

December 20, 2016

Alaska Department of Environmental Conservation  
555 Cordova Street  
Anchorage, Alaska 99501

Attn: Mr. Joshua Barsis

**RE: GROUNDWATER SAMPLING AND FREE-PRODUCT RECOVERY, FORMER  
MARKAIR FACILITY, KING SALMON, ALASKA**

This letter report presents the results of Shannon & Wilson, Inc.'s (Shannon & Wilson) groundwater sampling and free-product recovery activities conducted at the Former MarkAir Facility located in King Salmon, Alaska. The project purpose was to evaluate contaminant trends in the groundwater and reduce the amount of free-phase product on the water table. A vicinity map of the area is included as Figure 1 and a site plan is included as Figure 2.

Authorization to proceed with the project was provided by the Alaska Department of Environmental Conservation (ADEC) in the form of Notice to Proceed Numbers 1883603036 and 1883603036B, dated May 3, 2016 and December 14, 2016, respectively. The work was conducted in accordance with our *Groundwater Sampling and Free Product Recovery Work Plan, Former MarkAir Facility, King Salmon, Alaska*, dated November 2015. The work plan was approved by Mr. Joshua Barsis of the ADEC in the form of an email dated November 9, 2016.

**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 runway apron, near the northwest end of the airport's northwest/southeast runway as shown on Figure 1. A building formerly utilized by MarkAir as a cargo and terminal facility is located at the site. A fuel tank farm was previously located on the unpaved southeastern portion of the property. A former fuel cabinet was present northeast of the building and a decommissioned buried fuel pipeline extends towards the former fuel storage area. Additional aboveground storage tanks (ASTs) and underground storage tanks (USTs) were located south and east of the terminal building. An approximately 1,000-gallon heating oil AST

is present near the north corner of the terminal building. A site plan showing relevant site features and monitoring well locations is included as Figure 2.

Impacted soil and groundwater has been documented at the former MarkAir facility and extends off-property towards the west/southwest. Between 2004 and 2009, Shannon & Wilson installed 21 groundwater monitoring wells (B1MW through B21MW) on- and off-property. Free-phase petroleum product has been observed in on-property Monitoring Wells B4MW, B5MW, and B9MW, and in off-property Monitoring Wells B10MW and B11MW.

In January 2008, Shannon & Wilson installed passive product collection bailers in Monitoring Wells B4MW and B5MW and a passive skimmer in Monitoring Well B9MW. During product monitoring and recovery efforts conducted between 2008 and 2014, approximately 200 gallons of petroleum product were recovered from Monitoring Wells B4MW, B5MW, and B9MW, with most of the product generated from Monitoring Well B9MW.

### **FIELD ACTIVITIES**

The field activities for this project included collecting groundwater samples, monitoring well repairs, measuring free-phase product, and free-phase product recovery. Field notes are included in Attachment 1.

#### **Groundwater Sampling**

Groundwater sampling was conducted between May 2 and 4, 2016. Sampling activities were initiated by measuring groundwater and total well depths from Monitoring Wells B1MW through B3MW, B6MW, B7MW, B10MW through B18MW, B20MW, and B21MW. Monitoring Well B19MW could not be sampled due to a vehicle located over the well. An attempt to locate Well B8MW was made using hand tools and a metal detector but was not located. It is assumed that the well was destroyed by paving activities conducted in 2006. A down-hole dual-phase probe was used to measure depth to water and free-phase product thickness, if present. The probe was decontaminated using aalconox/water mixture and a water rinse prior to insertion in each well. Product was measured in Wells B10MW and B11MW; therefore, these wells were not sampled. The depths to groundwater and product in the monitoring wells are listed on Table 1.

The wells were purged and sampled using a low-flow technique, with a submersible pump with disposable vinyl tubing. Sampling was initiated by purging each well to reduce the effect of stagnant well casing water on chemical concentrations and to obtain groundwater samples that are representative of the surrounding water-bearing formation. A submersible pump was placed between 1 and 2 feet below the groundwater interface to avoid sediment disturbance. The pump

rate was set at 0.2 liter per minute (L/min) with a goal of limiting the sustained water drawdown to a maximum of 4 inches. The drawdown was determined using an electronic water probe that was checked regularly throughout the purging/sampling process.

During the purging process, field personnel monitored water quality parameters (pH, conductivity, temperature, and turbidity) and purge volume at about 5 minute intervals. When water quality parameters stabilized over three successive readings (pH within 0.1 unit, conductivity within 3 percent, temperature within 3 percent [minimum 0.2 degree Celsius], and turbidity within 10 percent or three consecutive readings of less than 10 Nephelometric Turbidity Units [NTUs]) groundwater samples were collected. Water quality parameters stabilized in all wells prior to collecting groundwater samples. Analytical samples were collected in decreasing order of volatility by transferring water directly from the pump tubing into laboratory-supplied containers. The pump was decontaminated in between each well. Approximately 22 gallons of purgewater and decontamination water were generated and stored in a 55-gallon drum on site. Final water quality parameters are listed on Table 1.

### **Free-Product Recovery**

Free-phase product recovery activities were conducted in Wells B4MW, B5MW, B9MW, B10MW, and B11MW on a monthly basis between May 4, 2016 and September 22, 2016. During each product recovery event, an oil/water interface probe was used to measure the depth to product and water. Prior to product and water measurements, passive bailers were removed from Wells B4MW, B5MW, and B11MW and the passive skimmer was removed from Well B9MW. Product was removed from these wells containing measurable product by emptying the passive bailers or skimmers and bailing remaining product in the wells with disposable bailers. An attempt was made to minimize the amount of water recovered with the product during bailing, but water was unavoidably recovered with the product as the product thickness decreased during bailing. The product and water measurement data and volume of product/water mixture removed from the Former MarkAir Facility monitoring wells in 2016 are summarized in Table 3.

A total of approximately 36 gallons of product/water mixture were recovered from the monitoring wells in 2016, with most of the product generated from Well B9MW (35 gallons). The generated product/water mixture was temporarily stored on site in one 55-gallon drum.

### **Monitoring Well Repair**

No monitoring well repairs were made during the 2016 sampling activities; however, it was noted that Well B21MW had a damaged monument that could not be repaired with our available tools and supplies.

### **INVESTIGATION DERIVED WASTE**

The two drums containing purgewater and product were transported to Anchorage on October 7, 2016 by Northern Air Cargo (NAC). NRC picked up the two drums on October 10, 2016 and the contents were disposed/treated. Copies of the purgewater and product disposal receipts are included as Attachment 2.

### **LABORATORY ANALYSES**

Fourteen groundwater samples were submitted to SGS North America Inc. (SGS) of Anchorage, Alaska using chain-of-custody procedures. Each groundwater sample was analyzed for diesel range organics (DRO) by Alaska Method (AK) 102 and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8021B. A trip blank accompanied the groundwater samples and was analyzed for BTEX by EPA Method 8021B.

### **DISCUSSION OF ANALYTICAL RESULTS**

The reported contaminant concentrations in the groundwater samples were compared to the ADEC's groundwater cleanup levels listed in Table C of 18 AAC 75.345 (November 2016). The 2016 groundwater analytical results and cleanup levels are provided in Table 2. A summary of the historical groundwater results is included in Table 4. The laboratory report and the ADEC Laboratory Data Review Checklist are provided in Attachment 3.

### **Groundwater Sample Results**

Groundwater samples from B1MW, B2MW, B7MW, B17MW, and B18MW contained DRO concentrations (1.81 mg/L, 14.1 mg/L, 10.0 mg/L, 2.37 mg/L, and 1.66 mg/L, respectively) in excess of the applicable cleanup level of 1.5 mg/L. Benzene and ethylbenzene were also detected in the sample from Well B2MW (0.0813 mg/L and 0.0224 mg/L, respectively) in excess of the applicable ADEC cleanup levels of 0.0046 mg/L and 0.015 mg/L, respectively. The remaining contaminant concentrations were either not detected or were detected at concentrations less than the applicable ADEC cleanup levels.

The analytical groundwater sample results are used to evaluate potential source areas, delineate plume boundaries, and track changes in hydrocarbon distribution throughout the plume. The following observations were noted regarding the extents and trends observed for the plume:

- Samples from Well B2MW have generally contained the highest DRO and benzene concentrations. As shown on Table 4, DRO and benzene have exhibited a general long-term decreasing trend over the last 12 years.
- DRO in samples from Wells B1MW and B3MW have also exhibited general long-term decreasing trends over the last 12 years.
- Sample results from Wells B12MW, B13MW, and B15MW continue to exhibit non-detect or trace DRO and BTEX concentrations less than the ADEC cleanup levels, and bound the plume to the south.
- Historical results indicate that the plume's leading edge is between Wells B17MW/B18MW and B19MW/B21MW. Samples from Wells B19MW and B21MW continue to exhibit non-detect or trace DRO concentrations less than the ADEC cleanup level, and bound the plume to the west and northwest, respectively.
- DRO in samples from Wells B3MW and B6MW have not been detected above the ADEC cleanup level since 2006. Samples from B3MW and B6MW were collected in 2007 and 2016 and contained concentrations of DRO below the ADEC cleanup level, and bound the plume to the east.
- Wells B10MW and B11MW have continued to exhibit trace amounts of product and have not been sampled since 2006.
- Wells B4MW, B5MW, and B9MW have historically contained product and have not been sampled.

### **Quality Assurance Summary**

The project laboratory implements on-going quality assurance/quality control procedures to evaluate conformance to ADEC data quality objectives (DQOs). Internal laboratory controls to assess data quality for this project include surrogates, method blanks, matrix spike/matrix spike duplicates (MS/MSD), and laboratory control sample/laboratory control sample duplicates (LCS/LCSD) to assess precision, accuracy, and matrix bias. If a DQO was not met, the project

laboratory provides a brief narrative concerning the problem in the case narrative of their laboratory reports (See Attachment 3).

One water trip blank (Sample WTB) accompanied the sample bottles from the laboratory to the site during sampling activities and back again to SGS. The trip blank did not contain detectable concentrations of BTEX.

Shannon & Wilson reviewed the SGS data deliverables and completed an ADEC Laboratory Data Review Checklist for the project work orders. The laboratory report and data review checklist are included in Attachment 3. In our opinion, no non-conformances that would adversely impact data usability for the objectives of this project were noted.

### **CONCEPTUAL SITE MODEL**

A conceptual site model (CSM) was prepared to identify known and potential exposure pathways at the subject site. The CSM was developed in general accordance with the ADEC's *Policy Guidance on Developing Conceptual Site Models* (October 2010), using the ADEC's CSM Human Health Graphic and Scoping Forms. The ADEC forms are included in Attachment 4, with discussions of the potential exposure pathways provided below. The narrative includes descriptions of site-specific considerations that increase or decrease the viability of each pathway at this site.

#### **Soil – Direct Contact**

Direct contact with impacted soil comprises the incidental ingestion and dermal absorption exposure routes. The direct contact incidental ingestion exposure pathway is potentially complete for on-site commercial workers, site visitors, trespassers, and/or construction workers. Concentrations of DRO exceeding the ingestion cleanup level have been documented in soil samples collected at the site. Soil contaminants which can permeate the skin have not been documented at the site, therefore, the dermal absorption pathway is considered incomplete.

#### **Groundwater**

ADEC guidance stipulates that ingestion of groundwater be considered a potentially 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 “currently of reasonable expected future source of drinking water”. DRO concentrations exceeding the ADEC's Table C

cleanup level has been documented in the site's groundwater since 2004. Therefore, ingestion of impacted groundwater is a potentially complete exposure pathway for on-site commercial workers, site visitors, trespassers, and/or construction workers.

### **Air**

The outdoor inhalation pathway is complete due to the presence of benzene and DRO in soil and/or groundwater within the top 15 feet bgs. Although this pathway is considered complete, it is noted that the documented soil contaminated concentrations do not exceed the ADEC Method Two Human Health cleanup levels.

Because buildings are located within 30 feet of the contamination, the ADEC may require a vapor intrusion evaluation for current and/or future buildings, based on the documented contaminant levels in the site's soil and groundwater. Although it is noted that the ADEC has not established a soil cleanup level for the indoor air inhalation pathway and the ADEC does not currently require the evaluation of petroleum hydrocarbons for the vapor intrusion pathway.

### **Surface Water**

Surface water is not present at the site.

### **Other**

Other impacted media, including sediment and biota, were not identified at the site.

### **CSM Summary**

Currently complete or potentially complete exposure pathways have been identified at the site and include direct contact with soil, ingestion of groundwater, and inhalation of outdoor air. It is also recognized that changes in the site use or other site conditions may affect the viability of potential exposure pathways. In particular, the CSM will need to be re-evaluated and revised as necessary if construction occurs at the site or a change in land use occurs.

## CONCLUSIONS AND RECOMMENDATIONS

The historical groundwater sample results for multiple wells appear to indicate long term decreasing trends. The plume appears stable and is not currently expanding further downgradient, based on the continued non-detect contaminant concentrations downgradient of the source area at B9MW. The plume appears bound to the east, south, and west. The site wells were last surveyed between 2007 and 2009. Based on the age of the last survey and observed changes in the well casing heights, it is our opinion that this survey data should not be used to calculate the current groundwater flow direction and gradient. Therefore, we recommend surveying the vertical elevations of the wells, prior to the next groundwater monitoring event.

Measurable free-product was documented in Monitoring Wells B4MW, B5MW, B9MW, B10MW, and B11MW. Product was removed monthly from the wells with a disposable bailer from May to September 2016. Based on the similar level of product measured in these wells at the start of each recovery event, the current product removal method does not appear to be resulting in a measurable decrease in the free-product at the site. We recommend to continue to monitor the wells that have historically contained product and conduct product recovery efforts on Well B9MW.

## CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our clients and their representatives in the study of this site. The findings we have presented within this report are based on the limited sampling and analyses that we conducted. They should not be construed as a definite conclusion regarding the site's groundwater conditions. It is possible that our tests missed higher levels, although our intention was to sample in accordance with our ADEC-approved work plan. Therefore, the sampling and analyses performed can provide you with only our professional judgment as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our sampling activities. 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 documents in Attachment 5, "Important Information About Your Geotechnical/Environmental Report", to assist you and others in understanding the use and limitations of our reports. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the



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responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study except with your permission or as required by law.

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

Sincerely,

SHANNON & WILSON, INC.

Prepared by:



Jacob Tracy, E.I.T.  
Environmental Engineering Staff

Reviewed by:



Matthew Henry, P.E.  
Vice President

Encl: Tables 1 through 4, Figures 1 and 2, and Attachments 1 through 5

**TABLE 1  
GROUNDWATER SAMPLING LOG**

	Monitoring Well Number						
	B1MW	B2MW	B3MW	B4MW	B5MW	B6MW	B7MW
<b>Water Level Measurement Data</b>							
Date Water Level Measured	5/3/2016	5/4/2016	5/4/2016	5/4/2016	5/4/2016	5/3/2016	5/3/2016
Time Water Level Measured	13:32	11:38	13:17	14:50	14:40	9:07	15:33
Depth to Product Below TOC, Feet	-	-	-	15.89	14.54	-	-
Depth to Water Below TOC, Feet	19.23	27.22	12.30	16.08	14.55	8.87	16.40
<b>Purging/Sampling Data</b>							
Date Sampled	5/3/2016	5/4/2016	5/4/2016	-	-	5/3/2016	5/3/2016
Time Sampled	14:25	12:07	13:57	-	-	10:07	16:02
Depth to Water Below TOC, Feet	19.23	27.22	12.30	-	-	8.87	16.40
Total Depth of Well Below TOC, Feet	31.10	31.43	21.91	-	-	24.67	19.56
Water Column in Well, Feet	11.87	4.21	9.61	-	-	15.80	3.16
Gallons per Foot	0.16	0.16	0.16	-	-	0.16	0.16
Gallons in Well	1.90	0.67	1.54	-	-	2.53	0.51
Total Gallons Pumped	2.0	1.0	1.8	-	-	2.8	1.0
Purging/Sampling Method	Submersible Pump	Submersible Pump	Submersible Pump	- -	- -	Submersible Pump	Submersible Pump
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch
<b>Water Quality Data at Time of Sampling</b>							
Temperature, °C	10.38	9.25	5.45	-	-	7.76	7.40
Specific Conductance, µS/cm	306	1,002	267	-	-	95	634
pH, standard units	6.96	7.08	6.89	-	-	6.12	6.74
Turbidity, NTU	2.57	5.19	2.51	-	-	2.29	1.82
<b>Remarks</b>							
				Contained product	Contained product		

## Notes:

Water quality parameters were measured with YSI-556 and MicroTPW turbidimeter field meters.

°C = degrees Celsius

µS/cm = microsiemens per centimeter

NTU = Nephthelometric Turbidity Unit

TOC = top of casing

- = not applicable or not measured

**TABLE 1  
GROUNDWATER SAMPLING LOG**

	Monitoring Well Number						
	B8MW	B9MW	B10MW	B11MW	B12MW	B13MW	B14MW
<b>Water Level Measurement Data</b>							
Date Water Level Measured	-	5/4/2016	5/4/2016	5/4/2016	5/2/2016	5/2/2016	5/2/2016
Time Water Level Measured	-	15:00	14:30	14:25	13:27	12:35	15:47
Depth to Product Below TOC, Feet	-	25.32	15.50	12.70	-	-	-
Depth to Water Below TOC, Feet	-	31.60	15.60	12.71	8.28	7.71	8.78
<b>Purging/Sampling Data</b>							
Date Sampled	-	-	-	-	5/2/2016	5/2/2016	5/2/2016
Time Sampled	-	-	-	-	14:17	13:17	16:37
Depth to Water Below TOC, Feet	-	-	-	-	8.28	7.71	8.78
Total Depth of Well Below TOC, Feet	-	-	-	-	19.36	14.88	19.15
Water Column in Well, Feet	-	-	-	-	11.08	7.17	10.37
Gallons per Foot	-	-	-	-	0.16	0.16	0.16
Gallons in Well	-	-	-	-	1.77	1.15	1.66
Total Gallons Pumped	-	-	-	-	1.8	1.4	1.8
Purging/Sampling Method	-	-	-	-	Submersible Pump	Submersible Pump	Submersible Pump
Diameter of Well Casing	-	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch
<b>Water Quality Data at Time of Sampling</b>							
Temperature, °C	-	-	-	-	4.38	3.85	5.30
Specific Conductance, µS/cm	-	-	-	-	220	92	101
pH, standard units	-	-	-	-	6.01	5.80	6.45
Turbidity, NTU	-	-	-	-	1.66	2.99	2.05
<b>Remarks</b>	Could not locate - Assumed destroyed	Contained product	Contained product	Contained product			

## Notes:

Water quality parameters were measured with YSI-556 and MicroTPW turbidimeter field meters.

°C = degrees Celsius

µS/cm = microsiemens per centimeter

NTU = Nephthelometric Turbidity Unit

TOC = top of casing

- = not applicable or not measured

**TABLE 1  
GROUNDWATER SAMPLING LOG**

	Monitoring Well Number						
	B15MW	B16MW	B17MW	B18MW	B19MW	B20MW	B21MW
<b>Water Level Measurement Data</b>							
Date Water Level Measured	5/2/2016	5/2/2016	5/3/2016	5/3/2016	-	5/2/2016	5/2/2016
Time Water Level Measured	14:37	16:57	10:37	16:22	-	20:12	19:12
Depth to Product Below TOC, Feet	-	-	-	-	-	-	-
Depth to Water Below TOC, Feet	9.41	13.50	10.35	12.83	-	11.10	8.22
<b>Purging/Sampling Data</b>							
Date Sampled	5/2/2016	5/2/2016	5/3/2016	5/3/2016	-	5/2/2016	5/2/2016
Time Sampled	15:27	17:32	11:12	16:57	-	20:52	19:47
Depth to Water Below TOC, Feet	9.41	13.50	10.35	12.83	-	11.10	8.22
Total Depth of Well Below TOC, Feet	19.94	19.93	18.95	19.96	-	19.86	14.85
Water Column in Well, Feet	10.53	6.43	8.60	7.13	-	8.76	6.63
Gallons per Foot	0.16	0.16	0.16	0.16	-	0.16	0.16
Gallons in Well	1.68	1.03	1.38	1.14	-	1.40	1.06
Total Gallons Pumped	1.8	1.2	1.5	1.2	-	1.4	1.2
Purging/Sampling Method	Submersible Pump	Submersible Pump	Submersible Pump	Submersible Pump	-	Submersible Pump	Submersible Pump
Diameter of Well Casing	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch	2-inch
<b>Water Quality Data at Time of Sampling</b>							
Temperature, °C	4.41	5.69	4.74	5.94	-	4.27	4.18
Specific Conductance, µS/cm	61	174	438	209	-	690	166
pH, standard units	6.41	6.41	5.35	7.01	-	5.14	5.99
Turbidity, NTU	1.68	1.86	2.91	2.38	-	0.98	6.74
<b>Remarks</b>				Hydrocarbon odor	Vehicle parked over well		Damaged monument

## Notes:

Water quality parameters were measured with YSI-556 and MicroTPW turbidimeter field meters.

°C = degrees Celsius

µS/cm = microsiemens per centimeter

NTU = Nephthelometric Turbidity Unit

TOC = top of casing

- = not applicable or not measured

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS**

Parameter Tested	Method*	Cleanup Level (mg/L)**	Sample ID Number^ and Water Depth in Feet Below TOC (See Table 1 and Figure 2)				
			Monitoring Wells				
			B1MW 19.23	B2MW 27.22	B3MW 12.30	B6MW 8.87	B7MW 16.40
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	<b>1.81</b>	<b>14.1</b>	<b>0.599</b>	<b>0.205 J</b>	<b>10.0</b>
Aromatic Volatile Organics (BTEX)							
Benzene - mg/L	EPA 8021B	0.0046	<b>0.000550</b>	<b>0.0813</b>	<0.000250	<0.000250	<b>0.000270 J</b>
Toluene - mg/L	EPA 8021B	1.1	<b>0.000580 J</b>	<b>0.000690 J</b>	<0.000500	<0.000500	<0.000500
Ethylbenzene - mg/L	EPA 8021B	0.015	<0.000500	<b>0.0224</b>	<0.000500	<0.000500	<b>0.000780 J</b>
Xylenes - mg/L	EPA 8021B	0.19	<0.00150	<b>0.0134</b>	<0.00150	<0.00150	<0.00150

## Notes:

- \* = see Attachment 3 for compounds tested, methods, and laboratory reporting limits
- \*\* = groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2016)
- ^ = sample ID number preceded by "17490-005-" on the chain of custody form
- mg/L = milligrams per liter
- <0.000250 = analyte not detected; laboratory limit of detection of 0.000250 mg/L
- 0.599** = analyte detected
- 1.81** = reported concentration exceeds the applicable ADEC cleanup level
- J** = reported concentration is an estimate below the limit of quantitation. See laboratory report for more details.
- TOC = top of casing

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS**

Parameter Tested	Method*	Cleanup Level (mg/L)**	Sample ID Number^ and Water Depth in Feet Below TOC (See Table 1 and Figure 2)				
			Monitoring Wells				
			B12MW 8.28	B13MW 7.71	B14MW 8.78	B15MW 9.41	B16MW 13.50
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	<b>0.205 J</b>	<b>0.330 J</b>	<b>0.352 J</b>	<b>0.197 J</b>	<b>0.538 J</b>
Aromatic Volatile Organics (BTEX)							
Benzene - mg/L	EPA 8021B	0.0046	<0.000250	<0.000250	<0.000250	<0.000250	<0.000250
Toluene - mg/L	EPA 8021B	1.1	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Ethylbenzene - mg/L	EPA 8021B	0.015	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Xylenes - mg/L	EPA 8021B	0.19	<0.00150	<0.00150	<0.00150	<0.00150	<0.00150

## Notes:

- \* = see Attachment 3 for compounds tested, methods, and laboratory reporting limits
- \*\* = groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2016)
- ^ = sample ID number preceded by "17490-005-" on the chain of custody form
- mg/L = milligrams per liter
- <0.000250 = analyte not detected; laboratory limit of detection of 0.000250 mg/L
- 0.205 J** = analyte detected
- J** = reported concentration is an estimate below the limit of quantitation. See laboratory report for more details.
- TOC = top of casing

**TABLE 2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS**

Parameter Tested	Method*	Cleanup Level (mg/L)**	Sample ID Number^ and Water Depth in Feet Below TOC (See Table 1 and Figure 2)				
			Monitoring Wells				Trip Blank
			B17MW 10.35	B18MW 12.83	B20MW 11.10	B21MW 8.22	WTB -
Diesel Range Organics (DRO) - mg/L	AK 102	1.5	<b>2.37</b>	<b>1.66</b>	<b>0.358 J</b>	<b>0.242 J</b>	-
Aromatic Volatile Organics (BTEX)							
Benzene - mg/L	EPA 8021B	0.0046	<0.000250	<0.000250	<0.000250	<0.000250	<0.000250
Toluene - mg/L	EPA 8021B	1.1	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Ethylbenzene - mg/L	EPA 8021B	0.015	<0.000500	<0.000500	<0.000500	<0.000500	<0.000500
Xylenes - mg/L	EPA 8021B	0.19	<0.00150	<0.00150	<0.00150	<0.00150	<0.00150

## Notes:

- \* = see Attachment 3 for compounds tested, methods, and laboratory reporting limits
- \*\* = groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2016)
- ^ = sample ID number preceded by "17490-005-" on the chain of custody form
- mg/L = milligrams per liter
- <0.000250 = analyte not detected; laboratory limit of detection of 0.000250 mg/L
- 0.358 J** = analyte detected
- 2.37** = reported concentration exceeds the applicable ADEC cleanup level
- J** = reported concentration is an estimate below the limit of quantitation. See laboratory report for more details.
- = not applicable or sample not tested for this analyte
- TOC = top of casing

**TABLE 3**  
**SUMMARY OF PRODUCT RECOVERY DATA**

Monitoring Well Number	Date	Depth to Product below TOC (feet)	Depth to Water below TOC (feet)	Product Thickness (feet)	Product/Water Removed (gallons)	Remarks	
B4MW	5/14/2012	-	-	-	0	passive bailer frozen in well	
	5/25/2012	-	-	-	0		passive bailer frozen in well
	6/19/2012	17.21	20.66	3.45	3		
	7/5/2012	17.30	19.37	2.07	2		
	7/23/2012	16.86	17.30	0.44	1		
	8/6/2012	16.42	16.75	0.33	0.5		
	8/20/2012	16.17	16.21	0.04	0		
	9/6/2012	16.25	16.33	0.08	0		
	10/2/2012	15.12	15.20	0.08	0		
	10/25/2012	14.95	15.05	0.10	0.25		
	Total volume of product/water removed in 2012:					6.75	
	6/14/2014	16.65	17.09	0.44	0.25		
	7/9/2014	16.16	16.55	0.39	0.1		
	8/14/2014	16.01	16.15	0.14	0.1		
	9/17/2014	-	15.50	0.00	0.05		
	10/10/2014	-	15.45	0.00	0.05		
	Total volume of product/water removed in 2014:					0.55	
	5/4/2016	15.89	16.08	0.19	0.1		
	6/20/2016	15.90	16.01	0.11	0		
	7/16/2016	15.87	16.12	0.25	0.1		
	8/18/2016	15.91	16.10	0.19	0.1		
	9/22/2016	14.35	14.40	0.05	0.05		
	Total volume of product/water removed in 2016:					0.35	
B5MW	5/14/2012	16.98	18.44	1.46	1		
	5/25/2012	16.75	17.03	0.28	0.25		
	6/19/2012	16.99	17.01	0.02	0.1		
	7/5/2012	16.20	16.21	0.01	0.05		
	7/23/2012	-	15.44	0.00	0		
	8/6/2012	-	14.90	0.00	0		
	8/20/2012	-	15.05	0.00	0		
	9/6/2012	-	14.88	0.00	0		
	10/2/2012	-	14.50	0.00	0		
	10/25/2012	-	13.79	0.00	0		
	Total volume of product/water removed in 2012:					1.4	
	6/14/2014	15.90	15.97	0.07	0.2		
	7/9/2014	15.92	16.00	0.08	0.1		
	8/14/2014	15.95	16.00	0.05	0.1		
	9/17/2014	13.75	13.78	0.03	0.1		
	10/10/2014	13.80	13.82	0.02	0.05		
	Total volume of product/water removed in 2014:					0.55	
	5/4/2016	14.54	14.55	0.01	0.03		Product in passive bailer
	6/20/2016	-	14.35	0.00	0.01		
	7/16/2016	14.52	14.56	0.04	0		
	8/18/2016	14.55	14.59	0.04	0		
	9/22/2016	-	13.31	0.00	0		
	Total volume of product/water removed in 2016:					0.04	

Notes:

- TOC = top of casing  
- = not applicable or not measured



**TABLE 3  
SUMMARY OF PRODUCT RECOVERY DATA**

Monitoring Well Number	Date	Depth to Product below TOC (feet)	Depth to Water below TOC (feet)	Product Thickness (feet)	Product/Water Removed (gallons)	Remarks	
B9MW	5/14/2012	26.33	30.80	4.47	7		
	5/25/2012	26.21	31.71	5.50	7.5		
	6/19/2012	26.45	31.71	5.26	6.5		
	7/5/2012	25.97	31.72	5.75	7.5		
	7/23/2012	25.82	31.72	5.90	8		
	8/6/2012	25.40	31.68	6.28	7.5		
	8/20/2012	25.60	31.70	6.10	7		
	9/6/2012	25.39	31.70	6.31	7.5		
	10/2/2012	24.68	31.66	6.98	7.5		
	10/25/2012	25.23	29.64	4.41	8		
	Total volume of product/water removed in 2012:					74	
	6/14/2014	26.31	31.85	5.54	7.5		
	7/9/2014	25.89	31.72	5.83	7		
	8/14/2014	25.91	31.72	5.81	7		
	9/17/2014	25.33	31.70	6.37	7		
	10/10/2014	25.22	31.55	6.33	7		
	Total volume of product/water removed in 2014:					35.5	
	5/4/2016	25.32	31.60	6.28	7.5		
	6/20/2016	25.40	32.40	7.00	7		
	7/16/2016	25.70	31.75	6.05	7		
8/18/2016	25.30	31.76	6.46	7			
9/22/2016	24.58	31.06	6.48	7			
Total volume of product/water removed in 2016:					35.5		
B10MW	5/14/2012	-	17.29	0.00	0		
	5/25/2012	-	17.23	0.00	0		
	6/19/2012	-	16.99	0.00	0		
	7/5/2012	-	16.69	0.00	0		
	7/23/2012	-	16.25	0.00	0		
	8/6/2012	-	15.86	0.00	0		
	8/20/2012	-	15.62	0.00	0		
	9/6/2012	-	15.41	0.00	0		
	10/2/2012	-	14.99	0.00	0		
	10/25/2012	-	14.79	0.00	0		
	Total volume of product/water removed in 2012:					0	
	6/14/2014	-	16.49	0.00	0		
	7/9/2014	-	16.03	0.00	0		
	8/14/2014	-	15.89	0.00	0		
	9/17/2014	-	15.40	0.00	0		
	10/10/2014	-	15.19	0.00	0		
	Total volume of product/water removed in 2014:					0	
	5/4/2016	15.50	15.60	0.10	0.01		
	6/20/2016	15.33	15.75	0.42	0.1		
	7/16/2016	15.40	15.55	0.15	0		
8/18/2016	15.46	15.51	0.05	0			
9/22/2016	14.39	14.45	0.06	0			
Total volume of product/water removed in 2016:					0.11		

Notes:

- TOC = top of casing  
- = not applicable or not measured

**TABLE 3**  
**SUMMARY OF PRODUCT RECOVERY DATA**

Monitoring Well Number	Date	Depth to Product below TOC (feet)	Depth to Water below TOC (feet)	Product Thickness (feet)	Product/Water Removed (gallons)	Remarks	
B11MW	5/14/2012	14.43	15.71	1.28	1	installed passive bailer	
	5/25/2012	14.28	14.30	0.02	0.05		
	6/19/2012	13.90	13.92	0.02	0.05		
	7/5/2012	-	13.85	0.00	0		
	7/23/2012	-	13.04	0.00	0		
	8/6/2012	-	13.80	0.00	0		
	8/20/2012	-	-	-	-		passive bailer stuck in well
	9/6/2012	-	-	-	-		
	10/2/2012	-	12.90	0.00	0		
	10/25/2012	-	12.62	0.00	0		
	Total volume of product/water removed in 2012:					1.1	Possible thin layer of product on 6/14/2014
	6/14/2014	-	13.86	0.00	0		
	7/9/2014	-	14.36	0.00	0		
	8/14/2014	-	13.96	0.00	0		
	9/17/2014	-	13.54	0.00	0		
	10/10/2014	-	13.35	0.00	0		
	Total volume of product/water removed in 2014:					0	
	5/4/2016	12.70	12.71	0.01	0		
	6/20/2016	-	13.20	0.00	0		
	7/16/2016	-	13.42	0.00	0		
8/18/2016	-	13.41	0.00	0			
9/22/2016	-	11.65	0.00	0			
Total volume of product/water removed in 2016:					0		

## Notes:

- TOC = top of casing  
 - = not applicable or not measured

**TABLE 4**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS**

Monitoring Well	Date	Depth to Water, ft	Parameter Tested* and Cleanup Level** in mg/L				
			DRO 1.5	Benzene 0.0046	Toluene 1.1	Ethylbenzene 0.015	Xylenes 0.19
B1MW	3/17/2004	21.19	<b>9.85</b>	<b>0.00246</b>	<0.00200	<0.00200	<b>0.00331</b>
	6/9/2004	22.06	<b>15.2</b>	<b>0.000748</b>	<0.00200	<0.00200	<0.00200
	5/18/2005	20.82	<b>9.88</b>	<0.00500	<0.0200	<0.0200	<0.0200
	10/6/2005	19.78	<b>4.35</b>	<b>0.00271</b>	<0.00200	<0.00200	<0.00200
	6/16/2006	21.25	<b>7.09</b>	<b>0.00208</b>	<0.00200	<b>0.00287</b>	<0.00200
	10/2/2006	20.83	<b>9.70</b>	<b>0.00202</b>	<0.00200	<0.00200	<0.00200
	8/19/2007	21.43	<b>6.76</b>	<b>0.00292</b>	<0.00200	<0.00200	<0.00200
	5/3/2016	19.23	<b>1.81</b>	<b>0.000550</b>	<b>0.000508 J</b>	<0.000500	<0.00150
B2MW	3/19/2004	28.15	<b>19.9</b>	<b>0.155</b>	<0.00200	<b>0.00798</b>	<b>0.0111</b>
	6/9/2004	28.34	<b>32.3</b>	<b>0.229</b>	<b>0.00205</b>	<b>0.0518</b>	<b>0.0860</b>
	5/17/2005	28.12	<b>61.0</b>	<b>0.189</b>	<0.0200	<b>0.0322</b>	<b>0.0246</b>
	10/6/2005	26.84	<b>19.0</b>	<b>0.220</b>	<0.00200	<b>0.0351</b>	<b>0.0312</b>
	6/16/2006	28.50	<b>23.2</b>	<b>0.223</b>	<0.0200	<b>0.0398</b>	<b>0.0280</b>
	10/2/2006	27.55	<b>62.5</b>	<b>0.218</b>	<0.00200	<b>0.0439</b>	<b>0.0545</b>
	8/15/2007	28.01	<b>31.6</b>	<b>0.170</b>	<0.0200	<b>0.0393</b>	<b>0.0245</b>
	5/4/2016	27.22	<b>14.1</b>	<b>0.0813</b>	<b>0.000690 J</b>	<b>0.0224</b>	<b>0.0134</b>
B3MW	3/19/2004	14.72	<b>1.02</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/9/2004	14.81	<b>1.37</b>	<0.000500	<0.00200	<0.00200	<0.00200
	5/17/2005	13.39	<b>0.836</b>	<0.000500	<0.00200	<0.00200	<0.00200
	10/6/2005	10.20	<b>0.840</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/17/2006	13.20	<b>0.817</b>	<0.000500	<0.00200	<0.00200	<0.00200
	10/2/2006	11.00	<b>1.85</b>	<0.000500	<0.00200	<0.00200	<0.00200
	8/17/2007	12.89	<b>0.942</b>	<0.000500	<0.00200	<0.00200	<0.00200
	5/4/2016	12.30	<b>0.599</b>	<0.000250	<0.000500	<0.000500	<0.00150
B6MW	3/20/2004	14.03	<b>0.569</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/9/2004	13.43	<b>0.471</b>	<0.000500	<0.00200	<0.00200	<0.00200
	5/17/2005	11.97	<b>0.380</b>	<0.000500	<0.00200	<0.00200	<0.00200
	10/6/2005	8.02	<0.330	<0.000500	<0.00200	<0.00200	<0.00200
	6/16/2006	11.69	<b>2.22</b>	<0.000500	<0.00200	<0.00200	<0.00200
	10/2/2006	9.30	<0.312	<0.000500	<0.00200	<0.00200	<0.00200
	8/17/2007	11.42	<0.300	<0.000500	<0.00200	<0.00200	<0.00200
	5/3/2016	8.87	<b>0.205 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B7MW	6/16/2006	17.25	<b>6.43</b>	<b>0.00201</b>	<0.00200	<0.00200	<b>0.00807</b>
	10/2/2006	16.53	<b>19.5</b>	<b>0.00132</b>	<0.00200	<0.00200	<b>0.00417</b>
	8/15/2007	17.60	<b>9.24</b>	<b>0.000505</b>	<0.00200	<0.00200	<0.00200
	5/3/2016	16.40	<b>10.0</b>	<b>0.000270 J</b>	<0.000500	<b>0.000780 J</b>	<0.00150
B8MW	6/16/2006	16.70	<b>5.66</b>	<0.000500	<0.00200	<0.00200	<0.00200
	10/2/2006	Could not locate					
	5/4/2016	Could not locate					

## Notes:

- \* = Higher result of field duplicate samples is listed
- \*\* = groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2016)
- DRO = diesel range organics
- ft = feet
- mg/L = milligrams per liter
- <0.00200 = analyte not detected; laboratory limit of detection of 0.00200 mg/L
- 1.02** = analyte detected
- 9.85** = Concentration exceeds ADEC cleanup level
- J** = Analyte detected at an estimated concentration less than the limit of quantitation

**TABLE 4**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS**

Monitoring Well	Date	Depth to Water, ft	Parameter Tested* and Cleanup Level** in mg/L				
			DRO 1.5	Benzene 0.0046	Toluene 1.1	Ethylbenzene 0.015	Xylenes 0.19
B10MW	6/16/2006	16.79	<b>21.0</b>	<b>0.0186</b>	<0.00200	<b>0.00749</b>	<b>0.00511</b>
	10/2/2006	15.33	<b>30.2</b>	<b>0.0116</b>	<0.00200	<b>0.0335</b>	<b>0.00273</b>
	5/4/2016	15.60	Product in well. Did not sample				
B11MW	6/16/2006	13.29	<b>1.10</b>	<b>0.0275</b>	<0.00200	<b>0.00936</b>	<b>0.00755</b>
	10/2/2006	11.60	<b>4.71</b>	<b>0.00536</b>	<0.00200	<b>0.0798</b>	<b>0.0628</b>
	5/4/2016	12.71	Product in well. Did not sample				
B12MW	8/18/2007	9.63	<0.300	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	9.26	<0.376	<0.000300	<0.000620	<0.000620	<0.00186
	6/12/2014	10.41	<0.625 B	<0.000250	<0.000500	<0.000500	<0.00150
	5/2/2016	8.28	<b>0.205 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B13MW	8/18/2007	9.11	<0.317	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	7.65	<b>0.639</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/12/2014	8.85	<0.612 B	<0.000250	<0.000500	<0.000500	<0.00150
	5/2/2016	7.71	<b>0.330 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B14MW	8/18/2007	10.84	<b>1.58</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/19/2009	12.05	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/19/2011	9.33	<b>0.743</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/12/2014	11.12	<1.01 B	<0.000250	<0.000500	<0.000500	<0.00150
	5/2/2016	8.78	<b>0.352 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B15MW	8/18/2007	11.31	<b>0.351</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/18/2009	11.04	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	10.59	<b>0.477 J</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/12/2014	11.00	<0.612 B	<0.000250	<0.000500	<0.000500	<0.00150
	5/2/2016	9.41	<b>0.197 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B16MW	8/19/2007	14.51	<b>0.484</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/18/2009	14.88	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	13.64	-	-	-	-	-
	6/13/2014	14.05	<0.310	<0.000250	<0.000500	<0.000500	<0.00150
	5/2/2016	13.50	<b>0.538 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B17MW	8/19/2007	11.54	<b>1.00</b>	<0.000500	<0.00200	<0.00200	<0.00200
	6/18/2009	12.69	<b>2.89</b>	<0.000500	<0.00200	<0.00200	<0.00200
	8/19/2011	10.18	<b>0.585 J</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/13/2014	11.35	<b>1.36</b>	<0.000250	<0.000500	<0.000500	<0.00150
	5/3/2016	10.35	<b>2.37</b>	<0.000250	<0.000500	<0.000500	<0.00150

## Notes:

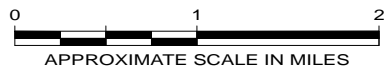
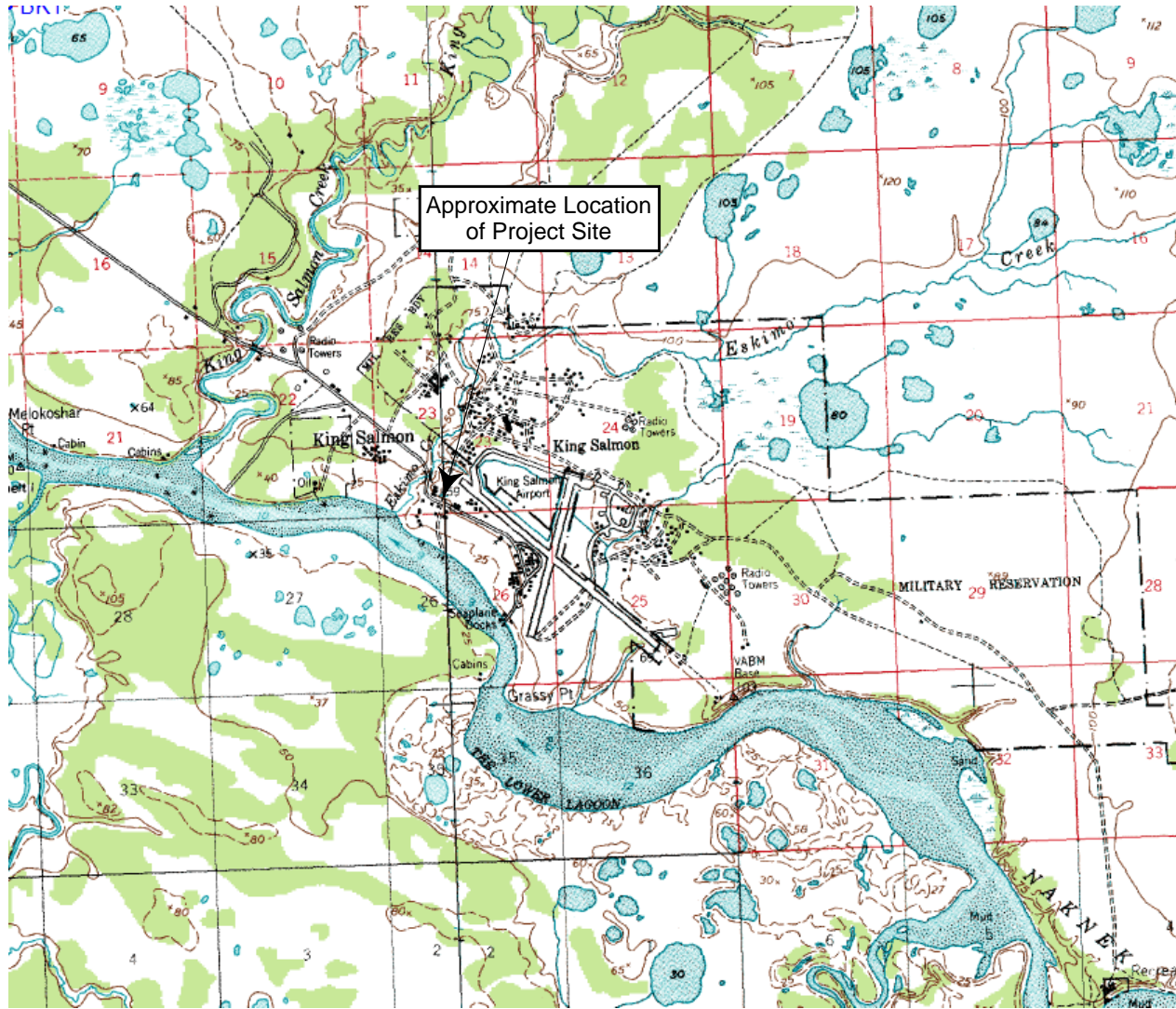
- \* = Higher result of field duplicate samples is listed
- \*\* = groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2016)
- DRO = diesel range organics
- ft = feet
- mg/L = milligrams per liter
- <0.00200 = analyte not detected; laboratory limit of detection of 0.00200 mg/L
- 0.351** = analyte detected
- 1.58** = Concentration exceeds ADEC cleanup level
- J** = Analyte detected at an estimated concentration less than the limit of quantitation
- B** = Analyte concentration potentially affected by method blank contamination.
- = not tested for this analyte

**TABLE 4**  
**HISTORICAL GROUNDWATER ANALYTICAL RESULTS**

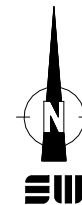
Monitoring Well	Date	Depth to Water, ft	Parameter Tested* and Cleanup Level** in mg/L				
			DRO 1.5	Benzene 0.0046	Toluene 1.1	Ethylbenzene 0.015	Xylenes 0.19
B18MW	8/19/2007	14.01	<b>12.8</b>	<b>0.0103</b>	<0.00200	<0.00200	<b>0.00419</b>
	6/19/2009	15.02	<b>13.8</b>	<b>0.00526</b>	<0.00200	<0.00200	<0.00200
	8/19/2011	13.12	<b>11.9</b>	<b>0.00252</b>	<0.000620	<b>0.000840 J</b>	<b>0.00164 J</b>
	6/13/2014	13.55	<b>14.9</b>	<b>0.00116</b>	<b>0.000340 J</b>	<b>0.000510 J</b>	<b>0.00106 J</b>
	5/3/2016	12.83	<b>1.66</b>	<0.000250	<0.000500	<0.000500	<0.00150
B19MW	6/19/2009	17.90	<0.833	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	13.47	<b>0.237 J</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/13/2014	16.85	<0.313	<0.000250	<0.000500	<0.000500	<0.00150
	5/3/2016	Could not sample due to vehicle over well					
B20MW	6/19/2009	17.30	<0.800	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	9.80	<b>0.219 J</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/13/2014	13.98	<b>0.412 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
	5/2/2016	11.10	<b>0.358 J</b>	<0.000250	<0.000500	<0.000500	<0.00150
B21MW	6/20/2009	11.35	<0.769	<0.000500	<0.00200	<0.00200	<0.00200
	8/18/2011	7.92	<b>0.302 J</b>	<0.000300	<0.000620	<0.000620	<0.00186
	6/12/2014	10.33	<0.390	<0.000250	<b>0.000350 J</b>	<0.000500	<0.00150
	5/2/2016	8.22	<b>0.242 J</b>	<0.000250	<0.000500	<0.000500	<0.00150

## Notes:

- \* = Higher result of field duplicate samples is listed
- \*\* = groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (November 2016)
- DRO = diesel range organics
- ft = feet
- mg/L = milligrams per liter
- <0.00200 = analyte not detected; laboratory limit of detection of 0.00200 mg/L
- 0.00252** = analyte detected
- 12.8** = Concentration exceeds ADEC cleanup level
- J** = Analyte detected at an estimated concentration less than the limit of quantitation
- = not tested for this analyte



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



Former MarkAir Facility  
King Salmon, Alaska

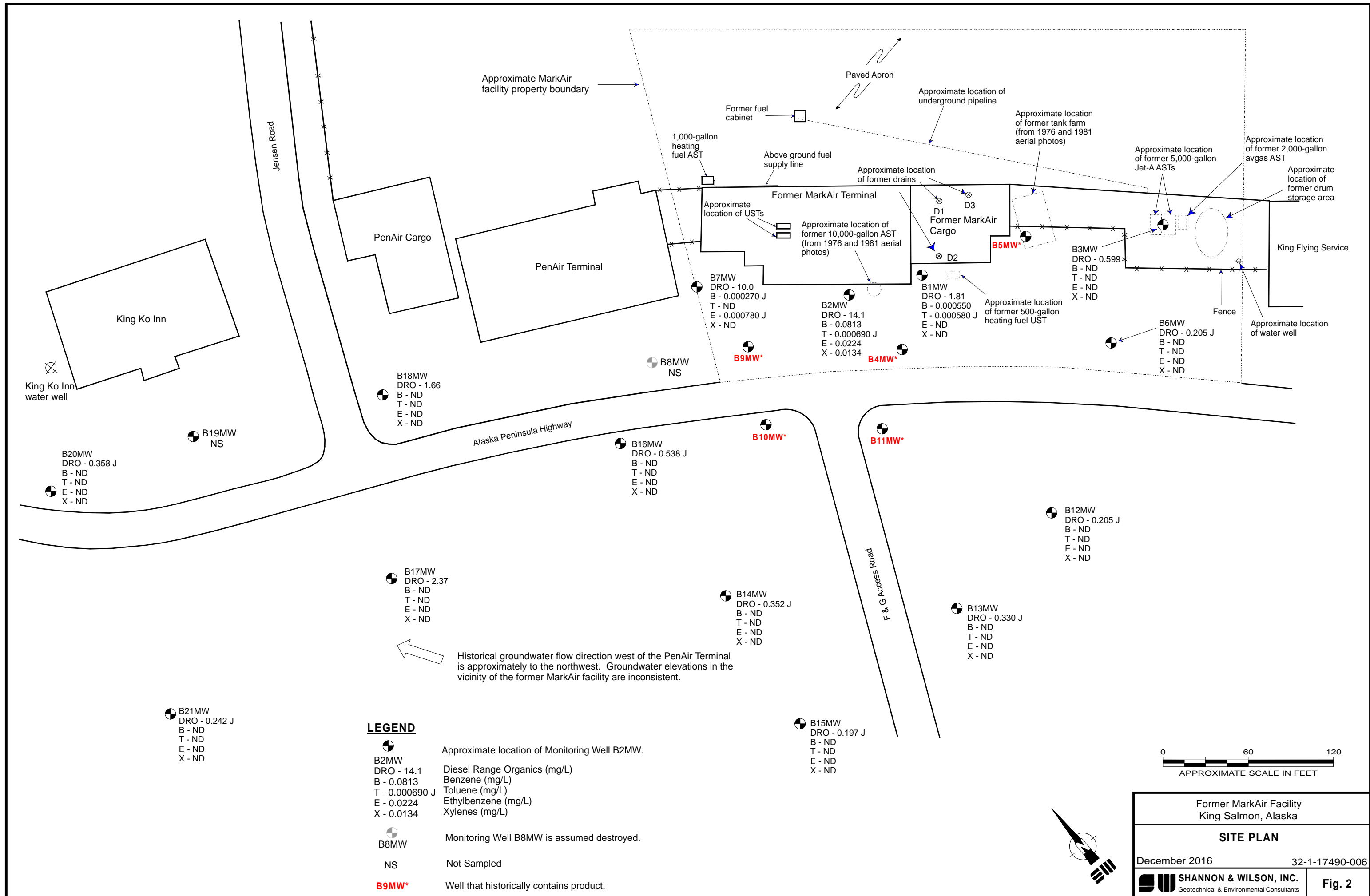
**VICINITY MAP**

December 2016

32-1-17490-006

**SW SHANNON & WILSON, INC.**  
Geotechnical & Environmental Consultants

**Fig. 1**



Approximate MarkAir facility property boundary

Paved Apron

Approximate location of underground pipeline

Approximate location of former tank farm (from 1976 and 1981 aerial photos)

Approximate location of former 5,000-gallon Jet-A ASTs

Approximate location of former 2,000-gallon avgas AST

Approximate location of former drum storage area

Former fuel cabinet

Above ground fuel supply line

Approximate location of former drains

Jensen Road

PenAir Cargo

PenAir Terminal

Former MarkAir Terminal

Approximate location of USTs

Approximate location of former 10,000-gallon AST (from 1976 and 1981 aerial photos)

D1 Former MarkAir Cargo

B5MW\*

B3MW  
DRO - 0.599  
B - ND  
T - ND  
E - ND  
X - ND

King Flying Service

King Ko Inn

King Ko Inn water well

B19MW  
NS

B20MW  
DRO - 0.358 J  
B - ND  
T - ND  
E - ND  
X - ND

B18MW  
DRO - 1.66  
B - ND  
T - ND  
E - ND  
X - ND

B8MW  
NS

B9MW\*

B4MW\*

B7MW  
DRO - 10.0  
B - 0.000270 J  
T - ND  
E - 0.000780 J  
X - ND

B2MW  
DRO - 14.1  
B - 0.0813  
T - 0.000690 J  
E - 0.0224  
X - 0.0134

B1MW  
DRO - 1.81  
B - 0.000550  
T - 0.000580 J  
E - ND  
X - ND

Approximate location of former 500-gallon heating fuel UST

B6MW  
DRO - 0.205 J  
B - ND  
T - ND  
E - ND  
X - ND

Fence

Approximate location of water well

Alaska Peninsula Highway

B16MW  
DRO - 0.538 J  
B - ND  
T - ND  
E - ND  
X - ND

B10MW\*

B11MW\*

B12MW  
DRO - 0.205 J  
B - ND  
T - ND  
E - ND  
X - ND

B17MW  
DRO - 2.37  
B - ND  
T - ND  
E - ND  
X - ND

B14MW  
DRO - 0.352 J  
B - ND  
T - ND  
E - ND  
X - ND

B13MW  
DRO - 0.330 J  
B - ND  
T - ND  
E - ND  
X - ND

F & G Access Road

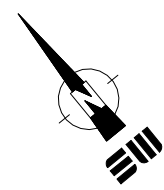
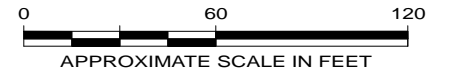


Historical groundwater flow direction west of the PenAir Terminal is approximately to the northwest. Groundwater elevations in the vicinity of the former MarkAir facility are inconsistent.

B21MW  
DRO - 0.242 J  
B - ND  
T - ND  
E - ND  
X - ND

**LEGEND**

- Approximate location of Monitoring Well B2MW.
- B2MW  
DRO - 14.1 Diesel Range Organics (mg/L)  
B - 0.0813 Benzene (mg/L)  
T - 0.000690 J Toluene (mg/L)  
E - 0.0224 Ethylbenzene (mg/L)  
X - 0.0134 Xylenes (mg/L)
- Monitoring Well B8MW is assumed destroyed.
- NS Not Sampled
- B9MW\*** Well that historically contains product.



Former MarkAir Facility King Salmon, Alaska	
<b>SITE PLAN</b>	
December 2016	32-1-17490-006
SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	<b>Fig. 2</b>

**ATTACHMENT 1**

**FIELD NOTES**



TABLE 1  
FREE-PHASE PRODUCT RECOVERY AND MONITORING LOG

Monitoring Well	Date	Time	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Volume of Product Removed (gal.)
B4MW	5/4/16	1450	15.89	16.08	0.19	—
	5/4/16	1535	15.95	16.08	0.13	0.1
	6/20/16	1425	15.90	16.01	0.11	—
	6/20/16	—	—	—	—	—
	7/16/16	1330	15.87	16.12	0.25	—
	7/16/16	1355	15.96	16.05	0.09	0.1
	8/18/16	1505	15.91	16.10	0.19	—
	8/18/16	1525	15.98	16.07	0.09	0.1
	9/22/16	1025	14.35	14.40	0.05	0.05 in bailer
	9/22/16	—	—	—	—	—
B5MW	5/4/16	1440	14.54	14.55	0.01	0.03 in bailer
	—	—	—	—	—	—
	6/20/16	1420	—	14.35	0.0	0.01 in bailer
	—	—	—	—	—	—
	7/16/16	1320	14.52	14.56	0.04	—
	7/16/16	—	—	—	—	—
	8/18/16	1455	14.55	14.59	0.04	—
	8/18/16	—	—	—	—	—
Bailer in well removed?	9/22/16	1020	—	13.31	0.0 (max)	—
	9/22/16	—	—	—	—	—
	—	—	—	—	—	—
	—	—	—	—	—	—
B9MW	5/4/16	1500	25.32	31.60	6.28	—
	5/4/16	1440	27.20	27.45	0.25	~7.5
	6/20/16	1430	25.40	32.40	7.0	—
	6/20/16	1600	27.06	27.61	0.55	~7
	7/16/16	1340	25.70	31.75	6.05	—
	7/16/16	1515	28.82	29.16	0.34	~7.0
	8/18/16	1515	25.30	31.76	6.46	—
	8/18/16	1645	27.83	28.11	0.28	~7.0
	9/22/16	1035	24.58	31.06	6.48	—
	9/22/16	1130	27.33	27.61	0.28	~7

## Notes:

ft = feet

gal. = gallons

## Additional notes or problems

- Mostly water in B4MW passive bailer. Raised bailer 6"  
 • B5MW bailer appears to be catching most of the product in well.  
 • Mostly water in B9MW recovery bailer, Raised bailer 6".  
 6/20: Only had a mini bailer so could not remove as much product as normal. Bailer was stolen

All wells except B11MW need repairs (stripped screws/hubs, broken eyelets)

**TABLE 1**  
**FREE-PHASE PRODUCT RECOVERY AND MONITORING LOG**

Monitoring Well	Date	Time	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Volume of Product Removed (gal.)
B10MW	5/4/16	1430	15.50	15.60	0.10	—
	5/4/16	1510	15.52	15.60	0.08	0.01
	6/20/16	1400	15.33	15.75	0.42	—
	6/20/16	1410	15.42	15.65	0.23	0.1
	7/16/16	1310	15.40	15.55	0.15	—
	7/16/16	—	—	—	—	—
	8/18/16	1450	15.46	15.51	0.05	—
	8/18/16	—	—	—	—	—
	9/22/16	1000	14.39	14.45	0.06	—
	9/22/16	—	—	—	—	—
B11MW	5/4/16	1425	12.70	12.71	0.01	—
	—	—	—	—	—	—
	6/20/16	1410	<del>12.60</del>	13.20	0.0	—
	—	—	—	—	—	—
	7/16/16	1300	—	13.42	0.0	—
	—	—	—	—	—	—
	8/18/16	1445	—	13.41	0.0	—
	8/18/16	—	—	—	—	—
	9/22/16	1000	—	11.65	0.0 <sup>(trace)</sup>	—
	9/22/16	—	—	—	—	—

Notes:

ft = feet  
gal. = gallons

5/4 [Bailer in B11MW contained nothing. Should we remove?  
Water rises in B11MW when passive bailer removed]

Additional notes or problems

## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Milk Air Weather: Overcast 45°F  
 Well No.: B1MW  
 Date: 5/3/16 Time Started: 1330 Time Completed: 1435  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1332 Date of Depth Measurement: 5/3/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 31.10 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 19.23  
 Water Column in Well: 11.87 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.9 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/3/16 Time Started: 1335 Time Completed: 1415  
 Three Well Volumes: 5.7 (Gallons in Well x 3)  
 Gallons Purged: 2.0 Depth of Pump (generally 2 ft from bottom): 21' to c lowered to 22' due to drawdown  
 Max. Drawdown (generally 0.3 ft): 1.8 Pump Rate: 0.2-0.4 L/min  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1340</u>	<u>0.25</u>	<u>0.2-0.4</u>	<u>-</u>	<u>-</u>	<u>9.63</u>	<u>297</u>	<u>-</u>	<u>6.82</u>	<u>-</u>	<u>3.81</u>
<u>1345</u>	<u>0.5</u>	<u>↓</u>	<u>-</u>	<u>-</u>	<u>10.37</u>	<u>295</u>	<u>-</u>	<u>6.87</u>	<u>-</u>	<u>3.65</u>
<u>1350</u>	<u>0.75</u>	<u>↓</u>	<u>20.52</u>	<u>1.29</u>	<u>10.41</u>	<u>301</u>	<u>-</u>	<u>6.92</u>	<u>-</u>	<u>3.29</u>
<u>1355</u>	<u>1.0</u>	<u>↓</u>	<u>-</u>	<u>-</u>	<u>10.40</u>	<u>303</u>	<u>-</u>	<u>6.96</u>	<u>-</u>	<u>3.07</u>
<u>1400</u>	<u>1.25</u>	<u>↓</u>	<u>-</u>	<u>-</u>	<u>10.45</u>	<u>306</u>	<u>-</u>	<u>6.98</u>	<u>-</u>	<u>2.71</u>
<u>1405</u>	<u>1.5</u>	<u>↓</u>	<u>21.03</u>	<u>1.8</u>	<u>10.42</u>	<u>306</u>	<u>-</u>	<u>6.99</u>	<u>-</u>	<u>3.10</u>

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B1MW Time / Date: 1425 5/3/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:  
 Water Quality Instruments Used/Manufacturer/Model Number: YSI 556, MicroTPO Turbidimeter  
 Calibration Info (Time, Ranges, etc): —

Remarks: Drawdown larger than expected. let recharge to at least 80% prior to sampling

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23



## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former WalkAir Weather: Overcast 40°F  
 Well No.: B2mw  
 Date: 5/4/16 Time Started: 1135 Time Completed: 1215  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1138 Date of Depth Measurement: 5/4/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: —  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 31.43 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 27.22  
 Water Column in Well: 4.21 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 0.7 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/4/16 Time Started: 1140 Time Completed: 1205  
 Three Well Volumes: 2.1 (Gallons in Well x 3)  
 Gallons Purged: 1.0 Depth of Pump (generally 2 ft from bottom): 28.5' below  
 Max. Drawdown (generally 0.3 ft): 0.07 Pump Rate: 0.2 4/min  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1145</u>	<u>0.2</u>	<u>0.2</u>	<u>—</u>	<u>—</u>	<u>7.12</u>	<u>999</u>	<u>—</u>	<u>7.02</u>	<u>—</u>	<u>19.96</u>
<u>1150</u>	<u>0.4</u>	<u>↓</u>	<u>—</u>	<u>—</u>	<u>9.21</u>	<u>1004</u>	<u>—</u>	<u>7.03</u>	<u>—</u>	<u>12.73</u>
<u>1155</u>	<u>0.6</u>	<u>↓</u>	<u>27.30</u>	<u>0.07</u>	<u>9.23</u>	<u>1003</u>	<u>—</u>	<u>7.05</u>	<u>—</u>	<u>8.18</u>
<u>1200</u>	<u>0.8</u>	<u>↓</u>	<u>—</u>	<u>—</u>	<u>9.22</u>	<u>1002</u>	<u>—</u>	<u>7.08</u>	<u>—</u>	<u>6.37</u>
<u>1205</u>	<u>1.0</u>	<u>↓</u>	<u>27.30</u>	<u>0.07</u>	<u>9.25</u>	<u>1002</u>	<u>—</u>	<u>7.08</u>	<u>—</u>	<u>5.19</u>

### SAMPLING DATA

Odor: 4c odor / sulfur odor Color: Clear  
 Sample Designation: 17490-005-B2mw Time / Date: 1207 5/4/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —  
 Sampling Method: Submersible Pump / Other: —

Water Quality Instruments Used/Manufacturer/Model Number 451556 MicroTAN Turbidimeter

Calibration Info (Time, Ranges, etc) 451556 checked on 5/4. Ranges good

Remarks: DBO and B567

Sampling Personnel: JUT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

**LOW-FLOW WATER SAMPLING LOG**

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Ferne Muckair Weather: overcast 45°F  
 Well No.: B3MW  
 Date: 5/4/13 Time Started: 1315 Time Completed: 1410  
 Develop Date: — Develop End Time: — (24 hour break)

**INITIAL GROUNDWATER LEVEL DATA**

Time of Depth Measurement: 1317 Date of Depth Measurement: 5/4/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 21.91 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 12.30  
 Water Column in Well: 9.61 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.6 (Water Column in Well x Gallons per foot)

**PURGING DATA**

Date Purged: 5/4/16 Time Started: 1320 Time Completed: 1355  
 Three Well Volumes: 4.8 (Gallons in Well x 3)  
 Gallons Purged: 1.75 Depth of Pump (generally 2 ft from bottom): 13.5' btoe  
 Max. Drawdown (generally 0.3 ft): 0 Pump Rate: 0.2-0.4 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
1325	0.25	0.2-0.4	—	—	5.55	268	—	7.15	—	4.58
1330	0.5	↓	—	—	5.50	273	—	7.01	—	3.96
1335	0.75	↓	12.30	0	5.49	270	—	6.98	—	3.50
1340	1.0	↓	—	—	5.45	269	—	6.95	—	3.38
1345	1.25	↓	—	—	5.44	268	—	6.91	—	2.85
1350	1.5	↓	12.30	0	5.45	267	—	6.89	—	2.23
1355	1.75	↓	—	—	5.45	267	—	6.89	—	2.51

**SAMPLING DATA**

Odor: None Color: Clear  
 Sample Designation: 17490-005-B3MW Time / Date: 1357 5/4/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:

Water Quality Instruments Used/Manufacturer/Model Number YS1556, Microturb Turbidimeter  
 Calibration Info (Time, Ranges, etc) Checked YS1556 ranges on 5/4. Ranges good

Remarks: DRO and BTER. Well is ~6" bgs. Need metal detector to find. Call DOT for access.

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former MarkAir Weather: Overcast 40°F  
 Well No.: B6MW  
 Date: 5/3/16 Time Started: 900 Time Completed: 1015  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 907 Date of Depth Measurement: 5/3/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 24.67 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 8.87  
 Water Column in Well: 15.8 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 2.6 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/3/16 Time Started: 905 Time Completed: 1005  
 Three Well Volumes: 7.8 (Gallons in Well x 3)  
 Gallons Purged: 2.75 Depth of Pump (generally 2 ft from bottom): 10  
 Max. Drawdown (generally 0.3 ft): 0.28 Pump Rate: 0.2 y/min - 0.4 y/min  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)	
915	0.25	0.2-0.4	—	—	5.65	108	—	6.34	—	1.86	
920	0.5	↓	—	—	5.51	102	—	6.21	—	1.68	
925	0.75		9.12	0.25	5.55	98	—	6.18	—	1.51	
930	1.0		—	—	5.61	96	—	6.17	—	1.59	
935	1.25		—	—	5.63	93	—	6.15	—	1.23	
940	1.5		—	9.15	0.28	5.67	92	—	6.11	—	1.07

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B6MW Time / Date: 1007 5/3/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:

Water Quality Instruments Used/Manufacturer/Model Number YSI 556 MicroTPW Turbidimeter

Calibration Info (Time, Ranges, etc) Checked ranges on YSI 556 on 5/3/16 at 830. Ranges OK

Remarks: Well cap covered with silica sand. Used spoon to scoop out.

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23





**LOW-FLOW WATER SAMPLING LOG**

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Mark Air Weather: Overcast 45°F  
 Well No.: BTMW  
 Date: 5/3/16 Time Started: 1530 Time Completed: 1610  
 Develop Date: - Develop End Time: - (24 hour break)

**INITIAL GROUNDWATER LEVEL DATA**

Time of Depth Measurement: 1533 Date of Depth Measurement: 5/3/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: \_\_\_\_\_  
 Diameter of Casing: 2" Well Screen Interval: -  
 Total Depth of Well Below MP: 19.56 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 16.40  
 Water Column in Well: 3.16 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 0.5 (Water Column in Well x Gallons per foot)

**PURGING DATA**

Date Purged: 5/3/16 Time Started: 1535 Time Completed: 1600  
 Three Well Volumes: 1.5 (Gallons in Well x 3)  
 Gallons Purged: 1.0 Depth of Pump (generally 2-ft from bottom): 18'6" to  
 Max. Drawdown (generally 0.3 ft): 0.21 Pump Rate: 0.2 - 0.4 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1540</u>	<u>0.2</u>	<u>0.2-0.4</u>	<u>-</u>	<u>-</u>	<u>7.47</u>	<u>622</u>	<u>-</u>	<u>6.84</u>	<u>-</u>	<u>2.87</u>
<u>1545</u>	<u>0.4</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>7.33</u>	<u>630</u>	<u>-</u>	<u>6.76</u>	<u>-</u>	<u>2.54</u>
<u>1550</u>	<u>0.6</u>	<u> </u>	<u>16.61</u>	<u>0.21</u>	<u>7.36</u>	<u>631</u>	<u>-</u>	<u>6.75</u>	<u>-</u>	<u>2.28</u>
<u>1555</u>	<u>0.8</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>7.39</u>	<u>633</u>	<u>-</u>	<u>6.75</u>	<u>-</u>	<u>2.07</u>
<u>1600</u>	<u>1.0</u>	<u>↓</u>	<u>-</u>	<u>-</u>	<u>7.40</u>	<u>634</u>	<u>-</u>	<u>6.74</u>	<u>-</u>	<u>1.82</u>

**SAMPLING DATA**

Odor: ~~He~~ odor Sulfur Color: Clear  
 Sample Designation: 17490-005-BTMW Time / Date: 1602 5/3/16  
 QC Sample Designation: - Time / Date: -  
 QA Sample Designation: - Time / Date: -

Evacuation Method: Submersible Pump / Other: \_\_\_\_\_  
 Sampling Method: Submersible Pump / Other: \_\_\_\_\_

Water Quality Instruments Used/Manufacturer/Model Number YSI 556, MicroTAN turbidimeter  
 Calibration Info (Time, Ranges, etc) Checked ranges on YSI 556 on 5/3/16, Ranges ok

Remarks: \_\_\_\_\_

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

### LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Mack Air Weather: Overcast 45°F  
Well No.: B11MW  
Date: 5/3/16 Time Started: \_\_\_\_\_ Time Completed: \_\_\_\_\_  
Develop Date: \_\_\_\_\_ Develop End Time: \_\_\_\_\_ (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: \_\_\_\_\_ Date of Depth Measurement: 5/3/16  
Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: \_\_\_\_\_  
Diameter of Casing: 2" Well Screen Interval: \_\_\_\_\_  
Total Depth of Well Below MP: \_\_\_\_\_ Product Thickness, if noted: 0.01'  
Depth-to-Water (DTW) Below MP: \_\_\_\_\_  
Water Column in Well: \_\_\_\_\_ (Total Depth of Well Below MP - DTW Below MP)  
Gallons per foot: 0.16  
Gallons in Well: \_\_\_\_\_ (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/3/16 Time Started: \_\_\_\_\_ Time Completed: \_\_\_\_\_  
Three Well Volumes: \_\_\_\_\_ (Gallons in Well x 3)  
Gallons Purged: \_\_\_\_\_ Depth of Pump (generally 2 ft from bottom): \_\_\_\_\_  
Max. Drawdown (generally 0.3 ft): \_\_\_\_\_ Pump Rate: \_\_\_\_\_  
Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____

### SAMPLING DATA

Odor: \_\_\_\_\_ Color: \_\_\_\_\_  
Sample Designation: \_\_\_\_\_ Time / Date: \_\_\_\_\_  
QC Sample Designation: \_\_\_\_\_ Time / Date: \_\_\_\_\_  
QA Sample Designation: \_\_\_\_\_ Time / Date: \_\_\_\_\_

Evacuation Method: Submersible Pump / Other: \_\_\_\_\_

Sampling Method: Submersible Pump / Other: \_\_\_\_\_

Water Quality Instruments Used/Manufacturer/Model Number \_\_\_\_\_

Calibration Info (Time, Ranges, etc) Well contains passive bailer. Bottom was black

Remarks: Contained approx 0.01' of product. Will not sample and include in product recovery efforts. After pulling bailer water/product rose from 14.00' to 12.70'

Sampling Personnel: \_\_\_\_\_

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Market Weather: Overcast 45°F  
 Well No.: B12MW  
 Date: 5/2/16 Time Started: 1325 Time Completed: 1425  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1327 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2' Well Screen Interval: —  
 Total Depth of Well Below MP: 19.36 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 8.28  
 Water Column in Well: 11.08 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.8 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/2/16 Time Started: 1330 Time Completed: 1415  
 Three Well Volumes: 5.4 (Gallons in Well x 3)  
 Gallons Purged: 1.8 Depth of Pump (generally 2-ft from bottom): 9.5' btoe  
 Max. Drawdown (generally 0.3 ft): 0.1 Pump Rate: ~0.24/min  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1335</u>	<u>0.2</u>	<u>~0.2</u>	<u>-</u>	<u>-</u>	<u>4.32</u>	<u>185</u>	<u>-</u>	<u>6.16</u>	<u>-</u>	<u>7.49</u>
<u>1340</u>	<u>0.4</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>4.34</u>	<u>189</u>	<u>-</u>	<u>6.17</u>	<u>-</u>	<u>6.91</u>
<u>1345</u>	<u>0.6</u>	<u> </u>	<u>8.38</u>	<u>0.1</u>	<u>4.36</u>	<u>208</u>	<u>-</u>	<u>6.09</u>	<u>-</u>	<u>3.09</u>
<u>1350</u>	<u>0.8</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>4.40</u>	<u>215</u>	<u>-</u>	<u>6.06</u>	<u>-</u>	<u>2.86</u>
<u>1355</u>	<u>1.0</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>4.35</u>	<u>218</u>	<u>-</u>	<u>6.06</u>	<u>-</u>	<u>2.62</u>
<u>1400</u>	<u>1.2</u>	<u>↓</u>	<u>8.38</u>	<u>0.1</u>	<u>4.38</u>	<u>220</u>	<u>-</u>	<u>6.05</u>	<u>-</u>	<u>2.43</u>

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B12MW Time / Date: 1417 5/2/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:

Water Quality Instruments Used/Manufacturer/Model Number YSI 556, MicroTPW Turbidimeter

Calibration Info (Time, Ranges, etc) YSI 556 on 5/2/16 at 1100

Remarks: DRO and BTEX

Sampling Personnel: JUT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23



**LOW-FLOW WATER SAMPLING LOG**

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Mack Air Weather: Overcast 45°F  
 Well No.: B13MW  
 Date: 5/2/16 Time Started: 1230 Time Completed: 1320  
 Develop Date: — Develop End Time: — (24 hour break)

**INITIAL GROUNDWATER LEVEL DATA**

Time of Depth Measurement: 1235 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: —  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 14.80 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 7.71  
 Water Column in Well: 7.17 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.15 (Water Column in Well x Gallons per foot)

**PURGING DATA**

Date Purged: 5/2/16 Time Started: 1240 Time Completed: 1315  
 Three Well Volumes: 3.72 (Gallons in Well x 3)  
 Gallons Purged: 1.4 Depth of Pump (generally 2 ft from bottom): 9' b10c  
 Max. Drawdown (generally 0.3 ft): 0.29 Pump Rate: ~0.24/min  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
1245	0.2	~0.2	—	—	4.60	150	—	5.24	—	5.47
1250	0.4	↓	—	—	3.82	107	—	5.39	—	4.29
1255	0.6	↓	8.00	0.29	3.86	98	—	5.50	—	4.06
1300	0.8	↓	—	—	3.89	94	—	5.67	—	3.78
1305	1.0	↓	—	—	3.90	93	—	5.74	—	3.50
1310	1.2	↓	8.00	0.29	3.87	92	—	5.78	—	3.34
1315	1.4	↓	—	—	3.85	92	—	5.80	—	2.99

**SAMPLING DATA**

Odor: None Color: Clear  
 Sample Designation: 17490-005-B13MW Time / Date: 1317 5/2/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —  
 Sampling Method: Submersible Pump / Other: —

Water Quality Instruments Used/Manufacturer/Model Number YSI 556 MicroTPW Turbidimeter  
 Calibration Info (Time, Ranges, etc) YSI 556 on 5/2/16 at 1100

Remarks: DRO and BTEX

Sampling Personnel: Jet

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

**LOW-FLOW WATER SAMPLING LOG**

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Farmer Mark A. Weather: Overcast 45°F  
 Well No.: B14MW  
 Date: 5/2/16 Time Started: 1545 Time Completed: 1645  
 Develop Date: - Develop End Time: - (24 hour break)

**INITIAL GROUNDWATER LEVEL DATA**

Time of Depth Measurement: 1547 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: \_\_\_\_\_  
 Diameter of Casing: 2" Well Screen Interval: -  
 Total Depth of Well Below MP: 19.15 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 8.78  
 Water Column in Well: 10.37 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.7 (Water Column in Well x Gallons per foot)

**PURGING DATA**

Date Purged: 5/2/16 Time Started: 1550 Time Completed: 1635  
 Three Well Volumes: 5.1 (Gallons in Well x 3)  
 Gallons Purged: 1.8 Depth of Pump (generally 2 ft from bottom): 10' below  
 Max. Drawdown (generally 0.3 ft): 0.2 Pump Rate: 0.24/min  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
1555	0.2	0.2	-	-	5.25	61	-	6.55	-	30.24
1600	0.4	↓	-	-	5.19	67	-	6.51	-	15.13
1605	0.6		8.98	0.2	5.32	80	-	6.36	-	5.30
1610	0.8		-	-	5.30	89	-	6.39	-	4.68
1615	1.0		-	-	5.25	96	-	6.41	-	4.20
1620	1.2		8.98	0.2	5.22	99	-	6.40	-	3.81

**SAMPLING DATA**

Odor: None Color: Clear  
 Sample Designation: 17490-005-B14MW Time / Date: 1637 5/2/16  
 QC Sample Designation: - Time / Date: -  
 QA Sample Designation: - Time / Date: -

Evacuation Method: Submersible Pump Other: \_\_\_\_\_  
 Sampling Method: Submersible Pump Other: \_\_\_\_\_

Water Quality Instruments Used/Manufacturer/Model Number YS1556, MicroTPW Turbidimeter

Calibration Info (Time, Ranges, etc) YS1556 on 5/2/16 at 1100

Remarks: DRD and BTEX

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23



## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Milk Acre Weather: Overcast 45°F  
 Well No.: B15MW  
 Date: 5/2/16 Time Started: 1435 Time Completed: 1535  
 Develop Date: - Develop End Time: - (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1437 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: \_\_\_\_\_  
 Diameter of Casing: 2" Well Screen Interval: -  
 Total Depth of Well Below MP: 19.94 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 9.41  
 Water Column in Well: 10.53 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.7 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/2/16 Time Started: 1440 Time Completed: 1525  
 Three Well Volumes: 5.1 (Gallons in Well x 3)  
 Gallons Purged: 1.8 Depth of Pump (generally 2 ft from bottom): 10.5' bto  
 Max. Drawdown (generally 0.3 ft): 0.3 Pump Rate: ~0.2 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1445</u>	<u>0.2</u>	<u>~0.2</u>	<u>-</u>	<u>-</u>	<u>4.70</u>	<u>54</u>	<u>-</u>	<u>6.44</u>	<u>-</u>	<u>2.30</u>
<u>1450</u>	<u>0.4</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>4.60</u>	<u>55</u>	<u>-</u>	<u>6.44</u>	<u>-</u>	<u>2.52</u>
<u>1455</u>	<u>0.6</u>	<u> </u>	<u>9.71</u>	<u>0.3</u>	<u>4.50</u>	<u>58</u>	<u>-</u>	<u>6.43</u>	<u>-</u>	<u>2.02</u>
<u>1500</u>	<u>0.8</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>4.48</u>	<u>59</u>	<u>-</u>	<u>6.43</u>	<u>-</u>	<u>1.93</u>
<u>1505</u>	<u>1.0</u>	<u> </u>	<u>-</u>	<u>-</u>	<u>4.45</u>	<u>60</u>	<u>-</u>	<u>6.42</u>	<u>-</u>	<u>1.80</u>
<u>1510</u>	<u>1.2</u>	<u>↓</u>	<u>9.71</u>	<u>0.3</u>	<u>4.43</u>	<u>60</u>	<u>-</u>	<u>6.42</u>	<u>-</u>	<u>1.59</u>

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B15MW Time / Date: 1527 5/2/16  
 QC Sample Designation: - Time / Date: -  
 QA Sample Designation: - Time / Date: -

Evacuation Method: Submersible Pump / Other: \_\_\_\_\_  
 Sampling Method: Submersible Pump / Other: \_\_\_\_\_

Water Quality Instruments Used/Manufacturer/Model Number YSI 556, MicroTPro Turbidimeter  
 Calibration Info (Time, Ranges, etc) YSI 556 on 5/2/16 at 1100

Remarks: DRO and BTEX  
Well is close to brown cone

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23





## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Milk Plant Weather: Overcast 45°F / Rain  
 Well No.: B16MW  
 Date: 5/2/16 Time Started: 1655 Time Completed: 1740  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1657 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casings / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 19.93 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 13.50  
 Water Column in Well: 6.43 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.1 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/2/16 Time Started: 1700 Time Completed: 1730  
 Three Well Volumes: 3.3 (Gallons in Well x 3)  
 Gallons Purged: 1.2 Depth of Pump (generally 2 ft from bottom): 5' 4.5"  
 Max. Drawdown (generally 0.3 ft): 0.15 Pump Rate: ~0.2 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1705</u>	<u>0.2</u>	<u>0.2</u>	<u>—</u>	<u>—</u>	<u>5.70</u>	<u>165</u>	<u>—</u>	<u>6.45</u>	<u>—</u>	<u>3.29</u>
<u>1710</u>	<u>0.4</u>	↓	<u>—</u>	<u>—</u>	<u>5.70</u>	<u>171</u>	<u>—</u>	<u>6.43</u>	<u>—</u>	<u>3.01</u>
<u>1715</u>	<u>0.6</u>		<u>13.65</u>	<u>0.15</u>	<u>5.69</u>	<u>172</u>	<u>—</u>	<u>6.41</u>	<u>—</u>	<u>2.53</u>
<u>1720</u>	<u>0.8</u>		<u>—</u>	<u>—</u>	<u>5.70</u>	<u>173</u>	<u>—</u>	<u>6.42</u>	<u>—</u>	<u>2.39</u>
<u>1725</u>	<u>1.0</u>		<u>—</u>	<u>—</u>	<u>5.70</u>	<u>173</u>	<u>—</u>	<u>6.41</u>	<u>—</u>	<u>2.07</u>
<u>1730</u>	<u>1.2</u>		<u>13.65</u>	<u>0.15</u>	<u>5.69</u>	<u>174</u>	<u>—</u>	<u>6.41</u>	<u>—</u>	<u>1.86</u>

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B16MW Time / Date: 1732 5/2/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:

Water Quality Instruments Used/Manufacturer/Model Number YSI 556 MicroTRP Turbid

Calibration Info (Time, Ranges, etc) —

Remarks: —

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Mack Air Weather: Overcast 45°F  
 Well No.: B17MW  
 Date: 5/3/16 Time Started: 1035 Time Completed: 1120  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1037 Date of Depth Measurement: 5/3/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 18.95 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 10.35  
 Water Column in Well: 8.6 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.4 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/3/16 Time Started: 1040 Time Completed: 1110  
 Three Well Volumes: 4.2 (Gallons in Well x 3)  
 Gallons Purged: 1.5 Depth of Pump (generally 2 ft from bottom): 11.5' bto  
 Max. Drawdown (generally 0.3 ft): 0.3 Pump Rate: 0.2-0.4  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1045</u>	<u>0.25</u>	<u>0.2-0.4</u>	<u>—</u>	<u>—</u>	<u>4.90</u>	<u>431</u>	<u>—</u>	<u>5.36</u>	<u>—</u>	<u>2.25</u>
<u>1050</u>	<u>0.5</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>4.84</u>	<u>434</u>	<u>—</u>	<u>5.37</u>	<u>—</u>	<u>2.08</u>
<u>1055</u>	<u>0.75</u>	<u>—</u>	<u>10.65</u>	<u>0.3</u>	<u>4.81</u>	<u>436</u>	<u>—</u>	<u>5.36</u>	<u>—</u>	<u>2.53</u>
<u>1100</u>	<u>1.0</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>4.77</u>	<u>437</u>	<u>—</u>	<u>5.36</u>	<u>—</u>	<u>2.16</u>
<u>1105</u>	<u>1.25</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>4.76</u>	<u>437</u>	<u>—</u>	<u>5.36</u>	<u>—</u>	<u>2.64</u>
<u>1110</u>	<u>1.5</u>	<u>—</u>	<u>10.65</u>	<u>0.3</u>	<u>4.74</u>	<u>438</u>	<u>—</u>	<u>5.35</u>	<u>—</u>	<u>2.91</u>

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B17MW Time / Date: 1112 5/3/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —  
 Sampling Method: Submersible Pump / Other: —

Water Quality Instruments Used/Manufacturer/Model Number YSI 556 MicroTPO Turbidimeter

Calibration Info (Time, Ranges, etc) Checked ranges on YSI 556 5/3/16. ranges ok

Remarks: DRO + BTEX

Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Markay Weather: Overcast 45°F  
 Well No.: B18MW  
 Date: 5/3/16 Time Started: 1620 Time Completed: 1710  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1622 Date of Depth Measurement: 5/3/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 19.96 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 12.83  
 Water Column in Well: 7.13 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.2 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/3/16 Time Started: 1625 Time Completed: 1655  
 Three Well Volumes: 3.6 (Gallons in Well x 3)  
 Gallons Purged: 1.2 Depth of Pump (generally 2 ft from bottom): 14  
 Max. Drawdown (generally 0.3 ft): 0.2 Pump Rate: 0.2-0.4 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)	
1630	0.2	0.2-0.4	—	—	5.91	204	—	7.20	—	3.42	
1635	0.4	↓	—	—	5.92	206	—	7.08	—	3.16	
1640	0.6		13.03	0.2	5.92	207	—	7.06	—	2.74	
1645	0.8		—	—	5.95	208	—	7.05	—	2.55	
1650	1.0		—	—	5.94	209	—	7.02	—	2.16	
1655	1.2		✓	13.03	0.2	5.94	209	—	7.01	—	2.38

### SAMPLING DATA

Odor: HC odor Color: Clear  
 Sample Designation: 17490-005-B18MW Time / Date: 1657 5/3/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:

Water Quality Instruments Used/Manufacturer/Model Number YSI 556 MicroTDS Turbidimeter  
 Calibration Info (Time, Ranges, etc) Checked YSI 556 ranges on 5/3/16 Ranges ok

Remarks: —

Sampling Personnel: JCY

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

**LOW-FLOW WATER SAMPLING LOG**

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Muth Air Weather: Overcast 45°F  
 Well No.: B20MW  
 Date: 5/2/16 Time Started: 2010 Time Completed: 2100  
 Develop Date: — Develop End Time: — (24 hour break)

**INITIAL GROUNDWATER LEVEL DATA**

Time of Depth Measurement: 2012 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other:  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 19.86 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 11.10  
 Water Column in Well: 8.76 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.4 (Water Column in Well x Gallons per foot)

**PURGING DATA**

Date Purged: 5/2/16 Time Started: 2015 Time Completed: 2050  
 Three Well Volumes: 4.2 (Gallons in Well x 3)  
 Gallons Purged: 1.4 Depth of Pump (generally 2 ft from bottom): 12.5' below  
 Max. Drawdown (generally 0.3 ft): 0.26 Pump Rate: 0.2 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
2020	0.2	0.2	—	—	4.40	656	—	5.39	—	2.34
2025	0.4	↓	—	—	4.30	675	—	5.20	—	2.16
2030	0.6		11.36	0.26	4.28	679	—	5.18	—	1.97
2035	0.8		—	—	4.26	688	—	5.17	—	1.62
2040	1.0		—	—	4.26	688	—	5.16	—	1.39
2045	1.2		11.36	0.26	4.26	690	—	5.16	—	1.01
2050	1.4		—	—	4.27	690	—	5.14	—	0.98

**SAMPLING DATA**

Odor: None Color: Clear  
 Sample Designation: 17490-005-B20RAW Time / Date: 2052 5/2/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other:  
 Sampling Method: Submersible Pump / Other:

Water Quality Instruments Used/Manufacturer/Model Number YSI 556, MicroTpw Turbidimeter  
 Calibration Info (Time, Ranges, etc) YSI 556 on 5/2/16 at 1100

Remarks: DRO and BTEX  
Well is in tall grass next to spruce tree  
 Sampling Personnel: JCT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65  
 ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

## LOW-FLOW WATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 17490-005 Location: Former Markham Weather: Rain 40°F  
 Well No.: B21MW  
 Date: 5/2/16 Time Started: 1910 Time Completed: 2000  
 Develop Date: — Develop End Time: — (24 hour break)

### INITIAL GROUNDWATER LEVEL DATA

Time of Depth Measurement: 1912 Date of Depth Measurement: 5/2/16  
 Measuring Point (MP): Top of PVC Casing / Top of Steel Protective Casing / Other: —  
 Diameter of Casing: 2" Well Screen Interval: —  
 Total Depth of Well Below MP: 14.85 Product Thickness, if noted: NA  
 Depth-to-Water (DTW) Below MP: 8.22  
 Water Column in Well: 6.63 (Total Depth of Well Below MP - DTW Below MP)  
 Gallons per foot: 0.16  
 Gallons in Well: 1.1 (Water Column in Well x Gallons per foot)

### PURGING DATA

Date Purged: 5/2/16 Time Started: 1915 Time Completed: 1945  
 Three Well Volumes: 3.3 (Gallons in Well x 3)  
 Gallons Purged: 1.2 Depth of Pump (generally 2 ft from bottom): 9.5' btoe  
 Max. Drawdown (generally 0.3 ft): 0.23 Pump Rate: ~0.2 gpm  
 Well Purged Dry: Yes  No  (If yes, use Well Purged Dry Log)

Time:	Gallons:	Pump Rate (L/min):	DTW (ft BMP):	Drawdown (ft):	Temp: (°C)	Sp. Cond.: (uS/cm)	DO: (mg/L)	pH: (S.U.)	ORP: (mV)	Turb: (NTU)
<u>1920</u>	<u>0.2</u>	<u>~0.2</u>	<u>—</u>	<u>—</u>	<u>4.48</u>	<u>165</u>	<u>—</u>	<u>6.35</u>	<u>—</u>	<u>40.01</u>
<u>1925</u>	<u>0.4</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>4.25</u>	<u>164</u>	<u>—</u>	<u>6.14</u>	<u>—</u>	<u>25.26</u>
<u>1930</u>	<u>0.6</u>	<u>—</u>	<u>8.45</u>	<u>0.23</u>	<u>4.22</u>	<u>165</u>	<u>—</u>	<u>6.05</u>	<u>—</u>	<u>14.38</u>
<u>1935</u>	<u>0.8</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>4.20</u>	<u>167</u>	<u>—</u>	<u>6.01</u>	<u>—</u>	<u>8.96</u>
<u>1940</u>	<u>1.0</u>	<u>—</u>	<u>—</u>	<u>—</u>	<u>4.18</u>	<u>165</u>	<u>—</u>	<u>6.00</u>	<u>—</u>	<u>7.39</u>
<u>1945</u>	<u>1.2</u>	<u>—</u>	<u>8.45</u>	<u>0.23</u>	<u>4.18</u>	<u>166</u>	<u>—</u>	<u>5.99</u>	<u>—</u>	<u>6.74</u>

### SAMPLING DATA

Odor: None Color: Clear  
 Sample Designation: 17490-005-B21MW Time / Date: 1947 5/2/16  
 QC Sample Designation: — Time / Date: —  
 QA Sample Designation: — Time / Date: —

Evacuation Method: Submersible Pump / Other: —  
 Sampling Method: Submersible Pump / Other: —

Water Quality Instruments Used/Manufacturer/Model Number Ysi 556 MicroTDS Turbidimeter  
 Calibration Info (Time, Ranges, etc) Ysi 556 on 5/2/16 at 100

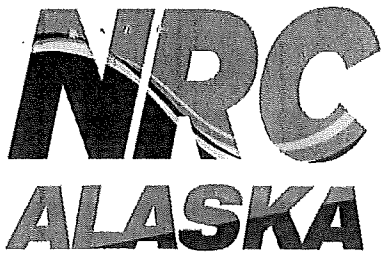
Remarks: Soil had frost jacked around well cap. Sediment possibly entered well.

Sampling Personnel: JLT

WELL CASING VOLUMES (GAL/FT): 1" = 0.04 2" = 0.16 4" = 0.65

ANNULAR SPACE VOLUME (GAL/FT): 4" casing and 2" well = 0.23

**ATTACHMENT 2**  
**DISPOSAL RECEIPTS**



# CERTIFICATE OF DISPOSAL/RECYCLE

GENERATOR: ADEC - MARK AIR  
KING SALMON, AK 99613

DISPOSAL FACILITY: NRC ALASKA LLC  
2020 VIKING DRIVE  
ANCHORAGE, AK 99501

EPA ID NUMBER: EXEMPT  
MANIFEST/DOCUMENT #: 107137  
DATE OF DISPOSAL/RECYCLE: OCT-10-2016

<u>LINE</u>	<u>WASTE DESCRIPTION</u>	<u>CONTAINERS</u>	<u>TYPE</u>	<u>QUANTITY</u>	<u>UOM</u>
1	DIESEL FUEL	1	DM	100	P
2	IDW DECON WATER/GROUNDWATER	1	DM	100	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: PLB

SIGNATURE: Patricia Beasley DATE: OCT 10 2016



# NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

<b>NON-HAZARDOUS WASTE MANIFEST</b>		1. Generator's US EPA ID No. <b>EXEMPT</b>	Manifest Document No. <b>107137</b>	2. Page 1 of 1
3. Generator's Name and Mailing Address <b>ADEC MARK AIR KING SALMON, AK 99613 (907) 561-2120</b>		4. Generator's Phone		
5. Transporter 1 Company Name <b>NORTHERN AIR CARGO, INC.</b>		6. US EPA ID Number <b>AKR000345526</b>	A. State Transporter's ID <b>(800) 478-3330</b>	
7. Transporter 2 Company Name <b>NRC ALASKA LLC</b>		8. US EPA ID Number <b>AKR00004184</b>	B. Transporter 1 Phone	
9. Designated Facility Name and Site Address <b>NRC ALASKA LLC 2020 VIKING DRIVE ANCHORAGE, AK 99501</b>		10. US EPA ID Number <b>AKR000004184</b>	C. State Transporter's ID <b>(907) 258-1558</b>	
			D. Transporter 2 Phone	
			E. State Facility's ID	
			F. Facility's Phone <b>(907) 258-1558</b>	

11. WASTE DESCRIPTION	Containers		13. Total Quantity	14. Unit Wt./Vol.
	No.	Type		
a. X <b>NA1993, Diesel Fuel, 3, PGIII ERG#128</b>	1	DM	100	P
b. <b>Material Not Regulated by DOT</b>	1	DM	100	P
c.				
d.				

G. Additional Descriptions for Materials Listed Above 1) EA0202 DIESEL FUEL 2) EA0302 IDW DECON WATER/GROUNDWATER	H. Handling Codes for Wastes Listed Above <b>05169</b>
-------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------

15. Special Handling Instructions and Additional Information  
**Shipper's Certification: This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation**

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name <b>Owner/Rep of ADEC MARK AIR ROYCE TRISDALE on behalf of ADEC-MARK AIR</b>	Signature <i>Royce Trisdale</i>	Date <b>10/10/16</b>
17. Transporter 1 Acknowledgement of Receipt of Materials	Printed/Typed Name <b>Joshua Siffert</b>	Signature <i>Joshua Siffert</i>
18. Transporter 2 Acknowledgement of Receipt of Materials	Printed/Typed Name <b>Royce Trisdale</b>	Signature <i>Royce Trisdale</i>
19. Discrepancy Indication Space		
20. Facility Name or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19.	Printed/Typed Name <b>Patricia L Beasley</b>	Signature <i>Patricia L Beasley</i>
		Date <b>10/10/16</b>

NON-HAZARDOUS WASTE

TRANSPORTER

FACILITY



**ATTACHMENT 3**

**RESULTS OF ANALYTICAL TESTING BY**

**SGS NORTH AMERICA INC. OF ANCHORAGE, ALASKA**

**AND**

**ADEC LABORATORY DATA REVIEW CHECKLIST**



## Laboratory Report of Analysis

To: Shannon & Wilson, Inc.  
5430 Fairbanks St. Suite 3  
Anchorage, AK 99518  
(907)561-2120

Report Number: **1162257**

Client Project: **17490-005 Former Mark Air**

Dear Jacob Tracy,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Victoria at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,  
SGS North America Inc.

---

Victoria Pennick  
Project Manager  
Victoria.Pennick@sgs.com

Date

Print Date: 05/17/2016 4:48:18PM

## Case Narrative

SGS Client: **Shannon & Wilson, Inc.**  
SGS Project: **1162257**  
Project Name/Site: **17490-005 Former Mark Air**  
Project Contact: **Jacob Tracy**

Refer to sample receipt form for information on sample condition.

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

Print Date: 05/17/2016 4:48:20PM

## Laboratory Qualifiers

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. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020A, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040C, 9045D, 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, 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/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing 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
IB	Instrument Blank
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., 1/2 of the LOQ)
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
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

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
17490-005-B1MW	1162257001	05/03/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B2MW	1162257002	05/04/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B3MW	1162257003	05/04/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B6MW	1162257004	05/04/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B7MW	1162257005	05/03/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B12MW	1162257006	05/02/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B13MW	1162257007	05/02/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B14MW	1162257008	05/02/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B15MW	1162257009	05/02/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B16MW	1162257010	05/02/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B17MW	1162257011	05/03/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B18MW	1162257012	05/03/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B20MW	1162257013	05/03/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-B21MW	1162257014	05/03/2016	05/09/2016	Water (Surface, Eff., Ground)
17490-005-WTB	1162257015	05/02/2016	05/09/2016	Water (Surface, Eff., Ground)

Method  
SW8021B  
AK102

Method Description  
BTEX 8021  
DRO Low Volume (W)

### Detectable Results Summary

Client Sample ID: **17490-005-B1MW**

Lab Sample ID: 1162257001

**Semivolatile Organic Fuels**

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	1.81	mg/L
Benzene	0.550	ug/L
Toluene	0.580J	ug/L

Client Sample ID: **17490-005-B2MW**

Lab Sample ID: 1162257002

**Semivolatile Organic Fuels**

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	14.1	mg/L
Benzene	81.3	ug/L
Ethylbenzene	22.4	ug/L
o-Xylene	3.36	ug/L
P & M -Xylene	10.0	ug/L
Toluene	0.690J	ug/L

Client Sample ID: **17490-005-B3MW**

Lab Sample ID: 1162257003

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.599	mg/L

Client Sample ID: **17490-005-B6MW**

Lab Sample ID: 1162257004

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.205J	mg/L

Client Sample ID: **17490-005-B7MW**

Lab Sample ID: 1162257005

**Semivolatile Organic Fuels**

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	10.0	mg/L
Benzene	0.270J	ug/L
Ethylbenzene	0.780J	ug/L

Client Sample ID: **17490-005-B12MW**

Lab Sample ID: 1162257006

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.205J	mg/L

Client Sample ID: **17490-005-B13MW**

Lab Sample ID: 1162257007

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.330J	mg/L

Client Sample ID: **17490-005-B14MW**

Lab Sample ID: 1162257008

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.352J	mg/L

Client Sample ID: **17490-005-B15MW**

Lab Sample ID: 1162257009

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.197J	mg/L

Client Sample ID: **17490-005-B16MW**

Lab Sample ID: 1162257010

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.538J	mg/L

Client Sample ID: **17490-005-B17MW**

Lab Sample ID: 1162257011

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	2.37	mg/L

Print Date: 05/17/2016 4:48:25PM

### Detectable Results Summary

Client Sample ID: **17490-005-B18MW**

Lab Sample ID: 1162257012

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	1.66	mg/L

Client Sample ID: **17490-005-B20MW**

Lab Sample ID: 1162257013

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.358J	mg/L

Client Sample ID: **17490-005-B21MW**

Lab Sample ID: 1162257014

**Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.242J	mg/L



## Results of 17490-005-B1MW

Client Sample ID: **17490-005-B1MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257001  
 Lab Project ID: 1162257

Collection Date: 05/03/16 14:25  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	1.81		0.588	0.176	mg/L	1		05/16/16 18:14
<b>Surrogates</b>								
5a Androstane (surr)	74.6		50-150		%	1		05/16/16 18:14

## Batch Information

Analytical Batch: XFC12383  
 Analytical Method: AK102  
 Analyst: S.G  
 Analytical Date/Time: 05/16/16 18:14  
 Container ID: 1162257001-D

Prep Batch: XXX35310  
 Prep Method: SW3520C  
 Prep Date/Time: 05/16/16 10:43  
 Prep Initial Wt./Vol.: 255 mL  
 Prep Extract Vol: 1 mL

## Results of 17490-005-B1MW

Client Sample ID: **17490-005-B1MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257001  
 Lab Project ID: 1162257

Collection Date: 05/03/16 14:25  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.550	0.500	0.150	ug/L	1		05/11/16 04:07
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/11/16 04:07
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/11/16 04:07
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/11/16 04:07
Toluene	0.580 J	1.00	0.310	ug/L	1		05/11/16 04:07
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	96.4	77-115		%	1		05/11/16 04:07

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/11/16 04:07  
 Container ID: 1162257001-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



Results of **17490-005-B2MW**

Client Sample ID: **17490-005-B2MW**  
Client Project ID: **17490-005 Former Mark Air**  
Lab Sample ID: 1162257002  
Lab Project ID: 1162257

Collection Date: 05/04/16 12:07  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	14.1	0.577	0.173	mg/L	1		05/16/16 18:24
<b>Surrogates</b>							
5a Androstane (surr)	89.7	50-150		%	1		05/16/16 18:24

**Batch Information**

Analytical Batch: XFC12383  
Analytical Method: AK102  
Analyst: S.G  
Analytical Date/Time: 05/16/16 18:24  
Container ID: 1162257002-D

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 05/16/16 10:43  
Prep Initial Wt./Vol.: 260 mL  
Prep Extract Vol: 1 mL



Results of 17490-005-B2MW

Client Sample ID: 17490-005-B2MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257002
Lab Project ID: 1162257

Collection Date: 05/04/16 12:07
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene, and Surrogates (1,4-Difluorobenzene (surr)).

Batch Information

Analytical Batch: VFC12991
Analytical Method: SW8021B
Analyst: S.P
Analytical Date/Time: 05/11/16 03:47
Container ID: 1162257002-A

Prep Batch: VXX28791
Prep Method: SW5030B
Prep Date/Time: 05/10/16 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of **17490-005-B3MW**

Client Sample ID: **17490-005-B3MW**  
Client Project ID: **17490-005 Former Mark Air**  
Lab Sample ID: 1162257003  
Lab Project ID: 1162257

Collection Date: 05/04/16 13:57  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.599	0.577	0.173	mg/L	1		05/16/16 18:34
<b>Surrogates</b>							
5a Androstane (surr)	89.9	50-150		%	1		05/16/16 18:34

**Batch Information**

Analytical Batch: XFC12383  
Analytical Method: AK102  
Analyst: S.G  
Analytical Date/Time: 05/16/16 18:34  
Container ID: 1162257003-D

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 05/16/16 10:43  
Prep Initial Wt./Vol.: 260 mL  
Prep Extract Vol: 1 mL



Results of 17490-005-B3MW

Client Sample ID: 17490-005-B3MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257003
Lab Project ID: 1162257

Collection Date: 05/04/16 13:57
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene, and Surrogates (1,4-Difluorobenzene (surr)).

Batch Information

Analytical Batch: VFC12991
Analytical Method: SW8021B
Analyst: S.P
Analytical Date/Time: 05/11/16 02:31
Container ID: 1162257003-A

Prep Batch: VXX28791
Prep Method: SW5030B
Prep Date/Time: 05/10/16 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

**Results of 17490-005-B6MW**

Client Sample ID: **17490-005-B6MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257004  
 Lab Project ID: 1162257

Collection Date: 05/04/16 10:07  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

**Results by Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.205 J	0.566	0.170	mg/L	1		05/16/16 18:44
<b>Surrogates</b>							
5a Androstane (surr)	85.6	50-150		%	1		05/16/16 18:44

**Batch Information**

Analytical Batch: XFC12383  
 Analytical Method: AK102  
 Analyst: S.G  
 Analytical Date/Time: 05/16/16 18:44  
 Container ID: 1162257004-D

Prep Batch: XXX35310  
 Prep Method: SW3520C  
 Prep Date/Time: 05/16/16 10:43  
 Prep Initial Wt./Vol.: 265 mL  
 Prep Extract Vol: 1 mL



Results of 17490-005-B6MW

Client Sample ID: 17490-005-B6MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257004
Lab Project ID: 1162257

Collection Date: 05/04/16 10:07
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene, and Surrogates (1,4-Difluorobenzene (surr)).

Batch Information

Analytical Batch: VFC12991
Analytical Method: SW8021B
Analyst: S.P
Analytical Date/Time: 05/11/16 02:12
Container ID: 1162257004-A

Prep Batch: VXX28791
Prep Method: SW5030B
Prep Date/Time: 05/10/16 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL





Results of **17490-005-B7MW**

Client Sample ID: **17490-005-B7MW**  
Client Project ID: **17490-005 Former Mark Air**  
Lab Sample ID: 1162257005  
Lab Project ID: 1162257

Collection Date: 05/03/16 16:02  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	10.0	0.577	0.173	mg/L	1		05/16/16 18:55
<b>Surrogates</b>							
5a Androstane (surr)	86.6	50-150		%	1		05/16/16 18:55

**Batch Information**

Analytical Batch: XFC12383  
Analytical Method: AK102  
Analyst: S.G  
Analytical Date/Time: 05/16/16 18:55  
Container ID: 1162257005-D

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 05/16/16 10:43  
Prep Initial Wt./Vol.: 260 mL  
Prep Extract Vol: 1 mL

## Results of 17490-005-B7MW

Client Sample ID: **17490-005-B7MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257005  
 Lab Project ID: 1162257

Collection Date: 05/03/16 16:02  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.270 J	0.500	0.150	ug/L	1		05/11/16 01:53
Ethylbenzene	0.780 J	1.00	0.310	ug/L	1		05/11/16 01:53
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/11/16 01:53
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/11/16 01:53
Toluene	0.500 U	1.00	0.310	ug/L	1		05/11/16 01:53
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	96.7	77-115		%	1		05/11/16 01:53

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/11/16 01:53  
 Container ID: 1162257005-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



Results of **17490-005-B12MW**

Client Sample ID: **17490-005-B12MW**  
Client Project ID: **17490-005 Former Mark Air**  
Lab Sample ID: 1162257006  
Lab Project ID: 1162257

Collection Date: 05/02/16 14:17  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.205 J	0.566	0.170	mg/L	1		05/16/16 19:05
<b>Surrogates</b>							
5a Androstane (surr)	73.5	50-150		%	1		05/16/16 19:05

**Batch Information**

Analytical Batch: XFC12383  
Analytical Method: AK102  
Analyst: S.G  
Analytical Date/Time: 05/16/16 19:05  
Container ID: 1162257006-D

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 05/16/16 10:43  
Prep Initial Wt./Vol.: 265 mL  
Prep Extract Vol: 1 mL

## Results of 17490-005-B12MW

Client Sample ID: **17490-005-B12MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257006  
 Lab Project ID: 1162257

Collection Date: 05/02/16 14:17  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/11/16 01:34
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/11/16 01:34
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/11/16 01:34
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/11/16 01:34
Toluene	0.500 U	1.00	0.310	ug/L	1		05/11/16 01:34
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	96.6	77-115		%	1		05/11/16 01:34

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/11/16 01:34  
 Container ID: 1162257006-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

**Results of 17490-005-B13MW**

Client Sample ID: **17490-005-B13MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257007  
 Lab Project ID: 1162257

Collection Date: 05/02/16 13:17  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

**Results by Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.330 J	0.566	0.170	mg/L	1		05/16/16 19:15
<b>Surrogates</b>							
5a Androstane (surr)	86.9	50-150		%	1		05/16/16 19:15

**Batch Information**

Analytical Batch: XFC12383  
 Analytical Method: AK102  
 Analyst: S.G  
 Analytical Date/Time: 05/16/16 19:15  
 Container ID: 1162257007-D

Prep Batch: XXX35310  
 Prep Method: SW3520C  
 Prep Date/Time: 05/16/16 10:43  
 Prep Initial Wt./Vol.: 265 mL  
 Prep Extract Vol: 1 mL



Results of 17490-005-B13MW

Client Sample ID: 17490-005-B13MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257007
Lab Project ID: 1162257

Collection Date: 05/02/16 13:17
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene, and Surrogates (1,4-Difluorobenzene (surr)).

Batch Information

Analytical Batch: VFC12991
Analytical Method: SW8021B
Analyst: S.P
Analytical Date/Time: 05/11/16 01:15
Container ID: 1162257007-A

Prep Batch: VXX28791
Prep Method: SW5030B
Prep Date/Time: 05/10/16 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 17490-005-B14MW

Client Sample ID: 17490-005-B14MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257008
Lab Project ID: 1162257

Collection Date: 05/02/16 16:37
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Diesel Range Organics and Surrogates (5a Androstane).

Batch Information

Analytical Batch: XFC12383
Analytical Method: AK102
Analyst: S.G
Analytical Date/Time: 05/16/16 19:25
Container ID: 1162257008-D

Prep Batch: XXX35310
Prep Method: SW3520C
Prep Date/Time: 05/16/16 10:43
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL



Results of 17490-005-B14MW

Client Sample ID: 17490-005-B14MW  
Client Project ID: 17490-005 Former Mark Air  
Lab Sample ID: 1162257008  
Lab Project ID: 1162257

Collection Date: 05/02/16 16:37  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/11/16 00:56
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/11/16 00:56
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/11/16 00:56
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/11/16 00:56
Toluene	0.500 U	1.00	0.310	ug/L	1		05/11/16 00:56
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	96.1	77-115		%	1		05/11/16 00:56

Batch Information

Analytical Batch: VFC12991  
Analytical Method: SW8021B  
Analyst: S.P  
Analytical Date/Time: 05/11/16 00:56  
Container ID: 1162257008-A

Prep Batch: VXX28791  
Prep Method: SW5030B  
Prep Date/Time: 05/10/16 08:00  
Prep Initial Wt./Vol.: 5 mL  
Prep Extract Vol: 5 mL



**Results of 17490-005-B15MW**

Client Sample ID: **17490-005-B15MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257009  
 Lab Project ID: 1162257

Collection Date: 05/02/16 15:27  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

**Results by Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.197 J	0.577	0.173	mg/L	1		05/16/16 19:36
<b>Surrogates</b>							
5a Androstane (surr)	77.6	50-150		%	1		05/16/16 19:36

**Batch Information**

Analytical Batch: XFC12383  
 Analytical Method: AK102  
 Analyst: S.G  
 Analytical Date/Time: 05/16/16 19:36  
 Container ID: 1162257009-D

Prep Batch: XXX35310  
 Prep Method: SW3520C  
 Prep Date/Time: 05/16/16 10:43  
 Prep Initial Wt./Vol.: 260 mL  
 Prep Extract Vol: 1 mL

## Results of 17490-005-B15MW

Client Sample ID: **17490-005-B15MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257009  
 Lab Project ID: 1162257

Collection Date: 05/02/16 15:27  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/11/16 00:37
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/11/16 00:37
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/11/16 00:37
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/11/16 00:37
Toluene	0.500 U	1.00	0.310	ug/L	1		05/11/16 00:37
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	95.6	77-115		%	1		05/11/16 00:37

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/11/16 00:37  
 Container ID: 1162257009-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



Results of 17490-005-B16MW

Client Sample ID: 17490-005-B16MW  
Client Project ID: 17490-005 Former Mark Air  
Lab Sample ID: 1162257010  
Lab Project ID: 1162257

Collection Date: 05/02/16 17:32  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.538 J	0.577	0.173	mg/L	1		05/16/16 19:45
<b>Surrogates</b>							
5a Androstane (surr)	84.4	50-150		%	1		05/16/16 19:45

Batch Information

Analytical Batch: XFC12383  
Analytical Method: AK102  
Analyst: S.G  
Analytical Date/Time: 05/16/16 19:45  
Container ID: 1162257010-D

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 05/16/16 10:43  
Prep Initial Wt./Vol.: 260 mL  
Prep Extract Vol: 1 mL



Results of 17490-005-B16MW

Client Sample ID: 17490-005-B16MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257010
Lab Project ID: 1162257

Collection Date: 05/02/16 17:32
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, and Toluene.

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row includes 1,4-Difluorobenzene (surr).

Batch Information

Analytical Batch: VFC12991
Analytical Method: SW8021B
Analyst: S.P
Analytical Date/Time: 05/11/16 00:18
Container ID: 1162257010-A

Prep Batch: VXX28791
Prep Method: SW5030B
Prep Date/Time: 05/10/16 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 17490-005-B17MW

Client Sample ID: 17490-005-B17MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257011
Lab Project ID: 1162257

Collection Date: 05/03/16 11:12
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Diesel Range Organics and Surrogates (5a Androstane).

Batch Information

Analytical Batch: XFC12383
Analytical Method: AK102
Analyst: S.G
Analytical Date/Time: 05/16/16 19:56
Container ID: 1162257011-D

Prep Batch: XXX35310
Prep Method: SW3520C
Prep Date/Time: 05/16/16 10:43
Prep Initial Wt./Vol.: 265 mL
Prep Extract Vol: 1 mL

## Results of 17490-005-B17MW

Client Sample ID: **17490-005-B17MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257011  
 Lab Project ID: 1162257

Collection Date: 05/03/16 11:12  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/10/16 23:59
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:59
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:59
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/10/16 23:59
Toluene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:59
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	96.8	77-115		%	1		05/10/16 23:59

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/10/16 23:59  
 Container ID: 1162257011-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



Results of 17490-005-B18MW

Client Sample ID: 17490-005-B18MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257012
Lab Project ID: 1162257

Collection Date: 05/03/16 16:57
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Semivolatile Organic Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Diesel Range Organics and Surrogates (5a Androstane (surr)).

Batch Information

Analytical Batch: XFC12383
Analytical Method: AK102
Analyst: S.G
Analytical Date/Time: 05/16/16 20:06
Container ID: 1162257012-D

Prep Batch: XXX35310
Prep Method: SW3520C
Prep Date/Time: 05/16/16 10:43
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

## Results of 17490-005-B18MW

Client Sample ID: **17490-005-B18MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257012  
 Lab Project ID: 1162257

Collection Date: 05/03/16 16:57  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/10/16 23:40
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:40
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:40
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/10/16 23:40
Toluene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:40
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	97.5	77-115		%	1		05/10/16 23:40

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/10/16 23:40  
 Container ID: 1162257012-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL



**Results of 17490-005-B20MW**

Client Sample ID: **17490-005-B20MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257013  
 Lab Project ID: 1162257

Collection Date: 05/03/16 20:52  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

**Results by Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.358 J	0.577	0.173	mg/L	1		05/16/16 20:16
<b>Surrogates</b>							
5a Androstane (surr)	89.1	50-150		%	1		05/16/16 20:16

**Batch Information**

Analytical Batch: XFC12383  
 Analytical Method: AK102  
 Analyst: S.G  
 Analytical Date/Time: 05/16/16 20:16  
 Container ID: 1162257013-D

Prep Batch: XXX35310  
 Prep Method: SW3520C  
 Prep Date/Time: 05/16/16 10:43  
 Prep Initial Wt./Vol.: 260 mL  
 Prep Extract Vol: 1 mL



Results of 17490-005-B20MW

Client Sample ID: 17490-005-B20MW
Client Project ID: 17490-005 Former Mark Air
Lab Sample ID: 1162257013
Lab Project ID: 1162257

Collection Date: 05/03/16 20:52
Received Date: 05/09/16 12:32
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, o-Xylene, P & M -Xylene, Toluene, and Surrogates (1,4-Difluorobenzene (surr)).

Batch Information

Analytical Batch: VFC12991
Analytical Method: SW8021B
Analyst: S.P
Analytical Date/Time: 05/10/16 23:21
Container ID: 1162257013-A

Prep Batch: VXX28791
Prep Method: SW5030B
Prep Date/Time: 05/10/16 08:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL



Results of 17490-005-B21MW

Client Sample ID: 17490-005-B21MW  
Client Project ID: 17490-005 Former Mark Air  
Lab Sample ID: 1162257014  
Lab Project ID: 1162257

Collection Date: 05/03/16 19:47  
Received Date: 05/09/16 12:32  
Matrix: Water (Surface, Eff., Ground)  
Solids (%):  
Location:

Results by Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	0.242 J	0.577	0.173	mg/L	1		05/16/16 20:27
<b>Surrogates</b>							
5a Androstane (surr)	90.7	50-150		%	1		05/16/16 20:27

Batch Information

Analytical Batch: XFC12383  
Analytical Method: AK102  
Analyst: S.G  
Analytical Date/Time: 05/16/16 20:27  
Container ID: 1162257014-D

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 05/16/16 10:43  
Prep Initial Wt./Vol.: 260 mL  
Prep Extract Vol: 1 mL

## Results of 17490-005-B21MW

Client Sample ID: **17490-005-B21MW**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257014  
 Lab Project ID: 1162257

Collection Date: 05/03/16 19:47  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/10/16 23:02
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:02
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:02
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/10/16 23:02
Toluene	0.500 U	1.00	0.310	ug/L	1		05/10/16 23:02
<b>Surrogates</b>							
1,4-Difluorobenzene (surr)	96.8	77-115		%	1		05/10/16 23:02

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/10/16 23:02  
 Container ID: 1162257014-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Results of 17490-005-WTB

Client Sample ID: **17490-005-WTB**  
 Client Project ID: **17490-005 Former Mark Air**  
 Lab Sample ID: 1162257015  
 Lab Project ID: 1162257

Collection Date: 05/02/16 10:00  
 Received Date: 05/09/16 12:32  
 Matrix: Water (Surface, Eff., Ground)  
 Solids (%):  
 Location:

## Results by Volatile Fuels

<u>Parameter</u>	<u>Result Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable Limits</u>	<u>Date Analyzed</u>
Benzene	0.250 U	0.500	0.150	ug/L	1		05/10/16 21:45
Ethylbenzene	0.500 U	1.00	0.310	ug/L	1		05/10/16 21:45
o-Xylene	0.500 U	1.00	0.310	ug/L	1		05/10/16 21:45
P & M -Xylene	1.00 U	2.00	0.620	ug/L	1		05/10/16 21:45
Toluene	0.500 U	1.00	0.310	ug/L	1		05/10/16 21:45

## Surrogates

1,4-Difluorobenzene (surr)	96.5	77-115		%	1		05/10/16 21:45
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## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Analyst: S.P  
 Analytical Date/Time: 05/10/16 21:45  
 Container ID: 1162257015-A

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 05/10/16 08:00  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1733815 [VXX/28791]  
 Blank Lab ID: 1323968

Matrix: Water (Surface, Eff., Ground)

### QC for Samples:

1162257001, 1162257002, 1162257003, 1162257004, 1162257005, 1162257006, 1162257007, 1162257008, 1162257009, 1162257010, 1162257011, 1162257012, 1162257013, 1162257014, 1162257015

## Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	96.8	77-115		%

## Batch Information

Analytical Batch: VFC12991  
 Analytical Method: SW8021B  
 Instrument: Agilent 7890A PID/FID  
 Analyst: S.P  
 Analytical Date/Time: 5/10/2016 9:07:00PM

Prep Batch: VXX28791  
 Prep Method: SW5030B  
 Prep Date/Time: 5/10/2016 8:00:00AM  
 Prep Initial Wt./Vol.: 5 mL  
 Prep Extract Vol: 5 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1162257 [VXX28791]  
 Blank Spike Lab ID: 1323969  
 Date Analyzed: 05/10/2016 20:10

Spike Duplicate ID: LCSD for HBN 1162257 [VXX28791]  
 Spike Duplicate Lab ID: 1323970  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1162257001, 1162257002, 1162257003, 1162257004, 1162257005, 1162257006, 1162257007, 1162257008, 1162257009, 1162257010, 1162257011, 1162257012, 1162257013, 1162257014, 1162257015

## Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	100	107	107	100	105	105	( 80-120 )	1.50	(< 20 )
Ethylbenzene	100	102	102	100	100	100	( 75-125 )	2.20	(< 20 )
o-Xylene	100	98.5	99	100	95.7	96	( 80-120 )	2.90	(< 20 )
P & M -Xylene	200	199	99	200	194	97	( 75-130 )	2.40	(< 20 )
Toluene	100	105	105	100	102	102	( 75-120 )	2.50	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	50	97.7	98	50	99	99	( 77-115 )	1.30	

## Batch Information

Analytical Batch: **VFC12991**  
 Analytical Method: **SW8021B**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **S.P**

Prep Batch: **VXX28791**  
 Prep Method: **SW5030B**  
 Prep Date/Time: **05/10/2016 08:00**  
 Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL  
 Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

## Method Blank

Blank ID: MB for HBN 1734045 [XXX/35310]  
Blank Lab ID: 1324398

Matrix: Water (Surface, Eff., Ground)

### QC for Samples:

1162257001, 1162257002, 1162257003, 1162257004, 1162257005, 1162257006, 1162257007, 1162257008, 1162257009, 1162257010, 1162257011, 1162257012, 1162257013, 1162257014

## Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
<b>Surrogates</b>				
5a Androstane (surr)	76.8	60-120		%

## Batch Information

Analytical Batch: XFC12383  
Analytical Method: AK102  
Instrument: Agilent 7890B R  
Analyst: S.G  
Analytical Date/Time: 5/16/2016 5:43:00PM

Prep Batch: XXX35310  
Prep Method: SW3520C  
Prep Date/Time: 5/16/2016 10:43:04AM  
Prep Initial Wt./Vol.: 250 mL  
Prep Extract Vol: 1 mL

Print Date: 05/17/2016 4:48:34PM



## Blank Spike Summary

Blank Spike ID: LCS for HBN 1162257 [XXX35310]  
 Blank Spike Lab ID: 1324399  
 Date Analyzed: 05/16/2016 17:53

Spike Duplicate ID: LCSD for HBN 1162257  
 [XXX35310]  
 Spike Duplicate Lab ID: 1324400  
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1162257001, 1162257002, 1162257003, 1162257004, 1162257005, 1162257006, 1162257007,  
 1162257008, 1162257009, 1162257010, 1162257011, 1162257012, 1162257013, 1162257014

## Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	17.9	90	20	18.3	92	( 75-125 )	2.00	(< 20 )

### Surrogates

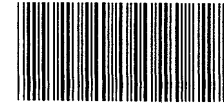
5a Androstane (surr)	0.4	98.6	99	0.4	98.6	99	( 60-120 )	0.02	
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## Batch Information

Analytical Batch: **XFC12383**  
 Analytical Method: **AK102**  
 Instrument: **Agilent 7890B R**  
 Analyst: **S.G**

Prep Batch: **XXX35310**  
 Prep Method: **SW3520C**  
 Prep Date/Time: **05/16/2016 10:43**  
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL  
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

1162257



**SHANNON & WILSON, INC.**  
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**CHAIN-OF-CUSTODY RECORD**

2705 Saint Andrews Loop, Suite A  
Pasco, WA 99301-3378  
(509) 946-6309

Laboratory SGS Page 1 of 2  
Attn: Teri

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	BTEX	EPA 8021B	DRD	AK 10+102	VWP 5/1/16	Total Number of Containers	Remarks/Matrix
17490-005-B1MW	① A-E	1425	5/3/16	X	X	X					5	Groundwater
B2MW	②	1207	5/4/16	X	X	X					5	
B3MW	③	1357	5/4/16	X	X	X					5	
B6MW	④	1007	5/3/16	X	X	X					5	
B7MW	⑤	1602	5/3/16	X	X	X					5	
B12MW	⑥	1417	5/2/16	X	X	X					5	
B13MW	⑦	1317	5/2/16	X	X	X					5	
B14MW	⑧	1637	5/2/16	X	X	X					5	
B15MW	⑨	1527	5/2/16	X	X	X					5	
B16MW	⑩	1732	5/2/16	X	X	X					5	

<b>Project Information</b>		<b>Sample Receipt</b>		<b>Relinquished By: 1.</b>		<b>Relinquished By: 2.</b>		<b>Relinquished By: 3.</b>	
Project Number: <u>17490-005</u>		Total Number of Containers		Signature: <u>[Signature]</u> Time: <u>1232</u>		Signature: _____ Time: _____		Signature: _____ Time: _____	
Project Name: <u>Former Markar</u>		COC Seals/Intact? Y/N/NA		Printed Name: <u>Jake Tracy</u> Date: <u>5/9/16</u>		Printed Name: _____ Date: _____		Printed Name: _____ Date: _____	
Contact: <u>JCT</u>		Received Good Cond./Cold		Company: <u>SGW</u>		Company: _____		Company: _____	
Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>		Delivery Method:		Received By: 1.		Received By: 2.		Received By: 3.	
Sampler: <u>JCT</u>		(attach shipping bill, if any)		Signature: _____ Time: _____		Signature: _____ Time: _____		Signature: <u>[Signature]</u> Time: <u>1232</u>	
<b>Instructions</b>				Printed Name: _____ Date: _____		Printed Name: _____ Date: _____		Printed Name: <u>V. Pennick</u> Date: <u>5/9/16</u>	
Requested Turnaround Time: <u>Standard</u>				Company: _____		Company: _____		Company: <u>STW</u>	
Special Instructions: <u>MSA-SGS-2016</u>									
<u>BTEX VOAs in cooler 2 of 2</u>									
Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report Yellow - w/shipment - for consignee files Pink - Shannon & Wilson - Job File									

4.0/238  
Cooler 2 3.3/D10 (VOAs)

1162257



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**CHAIN-OF-CUSTODY RECORD**

2705 Saint Andrews Loop, Suite A  
Pasco, WA 99301-3378  
(509) 946-6309

Laboratory SGS  
Attn: Tori

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	BTEX	PAHs	DO	AK-MAL-102	VLP 579/16	Total Number of Containers	Remarks/Matrix
17490-005-B17MW	(11) A-E	1112	5/3/16		X	X	X				5	Groundwater
B18MW	(12)	1657	5/3/16		X	X	X				5	
B20MW	(13)	2052	5/2/16		X	X	X				5	
B21MW	(14)	1947	5/2/16		X	X	X				5	
WTB	(15) A-C	1000	5/2/16			X					1 box	Trip blank

Project Information		Sample Receipt	
Project Number: <u>17490-005</u>	Total Number of Containers	COC Seals/Intact? Y/N/NA	Received Good Cond./Cold
Project Name: <u>Former Milk Av</u>	Contact: <u>JCT</u>	Ongoing Project? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Delivery Method:
Sampler: <u>JCT</u>	(attach shipping bill, if any)		

Instructions	
Requested Turnaround Time: <u>Standard</u>	Special Instructions: <u>MSA-SGS-2016</u>
<u>BTEX VOAS in cooler 2 of 2</u>	

Relinquished By: 1.		Relinquished By: 2.		Relinquished By: 3.	
Signature: <u>Jake Tracy</u>	Time: <u>1232</u>	Signature: _____	Time: _____	Signature: _____	Time: _____
Printed Name: <u>Jake Tracy</u>	Date: <u>5/9/16</u>	Printed Name: _____	Date: _____	Printed Name: _____	Date: _____
Company: <u>SEW</u>		Company: _____		Company: _____	
Received By: 1.		Received By: 2.		Received By: 3.	
Signature: _____	Time: _____	Signature: _____	Time: _____	Signature: <u>V. Pennick</u>	Time: <u>1232</u>
Printed Name: _____	Date: _____	Printed Name: _____	Date: _____	Printed Name: <u>V. Pennick</u>	Date: <u>5/9/16</u>
Company: _____		Company: _____		Company: <u>SGS</u>	

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



### Returned Bottles Inventory

Name of individual returning bottles:

Jake Tracy

Date Received:

05/09/16

Client Name:

STW

Received by:

VLP

Project Name:

King Salmon

SGS PM:

VLP

<b>HDPE/Nalgene:</b>	1-L					
	500-ml					
	250-ml or 8-oz					
	125-ml or 4-oz					
	60-ml or 2-oz					
	other					
<b>amber glass:</b>	1-L					
	500-ml					
	250-ml or 8-oz	4				
	125-ml or 4-oz with or without septa					
	40-ml VOA vial	12				
	other					
<b>Subtotal:</b>		16				

Note: Returned bottles (regardless of size/pres.) are billed back at \$4/bottle unless otherwise quoted.

Amount to Invoice Client \$:

\$ 64

WO#:

116 2257



1162257



1 1 6 2 2 5 7

SAMPLE RECEIPT FORM

Review Criteria:	Yes	N/A	No	Comments/Action Taken:
Were <b>custody seals</b> intact? Note # & location, if applicable. COC accompanied samples?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<i>Exemption permitted if sampler hand carries/delivers.</i>
<b>Temperature blank</b> compliant* (i.e., 0-6°C after CF)? <i>If &gt;6°C, were samples collected &lt;8 hours ago?</i> <i>If &lt;0°C, were all sample containers ice free?</i> Cooler ID: <u>1</u> @ <u>4.0</u> w/ Therm.ID: <u>238</u> Cooler ID: <u>2</u> @ <u>3.3</u> w/ Therm.ID: <u>D10(VOAs)</u> Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ 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."	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Exemption permitted if chilled &amp; collected &lt;8 hrs ago.</i>  <i>Note: Identify containers received at non-compliant temperature. Use form FS-0029 if more space is needed.</i>
Delivery method (specify all that apply): <input checked="" type="checkbox"/> Client (hand carried) <input type="checkbox"/> USPS <input type="checkbox"/> Lynden <input type="checkbox"/> AK Air <input type="checkbox"/> Alert Courier <input type="checkbox"/> UPS <input type="checkbox"/> FedEx <input type="checkbox"/> RAVN <input type="checkbox"/> C&D Delivery <input type="checkbox"/> Carlife <input type="checkbox"/> Pen Air <input type="checkbox"/> Warp Speed <input type="checkbox"/> Other: _____ → For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	Yes	N/A	No	
Were samples received within hold time? Do samples <b>match COC*</b> (i.e., sample IDs, dates/times collected)? Were analyses requested unambiguous?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Note: Refer to form F-083 "Sample Guide" for hold times.</i> <i>Note: If times differ &lt;1hr, record details and login per COC.</i>
Were samples in <b>good condition</b> (no leaks/cracks/breakage)? Packing material used (specify all that apply): <input checked="" type="checkbox"/> Bubble Wrap <input type="checkbox"/> Separate plastic bags <input type="checkbox"/> Vermiculite <input type="checkbox"/> Other:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were <b>proper containers</b> (type/mass/volume/preservative*) used? Were <b>Trip Blanks</b> (i.e., VOAs, LL-Hg) in cooler with samples? Were all VOA vials <b>free of headspace</b> (i.e., bubbles ≤6 mm)? Were all soil VOAs <b>field extracted</b> with MeOH+BFB?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/> <i>Exemption permitted for metals (e.g., 200.8/6020A).</i>  *
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was <b>pH verified and compliant</b> ? If pH was adjusted, were bottles flagged (i.e., stickers)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For <b>special handling</b> (e.g., "MI" soils, foreign soils, lab filter for dissolved..., lab extract for volatiles, Ref Lab, limited volume), were bottles/paperwork flagged (e.g., sticker)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
For <b>RUSH/SHORT Hold Time</b> , were COC/Bottles flagged accordingly? Was Rush/Short HT email sent, if applicable?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
For <b>SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP</b> , were containers / paperwork flagged accordingly?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>For any question answered "No,"</b> has the PM been notified and the problem resolved (or paperwork put in their bin)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	SRF Completed by: VLP 5/9/16 PM notified: VLP
Was <b>PEER REVIEW</b> of <i>sample numbering/labeling completed</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Peer Reviewed by:
Additional notes (if applicable):  * VOAs w/ Headspace (<6mm, but will be used last): -2 B,C; 8 C, 11 C; 15 C				

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



### Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1162257001-A	HCL to pH < 2	OK	1162257009-C	HCL to pH < 2	OK
1162257001-B	HCL to pH < 2	OK	1162257009-D	HCL to pH < 2	OK
1162257001-C	HCL to pH < 2	OK	1162257009-E	HCL to pH < 2	OK
1162257001-D	HCL to pH < 2	OK	1162257010-A	HCL to pH < 2	OK
1162257001-E	HCL to pH < 2	OK	1162257010-B	HCL to pH < 2	OK
1162257002-A	HCL to pH < 2	OK	1162257010-C	HCL to pH < 2	OK
1162257002-B	HCL to pH < 2	OK	1162257010-D	HCL to pH < 2	OK
1162257002-C	HCL to pH < 2	OK	1162257010-E	HCL to pH < 2	OK
1162257002-D	HCL to pH < 2	OK	1162257011-A	HCL to pH < 2	OK
1162257002-E	HCL to pH < 2	OK	1162257011-B	HCL to pH < 2	OK
1162257003-A	HCL to pH < 2	OK	1162257011-C	HCL to pH < 2	OK
1162257003-B	HCL to pH < 2	OK	1162257011-D	HCL to pH < 2	OK
1162257003-C	HCL to pH < 2	OK	1162257011-E	HCL to pH < 2	OK
1162257003-D	HCL to pH < 2	OK	1162257012-A	HCL to pH < 2	OK
1162257003-E	HCL to pH < 2	OK	1162257012-B	HCL to pH < 2	OK
1162257004-A	HCL to pH < 2	OK	1162257012-C	HCL to pH < 2	OK
1162257004-B	HCL to pH < 2	OK	1162257012-D	HCL to pH < 2	OK
1162257004-C	HCL to pH < 2	OK	1162257012-E	HCL to pH < 2	OK
1162257004-D	HCL to pH < 2	OK	1162257013-A	HCL to pH < 2	OK
1162257004-E	HCL to pH < 2	OK	1162257013-B	HCL to pH < 2	OK
1162257005-A	HCL to pH < 2	OK	1162257013-C	HCL to pH < 2	OK
1162257005-B	HCL to pH < 2	OK	1162257013-D	HCL to pH < 2	OK
1162257005-C	HCL to pH < 2	OK	1162257013-E	HCL to pH < 2	OK
1162257005-D	HCL to pH < 2	OK	1162257014-A	HCL to pH < 2	OK
1162257005-E	HCL to pH < 2	OK	1162257014-B	HCL to pH < 2	OK
1162257006-A	HCL to pH < 2	OK	1162257014-C	HCL to pH < 2	OK
1162257006-B	HCL to pH < 2	OK	1162257014-D	HCL to pH < 2	OK
1162257006-C	HCL to pH < 2	OK	1162257014-E	HCL to pH < 2	OK
1162257006-D	HCL to pH < 2	OK	1162257015-A	HCL to pH < 2	OK
1162257006-E	HCL to pH < 2	OK	1162257015-B	HCL to pH < 2	OK
1162257007-A	HCL to pH < 2	OK	1162257015-C	HCL to pH < 2	OK
1162257007-B	HCL to pH < 2	OK			
1162257007-C	HCL to pH < 2	OK			
1162257007-D	HCL to pH < 2	OK			
1162257007-E	HCL to pH < 2	OK			
1162257008-A	HCL to pH < 2	OK			
1162257008-B	HCL to pH < 2	OK			
1162257008-C	HCL to pH < 2	OK			
1162257008-D	HCL to pH < 2	OK			
1162257008-E	HCL to pH < 2	OK			
1162257009-A	HCL to pH < 2	OK			
1162257009-B	HCL to pH < 2	OK			

Container Id

Preservative

Container  
Condition

Container Id

Preservative

Container  
Condition

#### Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

BU - The container was received with headspace greater than 6mm.

DM- The container was received damaged.

FR- The container was received frozen and not usable for Bacteria or BOD analyses.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

## LABORATORY DATA REVIEW CHECKLIST

**Completed by:** Jake Tracy  
**Title:** Environmental Engineering Staff  
**Date:** December 2016

**CS Report Name:** Former MarkAir Facility, King Salmon, Alaska

**Laboratory Report Date:** May 17, 2016

**Consultant Firm:** Shannon & Wilson, Inc.

**Laboratory Name:** SGS North America Inc.

**Laboratory Report Number:** 1162257

**ADEC File Number:** 2569.38.009

**ADEC RecKey Number:** NA

(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: *The temperature blank was 4.0° C for Cooler 1 and 3.3° C for Cooler 2.*

- 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: *The laboratory noted that the sample containers were in good condition. The laboratory also noted that sample VOAs from Samples B2MW, B14MW, B17MW, and the trip blank contained bubbles greater than 6 millimeters.*
- 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. The laboratory noted that if necessary, the VOAs with bubbles greater than 6 millimeters would be analyzed last.*
- e. Data quality or usability affected? Please explain.  
Comments: *The samples that contained VOAs with bubbles greater than 6 millimeters were not analyzed by the laboratory and therefore the data quality is unaffected.*

#### **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:
- 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: *The case narrative does not comment on data quality/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:
- All soils reported on a dry weight basis? **Yes** / No / **NA** (please explain)  
Comments:
- c. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes** / No / NA (please explain)  
Comments:

- d. Data quality or usability affected? **NA** Please explain.  
Comments: *No discrepancies noted.*

## 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 LOQ, 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:
- v. Data quality or usability affected? Please explain.  
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:
- 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%, VOCs 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:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

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

Comments:

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

Comments:

**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:

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

Comments:

**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: *However, the laboratory sample receipt form notes that the VOA samples were in Cooler 2.*

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: *One water trip blank accompanied all of the VOA vials at all times so samples are usable.*

**e. Field Duplicate**

- i. One field duplicate submitted per matrix, analysis and 10 project samples?  
**Yes / No / NA** (please explain)  
Comments: *A field duplicate was not included in our ADEC-approved work plan.*

- 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:

- iv. Data quality or usability affected? Please explain.  
Comments:

**f. Decontamination or Equipment Blank** (if not applicable)

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

Comments: *The use of a decontamination or equipment blank was beyond the scope of the ADEC-approved work plan for this project.*

- i. All results less than LOQ? **Yes / No / NA** (please explain)  
Comments:

If above LOQ, what samples are affected? **NA**  
Comments:

- ii. 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: *A key is provided on page 3 of the laboratory report.*

**ATTACHMENT 4**  
**CONCEPTUAL SITE MODEL**

# HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Former MarkAir Facility, King Salmon, Alaska

Completed By: Shannon & Wilson, Inc.

Date Completed: December 2016

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

(1) Check the media that could be directly affected by the release.	(2) For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.
Media	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) Check all exposure media identified in (2).	(4) Check all pathways that could be complete. The pathways identified in this column must agree with Sections 2 and 3 of the Human Health CSM Scoping Form.	(5) Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.						
Exposure Media	Exposure Pathway/Route	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		F	F	F			
<input checked="" type="checkbox"/> groundwater	<input checked="" type="checkbox"/> Ingestion of Groundwater <input type="checkbox"/> Dermal Absorption of Contaminants in Groundwater <input type="checkbox"/> Inhalation of Volatile Compounds in Tap Water		F	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	C/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 type="checkbox"/> Dispensers/fuel loading racks | <input type="checkbox"/> Transformers                |
| <input checked="" type="checkbox"/> Drums              | <input type="checkbox"/> Other: <input type="text"/> |

**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 checked="" 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:

Petroleum hydrocarbons and BTEX have been detected in soil samples collected at the site.

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:

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:

Petroleum hydrocarbons have been detected in groundwater samples collected at the site since 2004.



## 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 detect in soil samples collected at the site.

## 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 detect in soil and groundwater samples collected at the site.

**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:

## 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 - PM<sub>10</sub>). 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 A

### BIOACCUMULATIVE COMPOUNDS OF POTENTIAL CONCERN

Organic compounds are identified as bioaccumulative if they have a BCF equal to or greater than 1,000 or a log  $K_{ow}$  greater than 3.5. Inorganic compounds are identified as bioaccumulative if they are listed as such by EPA (2000). Those compounds in Table B-1 of 18 AAC 75.341 that are bioaccumulative, based on the definition above, are listed below.

Aldrin	DDT	Lead
Arsenic	Dibenzo(a,h)anthracene	Mercury
Benzo(a)anthracene	Dieldrin	Methoxychlor
Benzo(a)pyrene	Dioxin	Nickel
Benzo(b)fluoranthene	Endrin	PCBs
Benzo(k)fluoranthene	Fluoranthene	
Cadmium	Heptachlor	Pyrene
Chlordane	Heptachlor epoxide	Selenium
Chrysene	Hexachlorobenzene	Silver
Copper	Hexachlorocyclopentadiene	Toxaphene
DDD	Indeno(1,2,3-c,d)pyrene	Zinc
DDE		

Because BCF values can relatively easily be measured or estimated, the BCF is frequently used to determine the potential for a chemical to bioaccumulate. A compound with a BCF greater than 1,000 is considered to bioaccumulate in tissue (EPA 2004b).

For inorganic compounds, the BCF approach has not been shown to be effective in estimating the compound's ability to bioaccumulate. Information available, either through scientific literature or site-specific data, regarding the bioaccumulative potential of an inorganic site contaminant should be used to determine if the pathway is complete.

The list was developed by including organic compounds that either have a BCF equal to or greater than 1,000 or a log  $K_{ow}$  greater than 3.5 and inorganic compounds that are listed by the United States Environmental Protection Agency (EPA) as being bioaccumulative (EPA 2000).

The list was developed by including organic compounds that either have a BCF equal to or greater than 1,000 or a log  $K_{ow}$  greater than 3.5 and inorganic compounds that are listed by the United States Environmental Protection Agency (EPA) as being bioaccumulative (EPA 2000). The BCF can also be estimated from a chemical's physical and chemical properties. A chemical's octanol-water partitioning coefficient ( $K_{ow}$ ) along with defined regression equations can be used to estimate the BCF. EPA's Persistent, Bioaccumulative, and Toxic (PBT) Profiler (EPA 2004) can be used to estimate the BCF using the  $K_{ow}$  and linear regressions presented by Meylan et al. (1996). The PBT Profiler is located at <http://www.pbtprofiler.net/>. For compounds not found in the PBT Profiler, DEC recommends using a log  $K_{ow}$  greater than 3.5 to determine if a compound is bioaccumulative.

## APPENDIX B

### VOLATILE COMPOUNDS OF POTENTIAL CONCERN

A chemical is identified here as sufficiently volatile and toxic for further evaluation if the Henry's Law constant is  $1 \times 10^{-5}$  atm-m<sup>3</sup>/mol or greater, the molecular weight is less than 200 g/mole (EPA 2004a), and the vapor concentration of the pure component posed an incremental lifetime cancer risk greater than  $10^{-6}$  or a non-cancer hazard quotient of 0.1, or other available scientific data indicates the chemical should be considered a volatile. Chemicals that are solid at typical soil temperatures and do not sublime are generally not considered volatile.

Acetone	Mercury (elemental)
<b>Benzene</b>	Methyl bromide (Bromomethane)
Bis(2-chloroethyl)ether	Methyl chloride (Chloromethane)
Bromodichloromethane	Methyl ethyl ketone (MEK)
Bromoform	Methyl isobutyl ketone (MIBK)
<b>n-Butylbenzene</b>	Methylene bromide
<b>sec-Butylbenzene</b>	Methylene chloride
<b>tert-Butylbenzene</b>	<b>1-Methylnaphthalene</b>
Carbon disulfide	<b>2-Methylnaphthalene</b>
Carbon tetrachloride	Methyl <i>tert</i> -butyl ether (MTBE)
Chlorobenzene	<b>Naphthalene</b>
Chlorodibromomethane (Dibromochloromethane)	Nitrobenzene
Chloroethane	n-Nitrosodimethylamine
Chloroform	<b>n-Propylbenzene</b>
2-Chlorophenol	<b>Styrene</b>
1,2-Dichlorobenzene	1,1,2,2-Tetrachlorethane
1,3-Dichlorobenzene	Tetrachloroethylene (PCE)
1,4-Dichlorobenzene	<b>Toluene</b>



Dichlorodifluoromethane	1,2,4-Trichlorobenzene
1,1-Dichloroethane	1,1,1-Trichloroethane
1,2-Dichloroethane	1,1,2-Trichloroethane
1,1-Dichloroethylene	Trichloroethane
<i>cis</i> -1,2-Dichloroethylene	2,4,6-Trichlorophenol
<i>trans</i> -1,2-Dichloroethylene	1,2,3-Trichloropropane
1,2-Dichloropropane	1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)
1,3-Dichloropropane	Trichlorofluoromethane (Freon-11)
<b>Ethylbenzene</b>	<b>1,2,4-Trimethylbenzene</b>
Ethylene dibromide (1,2-Dibromoethane)	<b>1,3,5-Trimethylbenzene</b>
Hexachlorobenzene	Vinyl acetate
Hexachloro-1,3-butadiene	Vinyl chloride (Chloroethene)
Hexachlorocyclopentadiene	<b>Xylenes (total)</b>
Hexachloroethane	GRO (see note 3 below)
Hydrazine	DRO (see note 3 below)
<b>Isopropylbenzene (Cumene)</b>	RRO (see note 3 below)

Notes:

1. Bolded chemicals should be investigated as volatile compounds when petroleum is present. If fuel containing additives (e.g., 1,2-dichloroethane, ethylene dibromide, methyl *tert*-butyl ether) were spilled, these chemicals should also be investigated.
2. If a chemical is not on this list, and not in Tables B of 18 AAC 75.345, the chemical has not been evaluated for volatility. Contact the ADEC risk assessor to determine if the chemical is volatile.
3. At this time, ADEC does not require evaluation of petroleum ranges GRO, DRO, or RRO for the indoor air inhalation (vapor intrusion) pathway.

**ATTACHMENT 5**  
**IMPORTANT INFORMATION ABOUT YOUR**  
**GEOTECHNICAL/ENVIRONMENTAL REPORT**



Date: December 2016  
To: ADEC  
\_\_\_\_\_

## **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