlers Inn and bring gear inside

8:30 pm Done

Fri 8-19-11

855 BSK Crk calculation for loading MUY

910 Mark Air - finish water sampling -

weather: rain, 50s°F

Calibrate instruments

Sample remaining wells except B16mw, which was in a flooded
 ditch

purge product from 4 wells

1400 - BSK Crk Job

14:24 Pack & ship gear back to Anchorage - Pen Air

17:30- Fuel truck & Return to Bristol Bay Contractors

17:50 check in at Pen Air - flight delayed from 7:30 pm to ~10 pm
 maybe?

→ Take 1.5 hr dinner break
 wait & travel

back in office 17:25 am - 12:40 am finish out time/timesheet/cubits
 receipts etc.

1.3 hr Mark Air
 2 hr Eskimo Creek



SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

JOB NAME _____

JOB NO. _____

SUBJECT _____

DATE _____

BY _____ CHK'D _____

SHEET _____ of _____

Call/mails
rental

Bristol Bay Contractors 246-3360 ← call when get in
~~Naknek Engine 246-6120 Roglio →~~

Call

~~Danny @ King KO 907 246-3377 installed in ROW - Paul Koval onyng 258-6600~~

Now: Jay Knight
~~David Cummings / ADOT & PF 246-3325 (shop)
leaves office @ 3pm 439-1129 (cell)~~
~~David Cummings @ alaska 19.00~~

Peat: Sawyer Alexis (W) 246-6131 (H) 246-3764
Orr Williams (H) 246-3006 (C) 439-3506

Antlers Inn (M) 246-8525 or 888-735-8525 Flora Gilbertson 439-8525 cell
Jim McFarland 439-8526 cell
info@antlersinn.com

Pen Air King Salmon 246-3372 (general & cargo) Account Number # 5738
Anchorage 243-2985 cargo 771-2500 general
↑ 7am-6pm M-Sat



- Gear:
- ✓ V-magnetometer
 - ✓ wrenches - sunsh mount
 - ✓ - drum, ~~bung~~ wrenches
 - ✓ 2901 key
 - water level indicator
 - ✓ OPN probe
 - ✓ worker battery, charged
 - ✓ pump, controller, fuses
 - ✓ tubing
 - ✓ builders 10+2 = 12 - 2x10
 - ✓ towel
 - cooler with ice
 - 55-gal drums 4 in K.S.
 - ✓ gloves
 - ✓ Hanna
 - - Downhole DO
 - ✓ Turbidimeter
 - ✓ buckets/lids (4)
 - alcomox
 - ✓ tape measures
 - ✓ safety vest
 - ✓ safety glasses
 - ✓ boots
 - hard hat
 - ✓ work gloves
 - ✓ gear cooler
 - ✓ sample coolers w/ice (12 gal)
 - ✓ tyvek suits
 - packing tape

Paper work

- survey data ✓
- old field logs / tables
- site plan
- field logs (15)
- clipboard / pens
- shipping labels
- dangerous goods labels etc
- COCs
- drum labels
- work plan
- ~~Survey~~
- Product drum label:
- red Flammable label
- & blue labels
- water: green labels

55 gal drums: red purge volume:

= Need	Blzmb	: 5
2:	13	3
one product,	14	3.5
one water	15	4.5
	16	2.5
	17	3.5
	18	2.5
	19	1.5
	20	1.5
	21	2

+ alcomox 29.5
+ 8
+ 15% ≈ 40+ gals

Tubing:

23'
18'
22'
23'
23'
22'
20'
23'
23'
18'
<hr/>
2x100', +40'

19.85



Flights

ANC to King Salmon (AKN)

Thurs Aug 18

Penair

745A - 905A

925A - 1045A ✓

1:30p - 2:50p

4:30p - 5:50p

5:40p - 7:00p

Alaska Air

11:15am - 12:24pm

King Salmon to Anchorage

Friday Aug 19

Penair

3:20p - 4:40p

6:20p - 7:40p

7:30pm - 8:50pm

11:15am - 12:35pm

9:35am - 10:55am

Alaska Air

1:24pm - 2:22pm

PenAir

PenPack

General freight

5/17/16

to AKN

priority
\$1.55

SAMPLE:

B2M1W - B21M1W

Method:

- Pump
- 3 Well volumes
- 90% recovery

Sample order:

(least contaminated to most)

Contract:

- Kayko, Tripods Manager etc. F&B access.
- get 55 gal drums
- rent truck?
- Antlers Inn reservation



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427

Page 1 of 1

Owner/Location ADEC / Former Mark A. King Salmon

Well No.: B12MW Random No.: _____ Date: 8-18-11

Weather: windy 50's F Time Started: 17:31 Time Completed: 18:27

SAMPLING DATA

Measuring Point (MP): FOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 47.80 Water Level Elevation: 38.54

Total Depth of Well Below MP: 19.46

Time of Depth Measurement: 12:22 8-18-11 DTW Below MP: 9.26 80% = 11.30

Time: _____ Water Column in Well: 10.20

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.63

Gallons Pumped/Bailed: 5

FIELD PARAMETERS

Time: 18:10 Odor: None Color: brown

Temp.: <u>5.4 °C</u>	Sp. Cond.: <u>87 µS</u>	pH: <u>6.72 SU</u>	DO: <u>downhole</u>	Turb.: <u>869 NTU</u>
<u>5.0</u>	<u>98</u>	<u>6.43</u>	<u>9.80 mg/L</u>	<u>359</u>
<u>3.9</u>	<u>99</u>	<u>6.31</u>		<u>456</u>

Evacuation Method: proactive pump

Sampling Method: proactive pump

Remarks: recovered 80%

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427

Page 1 of 1

Owner/Location: ADEL / Former Mark Air King Salmon

Well No.: B13.MW Random No.: _____ Date: 8-18-11

Weather: windy, cloudy 50°F Time Started: 12:30 Time Completed: 19:10

SAMPLING DATA

Measuring Point (MP): T00

Height of MP Above or Below Land Surface: _____

MP Elevation: 47.52 Water Level Elevation: 39.87

Total Depth of Well Below MP: 14.85

Time of Depth Measurement: 12:18 8-18-11 DTW Below MP: 7.65

Time: _____ Water Column in Well: 7.20

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.15

Gallons Pumped/Bailed: 3.5

7.66 possible
0.01
product
check
when
purging
No
product

FIELD PARAMETERS

Time: 19:00 Odor: none Color: brown

Temp.: 63 °C Sp. Cond.: 61 µS pH: 6.22 SU DO: downhole Turb.: 68.6 NTU
55 76 6.24 9.42 mg/L 81.0
5.0 64 6.22 77.2

Evacuation Method: proactive pump

Sampling Method: proactive pump

Remarks: 7800

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427

Page 1 of 1

Owner/Location ADEC / Former Mark Air King Salmon

Well No.: B14MW Random No.: _____ Date: 8-19-11

Weather: rain, 50s°F Time Started: 935 Time Completed: 10:10

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 48.52 Water Level Elevation: 39.19

Total Depth of Well Below MP: 19.25

Time of Depth Measurement: 13:32 8-18-11 DTW Below MP: 9.33 802 = 11.31

Time: _____ Water Column in Well: 9.92

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.59

Gallons Pumped/Bailed: 5

FIELD PARAMETERS

Time: 10:00 Odor: none Color: light brown to clear downhole

Temp.: <u>6.0</u> °C	Sp. Cond.: <u>104</u> µS	pH: <u>6.35</u> SU	DO: <u>6.23</u> mg/L	Turb.: <u>39.7</u> NTU
<u>5.8</u>	<u>147</u>	<u>6.28</u>	_____	<u>30.4</u>
<u>5.5</u>	<u>127</u>	<u>6.35</u>	_____	<u>45.1</u>

Evacuation Method: proactive pump

Sampling Method: proactive pump

Remarks: > 802

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427
Page 1 of 1

Owner/Location: ADEC / Pointe Marquette King Salmon

Well No.: B15MW Random No.: _____ Date: 8-18-11

Weather: rain 50°F Time Started: 17:13 Time Completed: 17:53

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 48.48 Water Level Elevation: 37.89

Total Depth of Well Below MP: 19.95

Time of Depth Measurement: 13:10 8-18-11 DTW Below MP: 10.59

10.60 check w/ battery as product 80% = 12.46'

Time: _____ Water Column in Well: 9.36

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.50

Gallons Pumped/Bailed: 4.5

FIELD PARAMETERS

Time: 17:50 Odor: None Color: mostly clear

yellowish (slightly grey) ascl

Temp.: <u>5.2 °C</u>	Sp. Cond.: <u>52 µS</u>	pH: <u>6.67 SU</u>	DO: <u>downhole</u>	Turb.: <u>49.5 NTU</u>
<u>4.4</u>	<u>54</u>	<u>6.66</u>	<u>8.95 mL</u>	<u>77.3</u>
<u>4.2</u>	<u>52</u>	<u>6.68</u>		<u>66.9</u>

Evacuation Method: practive pump

Sampling Method: practive pump

Remarks: > 80%

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427
Page 1 of 1

Owner/Location ADEC / Ferner - Mak Air King Salmon

Well No.: B16 MW Random No.: _____ Date: 8-19-11

Weather: Rain 50:9F Time Started: _____ Time Completed: _____

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 52.82 Water Level Elevation: 39.18

Total Depth of Well Below MP: 19.90

Time of Depth Measurement: 13:29 8-18-11 DTW Below MP: 13.64 803 = 14.99

Time: _____ Water Column in Well: 6.26

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.00

Gallons Pumped/Bailed: 370 gal

FIELD PARAMETERS

Time: _____ Odor: _____ Color: _____

Temp.: _____ °C Sp. Cond.: AD pH: SU DO: downhole Turb.: NTU
_____ mg/L

Evacuation Method: _____

Sampling Method: _____

Remarks: Could not sample 8-19-11. Flooded with overnight & continuing rain. Tried to dig

Sampling Personnel: Andrew Lee drainage trench & beams to no avail. Check back in afternoon if rain eases.

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427
Page 1 of 1

Owner/Location: ADEC / Former Market King Salmon

Well No.: B17MW Random No.: _____ Date: 8-19-11

Weather: rain 50°F Time Started: 10:13 Time Completed: 11:00

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 49.17 Water Level Elevation: 38.99

Total Depth of Well Below MP: 18.95

Time of Depth Measurement: 13.41 8:18 DTW Below MP: 10.18 *80% = 11.93*

Time: _____ Water Column in Well: 8.77

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.40

Gallons Pumped/Bailed: 4.5

FIELD PARAMETERS

Time: 10:45 Odor: none Color: light brown to clear

Temp.: <u>5.0 °C</u>	Sp. Cond.: <u>220 µS</u>	pH: <u>5.625</u>	DO: <u>countable</u>	Turb.: <u>12.0 NTU</u>
<u>3.7</u>	<u>280</u>	<u>5.63</u>	<u>8.77 mg/L</u>	<u>2.06</u>
<u>3.6</u>	<u>263</u>	<u>6.26</u>		<u>2.57</u>

Evacuation Method: peristaltic pump

Sampling Method: peristaltic pump

Remarks: Duplicate: 17427-B22MW @ 11:00 *>80% white purging*

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427

Page 1 of 1

Owner/Location ADEL / Former Mack Ave King Salmon

Well No.: B18MW Random No.: _____ Date: 8-19-11

Weather: Rain 50°F Time Started: 11:00 Time Completed: 11:40

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 51.31 Water Level Elevation: 38.19

Total Depth of Well Below MP: 19.95

Time of Depth Measurement: 13:46 8-18-11 DTW Below MP: 13.12 803 = 14.48'

Time: _____ Water Column in Well: 6.83

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.09

Gallons Pumped/Bailed: 3.5

FIELD PARAMETERS

Time: 11:30 Odor: None Color: brown to clear

Temp.: <u>6.2 °C</u>	Sp. Cond.: <u>699</u> <u>ns</u>	pH: <u>6.48</u> <u>sl</u>	DO: <u>downhole</u>	Turb.: <u>14.3</u> <u>NTU</u>
<u>5.3</u>	<u>888</u>	<u>6.57</u>	<u>1.82</u> <u>mg/L</u>	<u>10.5</u>
<u>5.3</u>	<u>700</u> <u>875</u>	<u>7.00</u>		<u>12.6</u>
	<u>ns</u>			

Evacuation Method: proactive pump

Sampling Method: proactive pump

Remarks: >803 during purge

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427

Page 1 of 1

Owner/Location: ADEC / FORMER MARKAIR KING SALMON

Well No.: B19MW Random No.: _____ Date: 8-18-11

Weather: windy cloudy 50°F Time Started: 16:49 Time Completed: 17:30

SAMPLING DATA

Measuring Point (MP): TOL

Height of MP Above or Below Land Surface: _____

MP Elevation: 48.22 Water Level Elevation: 34.75

Total Depth of Well Below MP: 20.23

Time of Depth Measurement: 12:54 8-18-11 DTW Below MP: 13.47

80% = 14.82'

Time: _____ Water Column in Well: 6.76

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.08

Gallons Pumped/Bailed: 3.5

FIELD PARAMETERS

Time: 17:20 Odor: none Color: faintly brown (clear)

Temp.: <u>6.8 °C</u>	Sp. Cond.: <u>268 µS</u>	pH: <u>6.22</u>	DO: <u>downhole</u>	Turb.: <u>70.2 NTU</u>
<u>5.9</u>	<u>267</u>	<u>6.38</u>	<u>9.40 mg/L</u>	<u>47.3</u>
<u>5.6</u>	<u>250</u>	<u>6.44</u>		<u>66.3</u>

Evacuation Method: proactive pump

Sampling Method: proactive pump

Remarks: 7803

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427
Page 1 of 1

Owner/Location ADEC / Former Mark A. King Salmon

Well No.: B-20 MW Random No.: _____ Date: 8-18-11

Weather: Rain 50s F Time Started: 16:08 Time Completed: 16:48

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 46.53 Water Level Elevation: 36.73

Total Depth of Well Below MP: 19.95

Time of Depth Measurement: 12:59 8-18-11 DTW Below MP: 9.80 802 = 11.83

Time: _____ Water Column in Well: 10.15

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.62

Gallons Pumped/Bailed: 5

FIELD PARAMETERS

Time: 16:40 Odor: none Color: brown to clear

Temp.: <u>8.0 °C</u>	Sp. Cond.: <u>256 µs</u>	pH: <u>4.82 cu</u>	DO: <u>downhole</u>	Turb.: <u>9.89 NTU</u>
<u>7.7</u>	<u>261</u>	<u>4.76</u>	<u>4.54 mg/L</u>	<u>2.90</u>
<u>7.4</u>	<u>265</u>	<u>4.73</u>		<u>4.16</u>

Evacuation Method: positive pump

Sampling Method: positive pump

Remarks: remained >80%

Sampling Personnel: Andrew Lal

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46



Shannon & Wilson, Inc.

WATER SAMPLING LOG

Job No: 32-1-17427

Page 1 of 1

Owner/Location: ADEL / Former Markham King Salmon

Well No.: B21 MW Random No.: _____ Date: 8-18-11

Weather: rain 50s F Time Started: 15:15 Time Completed: 16:07

SAMPLING DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: _____

MP Elevation: 43.08 Water Level Elevation: 35.16

Total Depth of Well Below MP: 15.03

Time of Depth Measurement: 12:38 8-18-11 DTW Below MP: 7.92

80% = 9.34

Time: _____ Water Column in Well: 7.11

Diameter of Casing: 2" Gallons per ft: 0.16

Gallons in Well: 1.14

Gallons Pumped/Bailed: 3.5

FIELD PARAMETERS

Time: 15:50 Odor: none Color: brown to clearish *is hot brown*

Temp.: <u>5.0 °C</u>	Sp. Cond.: <u>347 µS</u>	pH: <u>6.025</u>	DO: <u>downhole</u>	urb.: <u>921</u>	NTU
<u>4.9</u>	<u>312</u>	<u>5.99</u>	<u>3.36 mg/L</u>	<u>574</u>	
<u>4.5</u>	<u>366</u>	<u>6.73</u>		<u>492</u>	

Evacuation Method: proactive pump

Sampling Method: proactive pump

Remarks: purged dry (no) Ase *didn't purge to below 80"* Needs new moment lid

Sampling Personnel: Andrew Lee

WELL CASING VOLUMES

GAL/FT 1-1/4" = 0.077 2" = 0.16 3" = 0.37 4" = 0.65
 1-1/2" = 0.10 2-1/2" = 0.24 3-1/2" = 0.50 6" = 1.46

Free-Phase Product Recovery and Monitoring Log

ASL

Date/Time	B9MW			
	Vol.	DTP	DTW	PT
8-18-11 14:15	.8	25.80	31.82	6.02

Date/Time	B5MW			
	Vol.	DTP	DTW	PT
8-18-11 14:24	1	25.89 16.61	34.68 16.61	0.50

Date/Time	B4MW			
	Vol.	DTP	DTW	PT
8-18-11 14:18	6	15.97	24.68	8.71

Key
 Vol. Volume of product removed from well
 DTP Depth to product
 DTW Depth to water
 PT Product thickness (DTW - DTP)

APPENDIX B
SITE PHOTOGRAPHS



Photo 1: Monitoring Well B16MW is flooded with surface water from overnight rainfall (August 19, 2011).



Photo 2: 55-gallon drums containing purgewater and product removed from monitoring wells, prior to transport for disposal (August 19, 2011).

APPENDIX C
RESULTS OF ANALYTICAL TESTING BY
SGS NORTH AMERICA INC.
OF ANCHORAGE, ALASKA AND
ADEC LABORATORY DATA REVIEW CHECKLIST



SGS North America Inc.
Alaska Division
Level II Laboratory Data Report

Project: Mark Air 32-1-17427
Client: Shannon & Wilson, Inc.
SGS Work Order: 1113983

Released by:

Contents:

Cover Page
Case Narrative
Final Report Pages
Quality Control Summary Forms
Chain of Custody/Sample Receipt Forms

Note:
Unless otherwise noted, all quality assurance/quality control criteria is in compliance with the standards set forth by the proper regulatory authority, the SGS Quality Assurance Program Plan, and the National Environmental Accreditation Conference.



CASE NARRATIVE

Print Date: 8/30/2011

Client Name: Shannon & Wilson, Inc.
Project Name: Mark Air 32-1-17427
Workorder No.: 1113983

Sample Comments

Refer to the sample receipt form for information on sample condition.

<u>Lab Sample ID</u>	<u>Sample Type</u>	<u>Client Sample ID</u>
1113983002	PS	17427-B13MW
	AK102 - Unknown hydrocarbon with several peaks is present.	
1113983003	PS	17427-B14MW
	AK102 - Unknown hydrocarbon with several peaks is present.	
1113983006	PS	17427-B18MW
	AK102 - The pattern is consistent with a weathered middle distillate.	
1047245	* LCSD	LCSD for HBN 1255459 [XXX/2550
	AK102 - LCSD recovery for 5a-androstane (surrogate) does not meet QC criteria (biased high); however the sample surrogates are within criteria.	

* QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.



Laboratory Analytical Report

Client: **Shannon & Wilson, Inc.**
5430 Fairbanks Street
Suite 3
Anchorage, AK 99518

Attn: **Andrew Lee**
T: (907)561-2120 F:
asl@shanwil.com

Project: **Mark Air 32-1-17427**

Workorder No.: **1113983**

Certification:

This data package is in compliance with the terms and conditions of the contract, both technically and for completeness, unless otherwise noted on the sample data sheet(s) and/or case narrative. This certification applies only to the tested parameters and the specific sample(s) received at the laboratory. If you have any questions regarding this report, or if we can be of further assistance, please contact your SGS Project Manager.

Steve Crupi

steven.crupi@sgs.com
Project Manager

Contents (Bookmarked in PDF):

- Cover Page
- Glossary
- Sample Summary Forms
- Case Narrative
- Sample Results Forms
- Batch Summary Forms (by method)
- Quality Control Summary Forms (by method)
- Chain of Custody/Sample Receipt Forms
- Attachments (if applicable)

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. All work is provided under SGS general terms and conditions (<http://www.sgs.com/terms_and_conditions.htm>), unless other written agreements have been accepted by both parties.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and AK100001 for NELAP (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6010B, 6020, 7470A, 7471B, 8021B, 8081B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, the National Environmental Laboratory Accreditation Program and other regulatory authorities. The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV	Continuing Calibration Verification
CL	Control Limit
D	The analyte concentration is the result of a dilution.
DF	Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
F	Indicates value that is greater than or equal to the DL
GT	Greater Than
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
JL	The analyte was positively identified, but the quantitation is a low estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LOD	Limit of Detection (i.e., 2xDL)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
M	A matrix effect was present.
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
Q	QC parameter out of acceptance range.
R	Rejected
RL	Reporting Limit
RPD	Relative Percent Difference
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content.
All DRO/RRO analyses are integrated per SOP.



SAMPLE SUMMARY

Print Date: 8/30/2011 4:06 pm

Client Name: Shannon & Wilson, Inc.
Project Name: Mark Air 32-1-17427
Workorder No.: 1113983

Analytical Methods

<u>Method Description</u>	<u>Analytical Method</u>
BTEX 8021	SW8021B
DRO Low Volume (W)	AK102

Sample ID Cross Reference

<u>Lab Sample ID</u>	<u>Client Sample ID</u>
1113983001	17427-B12MW
1113983002	17427-B13MW
1113983003	17427-B14MW
1113983004	17427-B15MW
1113983005	17427-B17MW
1113983006	17427-B18MW
1113983007	17427-B19MW
1113983008	17427-B20MW
1113983009	17427-B21MW
1113983010	17427-B22MW
1113983011	17427-TB



Detectable Results Summary

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B13MW**

SGS Ref. #: 1113983002

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.639	mg/L

Client Sample ID: **17427-B14MW**

SGS Ref. #: 1113983003

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.743	mg/L

Client Sample ID: **17427-B15MW**

SGS Ref. #: 1113983004

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.477J	mg/L

Client Sample ID: **17427-B17MW**

SGS Ref. #: 1113983005

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.585J	mg/L

Client Sample ID: **17427-B18MW**

SGS Ref. #: 1113983006

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Benzene	2.52	ug/L
Ethylbenzene	0.840J	ug/L
o-Xylene	0.390J	ug/L
P & M -Xylene	1.25J	ug/L

Semivolatile Organic Fuels Department

Diesel Range Organics	11.9	mg/L
-----------------------	------	------

Client Sample ID: **17427-B19MW**

SGS Ref. #: 1113983007

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.237J	mg/L

Client Sample ID: **17427-B20MW**

SGS Ref. #: 1113983008

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.219J	mg/L



Detectable Results Summary

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B21MW**

SGS Ref. #: 1113983009

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.302J	mg/L

Client Sample ID: **17427-B22MW**

SGS Ref. #: 1113983010

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.403J	mg/L



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B12MW**
SGS Ref. #: 1113983001
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 18:10
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	93.5	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 15:33
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID:1113983001-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B12MW**
SGS Ref. #: 1113983001
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 18:10
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.376 U	0.625	0.188	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	99.7	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 22:32
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 240 mL
Prep Extract Vol.: 1 mL
Container ID:1113983001-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B13MW**
SGS Ref. #: 1113983002
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 19:00
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surrogate>	93.8	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 15:52
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983002-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B13MW**
SGS Ref. #: 1113983002
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 19:00
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.639	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	91.8	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 22:42
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983002-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B14MW**
SGS Ref. #: 1113983003
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 10:00
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	92.4	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 16:10
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983003-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B14MW**
SGS Ref. #: 1113983003
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 10:00
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.743	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	96.7	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 22:52
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983003-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B15MW**
SGS Ref. #: 1113983004
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 17:50
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	93.6	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 16:29
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983004-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B15MW**
SGS Ref. #: 1113983004
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 17:50
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.477J	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	99.8	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 23:03
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983004-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B17MW**
SGS Ref. #: 1113983005
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 10:45
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	93.5	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 16:48
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983005-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B17MW**
SGS Ref. #: 1113983005
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 10:45
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.585J	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	104	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 23:13
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983005-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B18MW**
SGS Ref. #: 1113983006
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 11:30
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	2.52	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.840J	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.390J	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.25J	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	93.9	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 14:56
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID:1113983006-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B18MW**
SGS Ref. #: 1113983006
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 11:30
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	11.9	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	94.5	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 23:23
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983006-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B19MW**
SGS Ref. #: 1113983007
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 17:20
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	93.6	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 17:07
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983007-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B19MW**
SGS Ref. #: 1113983007
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 17:20
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.237J	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	98.2	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 23:33
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983007-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B20MW**
SGS Ref. #: 1113983008
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 16:40
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surrogate>	93.6	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 17:25
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983008-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B20MW**
SGS Ref. #: 1113983008
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 16:40
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.219J	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	85.3	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 23:44
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983008-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B21MW**
SGS Ref. #: 1113983009
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 15:50
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <sur>	92.7	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 17:44
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983009-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B21MW**
SGS Ref. #: 1113983009
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 15:50
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.302J	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	85.2	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/25/11 23:54
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983009-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B22MW**
SGS Ref. #: 1113983010
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 11:00
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surrogate>	93.7	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 18:02
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983010-A
Analyst: EAB



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-B22MW**
SGS Ref. #: 1113983010
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/19/11 11:00
Receipt Date/Time: 08/23/11 10:14

Semivolatile Organic Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Diesel Range Organics	0.403J	0.600	0.180	mg/L	1	XFC10013	XXX25500	
5a Androstane <sur>	91.2	50-150		%	1	XFC10013	XXX25500	

Batch Information

Analytical Batch: XFC10013
Analytical Method: AK102
Analysis Date/Time: 08/26/11 00:04
Dilution Factor: 1

Prep Batch: XXX25500
Prep Method: SW3520C
Prep Date/Time: 08/25/11 08:45

Initial Prep Wt./Vol.: 250 mL
Prep Extract Vol.: 1 mL
Container ID:1113983010-D
Analyst: MCS



Shannon & Wilson, Inc.

Print Date: 8/30/2011 4:06 pm

Client Sample ID: **17427-TB**
SGS Ref. #: 1113983011
Project ID: Mark Air 32-1-17427
Matrix: Water (Surface, Eff., Ground)

Collection Date/Time: 08/18/11 08:00
Receipt Date/Time: 08/23/11 10:14

Volatile Fuels Department

<u>Parameter</u>	<u>Result</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Analytical Batch</u>	<u>Prep Batch</u>	<u>Qualifiers</u>
Benzene	0.300 U	0.500	0.150	ug/L	1	VFC10653	VXX22636	
Ethylbenzene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
o-Xylene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
P & M -Xylene	1.24 U	2.00	0.620	ug/L	1	VFC10653	VXX22636	
Toluene	0.620 U	1.00	0.310	ug/L	1	VFC10653	VXX22636	
1,4-Difluorobenzene <surr>	92.9	77-115		%	1	VFC10653	VXX22636	

Batch Information

Analytical Batch: VFC10653
Analytical Method: SW8021B
Analysis Date/Time: 08/24/11 18:40
Dilution Factor: 1

Prep Batch: VXX22636
Prep Method: SW5030B
Prep Date/Time: 08/24/11 08:00

Initial Prep Wt./Vol.: 5 mL
Prep Extract Vol.: 5 mL
Container ID: 1113983011-A
Analyst: EAB



SGS Ref.# 1047148 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# Mark Air 32-1-17427
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 08/30/2011 16:06
Prep Batch VXX22636
Method SW5030B
Date 08/24/2011

QC results affect the following production samples:

1113983001, 1113983002, 1113983003, 1113983004, 1113983005, 1113983006, 1113983007, 1113983008, 1113983009,
1113983010, 1113983011

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
<u>Volatile Fuels Department</u>					
Benzene	0.300 U	0.500	0.150	ug/L	08/24/11
Ethylbenzene	0.620 U	1.00	0.310	ug/L	08/24/11
o-Xylene	0.620 U	1.00	0.310	ug/L	08/24/11
P & M -Xylene	1.24 U	2.00	0.620	ug/L	08/24/11
Toluene	0.620 U	1.00	0.310	ug/L	08/24/11
Surrogates					
1,4-Difluorobenzene <surr>	93	77-115		%	08/24/11
Batch	VFC10653				
Method	SW8021B				
Instrument	HP 5890 Series II PID+FID VCA				



SGS Ref.# 1047243 Method Blank
Client Name Shannon & Wilson, Inc.
Project Name/# Mark Air 32-1-17427
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 08/30/2011 16:06
Prep Batch XXX25500
Method SW3520C
Date 08/25/2011

QC results affect the following production samples:

1113983001, 1113983002, 1113983003, 1113983004, 1113983005, 1113983006, 1113983007, 1113983008, 1113983009,
1113983010

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
-----------	---------	--------	----	-------	---------------

Semivolatile Organic Fuels Department

Diesel Range Organics	0.360 U	0.600	0.180	mg/L	08/25/11
-----------------------	---------	-------	-------	------	----------

Surrogates

5a Androstane <surr>	97	60-120		%	08/25/11
----------------------	----	--------	--	---	----------

Batch XFC10013

Method AK102

Instrument HP 6890 Series II FID SV D R



SGS Ref.# 1047149 Lab Control Sample
 1047150 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# Mark Air 32-1-17427
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 08/30/2011 16:06
Prep Batch VXX22636
Method SW5030B
Date 08/24/2011

QC results affect the following production samples:

1113983001, 1113983002, 1113983003, 1113983004, 1113983005, 1113983006, 1113983007, 1113983008, 1113983009, 1113983010, 1113983011

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
<u>Volatile Fuels Department</u>							
Benzene	LCS	100	100	(80-120)		100 ug/L	08/24/2011
	LCSD	103	103		3 (< 20)	100 ug/L	08/24/2011
Ethylbenzene	LCS	104	104	(75-125)		100 ug/L	08/24/2011
	LCSD	107	107		3 (< 20)	100 ug/L	08/24/2011
o-Xylene	LCS	102	102	(80-120)		100 ug/L	08/24/2011
	LCSD	105	105		3 (< 20)	100 ug/L	08/24/2011
P & M -Xylene	LCS	208	104	(75-130)		200 ug/L	08/24/2011
	LCSD	214	107		3 (< 20)	200 ug/L	08/24/2011
Toluene	LCS	103	103	(75-120)		100 ug/L	08/24/2011
	LCSD	106	106		3 (< 20)	100 ug/L	08/24/2011
Surrogates							
1,4-Difluorobenzene <surr>	LCS		99	(77-115)			08/24/2011
	LCSD		99		0		08/24/2011

Batch VFC10653
Method SW8021B
Instrument HP 5890 Series II PID+FID VCA



SGS Ref.# 1047244 Lab Control Sample
1047245 Lab Control Sample Duplicate
Client Name Shannon & Wilson, Inc.
Project Name/# Mark Air 32-1-17427
Matrix Water (Surface, Eff., Ground)

Printed Date/Time 08/30/2011 16:06
Prep Batch XXX25500
Method SW3520C
Date 08/25/2011

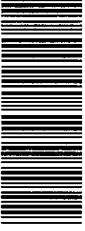
QC results affect the following production samples:

1113983001, 1113983002, 1113983003, 1113983004, 1113983005, 1113983006, 1113983007, 1113983008, 1113983009, 1113983010

Parameter	QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Semivolatile Organic Fuels Department							
Diesel Range Organics	LCS	18.3	91	(75-125)		20 mg/L	08/25/2011
	LCSD	20.8	104		13	(< 20)	20 mg/L 08/25/2011
Surrogates							
5a Androstane <surr>	LCS		114	(60-120)			08/25/2011
	LCSD		127 *		11		08/25/2011

Batch XFC10013
Method AK102
Instrument HP 6890 Series II FID SV D R

1113983



Laboratory SGS Page 1 of 2
Attn: Steve Crupi

CHAIN-OF-CUSTODY RECORD

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

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

2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600

2255 S.W. Canyon Road
Portland, OR 97201-2498
(503) 223-6147

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

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

1200 17th Street, Suite 1024
Denver, Co 80202
(303) 825-3800

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

Comp	Grab	DR0 (KQ)	B-TX (KQ)	Total Containers	Remarks/Matrix
X	X	X	X	5	water
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	
X	X	X	X	5	

Sample Identity	Lab No.	Time Sampled	Date Sampled	Comp	Grab	DR0 (KQ)	B-TX (KQ)	Total Containers	Remarks/Matrix
17427-B12MW		18:10	8-18-11	X	X	X	X	5	water
- B13MW		19:00	8-18-11	X	X	X	X	5	
- B14MW		10:00	8-19-11	X	X	X	X	5	
- B15MW		17:50	8-18-11	X	X	X	X	5	
- B17MW		10:45	8-19-11	X	X	X	X	5	
- B18MW		11:30	8-19-11	X	X	X	X	5	
- B19MW		17:20	8-18-11	X	X	X	X	5	
- B20MW		16:40	8-18-11	X	X	X	X	5	
- B21MW		15:50	8-18-11	X	X	X	X	5	
- B22MW		11:00	8-19-11	X	X	X	X	5	

Project Information	Sample Receipt	Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Project Number: <u>32-1-17427</u>	Total Number of Containers	Signature: <u>Andrew Lee</u>	Signature: _____	Signature: _____
Project Name: <u>Mark Air</u>	COC Seals/Intact? <u>Y/N/NA</u>	Printed Name: <u>Andrew Lee</u>	Printed Name: _____	Printed Name: _____
Contact: <u>Andrew Lee & Hayden Taylor</u>	Received Good Cond./Cold	Date: <u>8-23-11</u>	Date: _____	Date: _____
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method:	Company: <u>Shannon & Wilson</u>	Company: _____	Company: _____
Sampler: <u>Andrew Lee</u>	(attach shipping bill, if any)	Received By: 1. Signature: _____	Received By: 2. Signature: _____	Received By: 3. Signature: <u>Mary Martinec</u>
Instructions		Printed Name: _____	Printed Name: _____	Printed Name: <u>Mary Martinec</u>
Requested Turnaround Time: <u>Standard</u>		Company: _____	Company: _____	Company: <u>SGS</u>
Special Instructions: <u>ADEC Level II deliveries</u>		Time: _____	Time: <u>10:14</u>	Time: <u>10:14</u>

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

4.7/92d

No. 29563



SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were custody seals intact? Note # & location, if applicable. COC accompanied samples?	Yes No <u>N/A</u> <u>Yes</u> No N/A <u>Yes</u> No N/A	
Temperature blank compliant* (i.e., 0-6°C after correction factor)? * Note: Exemption permitted for chilled samples collected less than 8 hours ago. Cooler ID: <u>1</u> @ <u>4.7</u> w/ Therm.ID: <u>92d</u> Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received <u>without</u> a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP" will be noted to the right. In cases where neither a temp blank <u>nor</u> cooler temp can be obtained, note "ambient" or "chilled." If temperature(s) <0°C, were all sample containers ice free?	Yes No <u>N/A</u> Yes No <u>N/A</u> Yes No <u>N/A</u>	
Delivery method (specify all that apply): <u>Client</u> USPS Alert Courier Road Runner AK Air Lynden Carlile ERA PenAir FedEx UPS NAC Other: → For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?	Note airbill/tracking # See Attached or <u>N/A</u> Yes No <u>N/A</u>	
→ For samples received with payment, note amount (\$) and cash / check / CC (circle one). → For samples received in FBKS, ANCH staff will verify all criteria are reviewed.		SRF Initiated by: <u>N/A</u> <u>N/A</u>
Do samples match COC* (i.e., sample IDs, dates/times collected)? * Note: Exemption permitted if times differ <1hr; in which case, use times on COC. Were analyses requested unambiguous?	<u>Yes</u> No N/A <u>Yes</u> No N/A	
Were samples in good condition (no leaks/cracks/breakage)? Packing material used (specify all that apply): Bubble Wrap Separate plastic bags Vermiculite Other:	<u>Yes</u> No N/A <u>Yes</u> No N/A	Cracked returned bottle w/HCl
Were all VOA vials free of headspace (i.e., bubbles ≤6 mm)? Were all soil VOAs field extracted with MeOH+BFB? Were the bottles provided by SGS? (Note apparent exceptions.)	<u>Yes</u> No N/A Yes No <u>N/A</u> <u>Yes</u> No N/A	
Were proper containers (type/mass/volume/preservative*) used? * Note: Exemption permitted for waters to be analyzed for metals. Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	<u>Yes</u> No N/A <u>Yes</u> No N/A	
For special handling (e.g., "MI" or foreign soils, lab filter, limited volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?	Yes No <u>N/A</u>	
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was pH verified and compliant? If pH was adjusted, were bottles flagged (i.e., stickers)?	<u>Yes</u> No N/A Yes No <u>N/A</u>	
For RUSH/SHORT Hold Time or site-specific QC (e.g., BMS/BMSD/BDUP) samples, were the COC & bottles flagged (e.g., stickers) accordingly? For RUSH/SHORT HT, was email sent?	Yes No <u>N/A</u> Yes No <u>N/A</u>	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	Yes No N/A	SRF Completed by: <u>[Signature]</u> PM = <u>Cupic</u> N/A
Was PEER REVIEW of sample numbering/labeling completed (i.e., compare WO# on containers to COC, unique lab ID on each container, LIMS container labels used)?	Yes No N/A	Peer Reviewed by: <u>[Signature]</u>
Was selection of "Bill to" client PEER REVIEWed?	Yes No N/A	Metrics: <u>1746</u>
Additional notes (if applicable):		

Note to Client: Any "no" circled above indicates non-compliance with standard procedures and may impact data quality.

Returned Bottles Inventory

Name of individual returning bottles:

Date Received: 8/23/11

Client Name: Shannon Wilson

Received by: SAEM

Project Name: Mark Air

SGS PM: Crupi

Preservative:	unpres.	H2SO4	HCl	HNO3	NaOH	other	vials of MeOH
HDPE/Nalgene:							
1-L							
500-ml							
250-ml							
125-ml							
other							
Amber Glass:							
1-L BR							
500-ml BR							
250-ml BR			2				
125-ml BR							
8-oz SS							
4-oz SS							
4-oz w/ septa							
40-ml VOA vial			3				
other							
Subtotal:			5				

--- The bottom of this form should be completed by the Project Manager, who will determine how apply charges. ---

Note: Returned bottles (regardless of size/pres.) are billed back at \$4/bottle unless otherwise quoted.
 These prices are only for bottles returned to the lab for disposal.
 Unused/unreturned bottles are billed separately. Please see Accounting for current price list.

Amount to Invoice Client: \$ 20.00

WO#: 1113983

LABORATORY DATA REVIEW CHECKLIST

Completed by: Haydar Turker
Title: Principal Engineering Geologist
Date: December 2011

CS Report Name: Groundwater Monitoring and Free Product Recovery, Former MarkAir Facility, King Salmon, Alaska
Laboratory Report Date: 9/3/2011

Consultant Firm: Shannon & Wilson, Inc.

Laboratory Name: SGS North America, Inc.
Laboratory Report Number: 1113983

ADEC File Number: 2569.38.009
(NOTE: *NA* = not applicable; Text in *italics* added by Shannon & Wilson, Inc.)

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses? **Yes** / No / NA (please explain)
Comments:
- b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS-approved? Yes / No / **NA** (please explain)
Comments:

2. Chain of Custody (COC)

- a. COC information completed, signed, and dated (including released/received by)? **Yes** / No / NA (please explain)
Comments:
- b. Correct analyses requested? **Yes** / No / NA (please explain)
Comments:

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)? **Yes** / No / NA (please explain)
Comments: *Temperature blank = 4.7° C*

- b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)? **Yes** / No / NA (please explain)

Comments:

- c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)? **Yes** / No / NA (please explain)

Comments: *No problems noted.*

- d. If there were any discrepancies, were they documented? – For example, incorrect sample containers/preservation, sample temperature outside acceptance range, insufficient or missing samples, etc.? Yes / No / **NA** (please explain)

Comments: *No discrepancies noted.*

- e. Data quality or usability affected? Please explain.

Comments: *Not affected.*

4. Case Narrative

- a. Present and understandable? **Yes** / No / NA (please explain)

Comments:

- b. Discrepancies, errors or QC failures identified by the lab? **Yes** / No / NA (please explain)

Comments: *QC failures are discussed below.*

- c. Were corrective actions documented? Yes / **No** / NA (please explain)

Comments:

- d. What is the effect on data quality/usability, according to the case narrative?

Comments: *Case narrative does not comment on data quality or usability.*

5. Sample Results

- a. Correct analyses performed/reported as requested on COC? **Yes** / No / NA (please explain)

Comments:

- b. All applicable holding times met? **Yes** / No / NA (please explain)

Comments:

- c. All soils reported on a dry weight basis? Yes / No / **NA** (please explain)

Comments:

- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes** / No / NA (please explain)

Comments:

- e. Data quality or usability affected? Please explain.

Comments: *Not affected.*

6. QC Samples

a. Method Blank

- i. One method blank reported per matrix, analysis, and 20 samples?

Yes / No / NA (please explain)

Comments:

- ii. All method blank results less than LOQ? **Yes** / No / NA (please explain)

Comments:

- iii. If above PQL, what samples are affected? **NA**

Comments:

- iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes / No / **NA** (please explain)

Comments:

Data quality or usability affected? Please explain. **NA**

Comments:

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

- i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples?

(LCS/LCSD required per AK methods, LCS required per SW846) **Yes** / No / NA (please explain)

Comments:

- ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples? **Yes** / No / **NA** (please explain)

Comments:

- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages) **Yes** / **No** / NA (please explain)

Comments: *LCSD recovery for AK102 surrogate 5 α -androstane is outside DQO (biased high).*

- iv. Precision – All relative percent differences (RPDs) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages) **Yes** / No / NA (please explain)
Comments:

- v. If %R or RPD is outside of acceptable limits, what samples are affected? *NA*
Comments: *Every project sample.*

- vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?
Yes / **No** / NA (please explain)
Comments:

Data quality or usability affected? Please explain.

Comments: *The %R for AK102 sample surrogates meet DQOs. Sample data quality or usability is not considered affected.*

c. Surrogates - Organics Only

- i. Are surrogate recoveries reported for organic analyses, field, QC and laboratory samples? **Yes** / No / NA (please explain)
Comments:

- ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages) **Yes** / No / NA (please explain)
Comments:

- iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined? **Yes** / No / **NA** (please explain)
Comments:

Data quality or usability affected? Use the comment section to explain.

Comments: *The data quality and usability are not affected.*

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.)

- i. One trip blank reported per matrix, analysis and cooler? (If not, enter explanation below.) **Yes** / No / NA (please explain)
Comments:

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment stating why must be entered below.) **Yes** / No / **NA** (please explain)
Comments:

iii. All results less than LOQ? **Yes** / No / NA (please explain)

Comments:

iv. If above LOQ, what samples are affected? **NA**

Comments:

v. Data quality or usability affected? Please explain. **NA**

Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (please explain)

Comments:

ii. Submitted blind to the lab? **Yes** / No / NA (please explain)

Comments:

iii. Precision – All relative percent differences (RPDs) less than specified DQOs?
(Recommended: 30% for water, 50% for soil) **Yes** **No** / NA (please explain)

Comments: *Field duplicate and primary sample RPD is 37% for DRO. RPDs could not be calculated for BTEX constituents due to non-detect concentrations.*

iv. Data quality or usability affected? (Use the comment section to explain why or why not.)

Comments: *No. The reported DRO concentrations for both the project and duplicate samples are J-flagged as estimates.*

f. Decontamination or Equipment Blank (if not applicable)

Yes / No / **NA** (please explain)

Comments: *No decontamination or equipment blank submitted as per our work plan.*

i. All results less than PQL? **Yes** / No / **NA** (please explain)

Comments:

ii. If above PQL, what samples are affected? **NA**

Comments:

iii. Data quality or usability affected? Please explain. **NA**

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-specific, etc.)

a. Defined and appropriate? **Yes** / No / NA (please explain)

Comments: *Lab-specific qualifiers are defined on page 4 of the lab report.*

APPENDIX D
CONCEPTUAL SITE MODEL
GRAPHIC AND SCOPING FORMS

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Former MarkAir Facility
King Salmon, Alaska

Completed By: Shannon & Wilson, Inc.
 Date Completed: December 2011

Instructions: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.

(1) Media	(2) Transport Mechanisms	
<input checked="" type="checkbox"/> Surface Soil (0-2 ft bgs)	<input checked="" type="checkbox"/> Direct release to surface soil <i>check soil</i> <input checked="" type="checkbox"/> Migration to subsurface <i>check soil</i> <input checked="" type="checkbox"/> Migration to groundwater <i>check groundwater</i> <input checked="" type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Runoff or erosion <i>check surface water</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____	
	<input checked="" type="checkbox"/> Subsurface Soil (2-15 ft bgs)	<input checked="" type="checkbox"/> Direct release to subsurface soil <i>check soil</i> <input checked="" type="checkbox"/> Migration to groundwater <i>check groundwater</i> <input checked="" type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____
	<input checked="" type="checkbox"/> Ground-water	<input checked="" type="checkbox"/> Direct release to groundwater <i>check groundwater</i> <input checked="" type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Flow to surface water body <i>check surface water</i> <input type="checkbox"/> Flow to sediment <i>check sediment</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____
	<input type="checkbox"/> Surface Water	<input type="checkbox"/> Direct release to surface water <i>check surface water</i> <input type="checkbox"/> Volatilization <i>check air</i> <input type="checkbox"/> Sedimentation <i>check sediment</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____
	<input type="checkbox"/> Sediment	<input type="checkbox"/> Direct release to sediment <i>check sediment</i> <input type="checkbox"/> Resuspension, runoff, or erosion <i>check surface water</i> <input type="checkbox"/> Uptake by plants or animals <i>check biota</i> <input type="checkbox"/> Other (list): _____

(3) Exposure Media	(4) Exposure Pathway/Route	(5) Current & Future Receptors						
		Residents (adults or children)	Commercial or Industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
<input checked="" type="checkbox"/> soil	<input checked="" type="checkbox"/> Incidental Soil Ingestion <input type="checkbox"/> Dermal Absorption of Contaminants from Soil <input type="checkbox"/> Inhalation of Fugitive Dust		C/F	C/F	F			
<input checked="" type="checkbox"/> groundwater	<input checked="" type="checkbox"/> Ingestion of Groundwater <input type="checkbox"/> Dermal Absorption of Contaminants in Groundwater <input checked="" type="checkbox"/> Inhalation of Volatile Compounds in Tap Water		C/F	C/F	F			
<input checked="" type="checkbox"/> air	<input checked="" type="checkbox"/> Inhalation of Outdoor Air <input checked="" type="checkbox"/> Inhalation of Indoor Air <input type="checkbox"/> Inhalation of Fugitive Dust		C/F	C/F	F			
<input type="checkbox"/> surface water	<input type="checkbox"/> Ingestion of Surface Water <input type="checkbox"/> Dermal Absorption of Contaminants in Surface Water <input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water							
<input type="checkbox"/> sediment	<input type="checkbox"/> Direct Contact with Sediment							
<input type="checkbox"/> biota	<input type="checkbox"/> Ingestion of Wild or Farmed Foods							

Human Health Conceptual Site Model Scoping Form

Site Name:

File Number:

Completed by:

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- | | |
|---|--|
| <input checked="" type="checkbox"/> USTs | <input type="checkbox"/> Vehicles |
| <input checked="" type="checkbox"/> ASTs | <input type="checkbox"/> Landfills |
| <input checked="" type="checkbox"/> Dispensers/fuel loading racks | <input type="checkbox"/> Transformers |
| <input checked="" type="checkbox"/> Drums | <input checked="" type="checkbox"/> Other: <input type="text" value="Sumps/floor drains"/> |

Release Mechanisms *(check potential release mechanisms at the site)*

- | | |
|--|--|
| <input checked="" type="checkbox"/> Spills | <input type="checkbox"/> Direct discharge |
| <input checked="" type="checkbox"/> Leaks | <input type="checkbox"/> Burning |
| | <input type="checkbox"/> Other: <input type="text"/> |

Impacted Media *(check potentially-impacted media at the site)*

- | | |
|---|--|
| <input checked="" type="checkbox"/> Surface soil (0-2 feet bgs*) | <input checked="" type="checkbox"/> Groundwater |
| <input checked="" type="checkbox"/> Subsurface soil (>2 feet bgs) | <input type="checkbox"/> Surface water |
| <input type="checkbox"/> Air | <input type="checkbox"/> Biota |
| <input type="checkbox"/> Sediment | <input type="checkbox"/> Other: <input type="text"/> |

Receptors *(check receptors that could be affected by contamination at the site)*

- | | |
|--|--|
| <input type="checkbox"/> Residents (adult or child) | <input checked="" type="checkbox"/> Site visitor |
| <input checked="" type="checkbox"/> Commercial or industrial worker | <input checked="" type="checkbox"/> Trespasser |
| <input checked="" type="checkbox"/> Construction worker | <input type="checkbox"/> Recreational user |
| <input type="checkbox"/> Subsistence harvester (i.e. gathers wild foods) | <input type="checkbox"/> Farmer |
| <input type="checkbox"/> Subsistence consumer (i.e. eats wild foods) | <input type="checkbox"/> Other: <input type="text"/> |

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.)

If the box is checked, label this pathway complete:

Complete

Comments:

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.)

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)?

If both boxes are checked, label this pathway complete:

Incomplete

Comments:

Arsenic historically detected in soil assumed to be within naturally occurring background concentrations.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future?

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350.

If both boxes are checked, label this pathway complete:

Complete

Comments:

On-site drinking water well decommissioned in 2005. A second active drinking water well is located hydraulically downgradient of site at the King Ko Inn. The well is reported to be impacted with benzene levels (0.00918 mg/L) above the drinking water criteria.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future?

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities).

If both boxes are checked, label this pathway complete:

Incomplete

Comments:

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods?

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)?

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.)

If all of the boxes are checked, label this pathway complete:

Incomplete

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.)

Are the contaminants in soil volatile (see Appendix D in the guidance document)?

If both boxes are checked, label this pathway complete:

Complete

Comments:

Benzene has been documented in the soil at concentrations up to 0.0551 mg/kg.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminated soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures)



Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)?



If both boxes are checked, label this pathway complete:

Complete

Comments:

Benzene has been documented in the soil at concentrations up to 0.0551 mg/kg.

3. Additional Exposure Pathways: *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed:

Comments:

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed:

Comments:

An active drinking water well is located hydraulically downgradient of site at the King Ko Inn. The well is reported to be impacted with benzene levels (0.00918 mg/L) above the drinking water criteria.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM₁₀). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

Check the box if further evaluation of this pathway is needed:

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

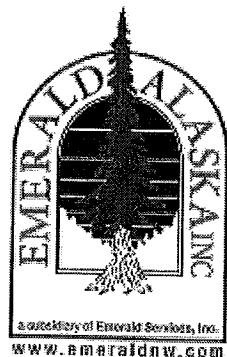
Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed:

Comments:

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

APPENDIX E
INVESTIGATION-DERIVED WASTE
DISPOSAL CERTIFICATE



CERTIFICATE OF DISPOSAL/RECYCLE

GENERATOR: ADEC - MARK AIR

KING SALMON AK 99613

DISPOSAL FACILITY: EMERALD ALASKA, INC.

2020 VIKING DRIVE
ANCHORAGE AK 99501

EPA ID NUMBER: EXEMPT

MANIFEST/DOCUMENT #: 15234

DATE OF DISPOSAL/RECYCLE: 11/15/2011

<u>LINE</u>	<u>WASTE DESCRIPTION</u>	<u>CONTAINERS</u>	<u>TYPE</u>	<u>QUANTITY</u>	<u>UOM</u>
1	DIESEL FUEL	1	DM55	300	P
2	DECON/POL/OILY WATER/BILGE SLOPS	1	DM55	300	P

I certify, on behalf of the above listed treatment facility, that to the best of my knowledge, the above described waste was managed in compliance with all applicable laws, regulations, permits, and licenses on the date listed above.

PREPARED BY: CHERYL DUNNE

SIGNATURE: Cheryl Dunne

DATE: 11/15/2011

Your Local Partner for Recycling Environmental Services

425 Outer Springer Loop Road - Palmer, AK 99645 - (907) 258-1558 - Fax (907) 746-3651 - Toll Free (877) 375-504

APPENDIX F
IMPORTANT INFORMATION ABOUT
YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT



Date: December 2011
To: ADEC
Re: Groundwater Monitoring and Product
Recovery, Former MarkAir Facility, King
Salmon, Alaska

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