

November 7, 2017

Deloychee, Inc.  
2900 Boniface Parkway  
Anchorage, Alaska 99504

Attn: Mr. Charles Akers

**RE: SITE CHARACTERIZATION ACTIVITIES, HOLY CROSS OIL COMPANY  
SITE, 1400 AIRPORT ROAD, HOLY CROSS, ALASKA; ADEC FILE NO.  
2417.38.002**

This letter report presents the results of our site characterization activities conducted at the Holy Cross Oil Company Site located at 1400 Airport Road (Site) in Holy Cross, Alaska. The site is located on the west bank of the Ghost Bank Slough. The Yukon River is located about 1,500 feet east of the site. A vicinity map and site plan are included as Figure 1 and 2, respectively.

### **BACKGROUND**

According to Spiltech, Inc.'s January 29, 1991 *Spill Cleanup / Site Remediation Plan*, approximately 20,000 gallons of gasoline were spilled at the Holy Cross Oil Company bulk fuel storage tank farm. Reportedly, a pipeline broke in January 1991 and fuel-impacted snow and ice was observed in an area approximately 60 feet by 240 feet, east of the tank farm in a slough. A Facility Map sketch of the Site is included in Attachment 1. In letters dated October 8, 2015 and September 15, 2016, the Alaska Department of Environmental Conservation (ADEC) requested that site characterization activities occur at the spill site.

### **FIELD ACTIVITIES**

A Shannon & Wilson (S&W) representative visited the Site on July 12 and 13, 2017 to conduct site characterization activities of the suspected location of the pipeline break and collect near-surface soil samples from the spill area. The project consisted of advancing hand borings and collecting soil samples. Under subcontract to Shannon & Wilson, SGS North America Inc. (SGS) of Anchorage, Alaska provided analytical testing of soil samples. Photographs and field notes taken during the site activities are included in Attachments 2 and 3, respectively.

## Site Reconnaissance

Prior to advancing the hand borings, S&W's field representative performed a reconnaissance of the suspected location of the pipeline break and the spill area. The location of the pipeline break was not observed during the site reconnaissance because the pipe is potentially buried or has been removed at the site. There was no evidence of stressed vegetation (i.e., localized areas of small/distressed grasses) in the approximate location of the 1991 the spill area. The site features observed during S&W's July 12 and 13, 2017 reconnaissance comprise the following:

- Two empty aboveground storage tanks (ASTs) with estimated capacities ranging from 500 to 1,000 gallons were located adjacent to the eastern Tank Farm fence.
- Three empty ASTs with estimated capacities ranging from 500 to 1,000 gallons were located adjacent to the northern Tank Farm fence.
- The secondary road, nearest the Ghost Bank Slough, is overgrown with vegetation.
- The "meter house" adjacent to the eastern Tank Farm fence was not observed at the Site.
- The Ghost Bank Slough was full of water. At the time of the site reconnaissance, it was estimated that the water depth ranged from 1 to 3 feet, but may be deeper in the middle (Photos 1 and 2).

S&W's field representative, Trevor Crosby, interviewed Mr. Ronald Demientieff, Holy Cross Oil President, on July 12, 2017. According to Mr. Demientieff, the Ghost Bank Slough water edge used to be adjacent to the east edge of the primary road (approximate location of a 3 to 4-foot embankment shown in Attachment 1), but since has receded.

## Hand Borings

On July 12, 2017, six hand borings (PB1 through PB6) were advanced at the site (Photos 3 through 8). The hand borings were advanced until groundwater or refusal was encountered at the approximate locations shown on Figure 2. In general, Hand Borings PB1 and PB3 were advanced within the approximate location of the 1991 spill, with four additional hand borings (PB2 and PB4 through PB6) positioned radially outward to delineate the lateral extent of impacted soil. The depths of the hand borings ranged from 2.5 feet below ground surface (bgs) in Hand Boring PB5 to 8 feet bgs in Hand Boring PB2.

Evidence of potential contamination (i.e. stained soil and fuel odors) were documented in Hand Borings PB1 and PB2. The fuel odors in Borings PB1 and PB2 do not appear to be associated

Deloycheet, Inc.  
Attn: Mr. Charles Akers  
November 7, 2017  
Page 3 of 6

SHANNON & WILSON, INC.

with the 1991 spill due to the “fresh” fuel odor. In our opinion the fuel odors observed during the field activities may be attributed to a recent release(s).

Field screening samples were obtained from the hand borings at 0.5 to 2-foot intervals. Sample jars were filled using dedicated stainless steel spoons, placed in coolers with ice packs, and transferred to the laboratory using chain of custody procedures. The analytical sample jars for volatile analyses were collected first, followed by the field screening sample, and finally the non-volatile analytical sample jars. Each soil sample was visually described and “screened” for volatile organic compounds (VOCs) using a photoionization detector (PID) and ADEC-approved headspace screening techniques. The field screening samples were collected in re-sealable plastic bags, warmed to a common temperature, and tested within 60 minutes of collection. To screen, the sample was agitated for about 15 seconds, the seal of the bag was opened slightly, the instrument probe was inserted into the air space above the soil, and the bag held closed around the probe. The maximum ionization response as the PID draws vapor from the sample bag was recorded. The PID was calibrated with 100 parts per million (ppm) isobutylene in air standard gas. The sampling equipment and hand auger were decontaminated between each sample location. The soil cuttings were used to backfill the boreholes.

Twenty-five field screening samples were collected from the six hand borings at the Site, with PID headspace screening readings ranging from 0.3 ppm to 966 ppm. Based on the results of the headspace screening and/or field observations, one analytical soil sample from each boring was selected for laboratory testing, with the exception of Boring PB6. A sample was not collected from Boring PB6 because the soil did not exhibit elevated PID headspace screening readings and visual or olfactory evidence of contamination. Analytical samples were collected by quickly and completely filling laboratory-provided glass jars in decreasing order of volatility. For each volatile sample, at least 25 grams of soil, but no more than what could be completely submerged with 25-milliliters of methanol, were placed into a pre-weighed, 4-ounce jar with a septa lid. A 25-milliliter aliquot of methanol containing laboratory-added surrogates were added to the sample jar to submerge the soil sample.

### **LABORATORY ANALYSES**

The project samples were delivered to SGS for analysis using chain-of-custody procedures. The six project soil samples, including one field duplicate, were analyzed for gasoline range organics (GRO) by Alaska Method (AK) 101 and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8021B. The two samples with the highest PID measurements were also tested for naphthalene by EPA Method 8260C. For quality control

purposes one trip blank was submitted and analyzed for GRO/BTEX and naphthalene by AK 101/EPA 8260C.

## DISCUSSION OF ANALYTICAL RESULTS

The soil cleanup criteria are based on the most stringent ADEC Method 2 levels listed in Tables B1 and B2 for the “under 40-inch (precipitation) zone”, 18 AAC 75 (July 2017). The analytical soil results and applicable cleanup levels are presented in Table 2.

### Soil Samples

Samples PB1S3, PB1S6 (duplicate of Sample PB1S3), and PB2S2 contained maximum concentrations of 4,450 milligrams per kilogram (mg/kg) GRO, 75.8 mg/kg benzene, 980 mg/kg toluene, 202 mg/kg ethylbenzene, 1,290 mg/kg xylenes, and 15.2 mg/kg of naphthalene, which exceed the ADEC cleanup levels of 300 mg/kg, 0.022 mg/kg, 6.7 mg/kg, 0.13 mg/kg, 1.5 mg/kg, and 0.038 mg/kg, respectively. The remaining tested analytes were either not detected or were reported at concentrations less than the ADEC cleanup levels. The laboratory report and completed ADEC Laboratory Data Review Checklist are provided in Attachment 4.

### Quality Control

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 4).

Field quality control samples included one trip blank and one field duplicate sample set. One laboratory-prepared trip blank accompanied the project sample jars from the laboratory to the site during sampling activities and back again to SGS. Estimated concentrations of p & m - xylene and toluene were detected in the trip blank. Both the sample and trip blank concentrations are reported at levels less than the LOQ, therefore the sample concentration is reported as non-detect at the LOQ. Affected project samples are qualified with a “B”-flag in Table 2 (see LDRC in Attachment 4 for details).

One duplicate sample set (Samples PB1S3 and PB1S6) was collected to assess the sampling

precision and calculate the relative percent difference (RPD). The RPD measurement provides an indication of the sample homogeneity and the precision of the analytical techniques. The RPDs are within the ADEC recommended DQO of 50 percent for soil samples.

Shannon & Wilson conducted a limited data assessment to review the laboratory's compliance with the precision, accuracy, sensitivity, and completeness criterion of the DQOs. Shannon & Wilson also reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review Checklist, which is included in Attachment 4. There were no non-conformances that would adversely affect data usability for the purposes of this report.

### **SUMMARY**

S&W's site assessment activities included visually assessing the suspected location of the pipeline break and the spill area, and advancing and sampling hand borings. Water was present within the slough during the field activities, therefore the hand borings were advanced adjacent to the slough and tank farm. Soil samples collected from Hand Boring PB1 and PB2 contained benzene, toluene, ethylbenzene, xylenes (BTEX), naphthalene, and GRO with concentrations that exceed the most stringent ADEC Method Two migration to groundwater cleanup levels. Based on the soil sample results, and "fresh" fuel odors observed during the field activities, it is our opinion the impacted soil at the site may not be associated exclusively with the 1991 release, and possibly associated with more recent release(s). The vertical extent of BTEX-, naphthalene-, and GRO-impacted soil at these locations is not known. The soil samples collected from Borings PB3, PB4, and PB5 did not contain concentrations of BTEX-, naphthalene-, and GRO-impacted soil above the ADEC cleanup levels. Note, however, Borings PB3, PB4, and PB5 are located at north, east, and south of the spill area; therefore, impacted soil may be present between these borings and the pipeline break and the spill area.

### **CLOSURE/LIMITATIONS**

This report was prepared for the exclusive use of our client and their representatives. 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 definite conclusions regarding the project site's soil quality. It is possible that our subsurface tests missed higher levels of contaminants, although our intention was to sample areas likely to be impacted and in accordance with our ADEC-approved work plan. As a result, the sampling and analyses performed can only provide you with 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,

Deloycheet, Inc.  
Attn: Mr. Charles Akers  
November 7, 2017  
Page 6 of 6

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Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised. Shannon & Wilson has prepared the document 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 responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study unless authorized by you or required by law.

We appreciate the opportunity to be of service. If you have questions or comments concerning this report, please call Dan P. McMahon or the undersigned at (907) 561-2120.

Sincerely,

**SHANNON & WILSON, INC.**



Trevor Crosby, CPG  
Environmental Scientist



Mathew S. Henry, P.E.  
Vice President

Enc: Tables 1 and 2, Figures 1 and 2, and Attachments 1 through 5

**TABLE 1**  
**SAMPLE LOCATIONS AND DESCRIPTIONS**

Sample Number	Date	Sample Location (See Figure 2)	Depth (feet bgs)**	Headspace (ppm) ^	Sample Description
<b>Hand Boring Samples</b>					
<b>Boring PB1</b>					
PB1S1	7/12/2017	Boring PB1, Sample 1	1.6	5.2	Dark brown, <i>Organics with Silt (OL)</i> ; moist
PB1S2	7/12/2017	Boring PB1, Sample 2	2.5	98	Brown, <i>Poorly Graded Sand (SP)</i> ; moist, hydrocarbon odor
* PB1S3	7/12/2017	Boring PB1, Sample 3	4.0	966	Grayish brown, <i>Silty Sand (SM)</i> ; moist, hydrocarbon odor
* PB1S6	7/12/2017	Duplicate of PB1S3	-	-	-
PB1S4	7/12/2017	Boring PB1, Sample 4	5.5	367	same as above - trace gravel at 5.5 feet bgs
PB1S5	7/12/2017	Boring PB1, Sample 5	7.5	432	Grayish brown, <i>Poorly Graded Sand with Gravel (SP)</i> ; moist, (refusal)
<b>Boring PB2</b>					
PB2S1	7/12/2017	Boring PB2, Sample 1	0.5	40	Dark brown, <i>Organics with Silt (OL)</i> ; moist
* PB2S2	7/12/2017	Boring PB2, Sample 2	2.0	826	Brown, <i>Poorly Graded Sand with Silt (SP-SM)</i> ; moist, hydrocarbon odor
PB2S3	7/12/2017	Boring PB2, Sample 3	3.0	789	Grayish brown, <i>Silty Sand (SM)</i> ; moist; hydrocarbon odor
PB2S4	7/12/2017	Boring PB2, Sample 4	4.5	318	same as above -trace gravel at 6' bgs
PB2S5	7/12/2017	Boring PB2, Sample 5	8.0	467	Grayish brown, <i>Poorly Graded Sand with Silt and Gravel (SP-SM)</i> ; moist; hydrocarbon odor
<b>Boring PB3</b>					
PB3S1	7/12/2017	Boring PB3, Sample 1	1.0	3.2	Dark brown, <i>Organics with Silt (OL)</i> ; moist
* PB3S2	7/12/2017	Boring PB3, Sample 2	2.0	10	Grayish brown, <i>Silty Sand (SM)</i> ; moist
PB3S3	7/12/2017	Boring PB3, Sample 3	3.5	3.9	same as above
PB3S4	7/12/2017	Boring PB3, Sample 4	4.5	4.6	same as above
PB3S5	7/12/2017	Boring PB3, Sample 5	5.5	-	Brown, <i>Poorly Graded Sand with Silt (SP-SM)</i> ; wet
<b>Boring PB4</b>					
PB4S1	7/12/2017	Boring PB4, Sample 1	2.0	4.3	Dark brown, <i>Organics with Silt (OL)</i> ; moist
* PB4S2	7/12/2017	Boring PB4, Sample 2	3.5	7.0	Brown, <i>Poorly Graded Sand with Silt (SP-SM)</i> ; moist
PB4S3	7/12/2017	Boring PB4, Sample 3	4.5	-	Brown, <i>Silty Sand (SM)</i> ; wet
<b>Boring PB5</b>					
PB5S1	7/12/2017	Boring PB5, Sample 1	0.5	1.2	Brown, <i>Poorly Graded Gravel with Sand (GP)</i> ; dry
* PB5S2	7/12/2017	Boring PB5, Sample 2	1.5	2.6	same as above
PB5S3	7/12/2017	Boring PB5, Sample 3	2.0	1.8	same as above
PB5S4	7/12/2017	Boring PB5, Sample 4	2.5	0.7	same as above; moist (refusal)
<b>Boring PB6</b>					
PB6S1	7/12/2017	Boring PB6, Sample 1	1.0	1.4	Dark brown, <i>Organics with Silt (OL)</i> ; moist
PB6S2	7/12/2017	Boring PB6, Sample 2	2.5	0.5	Brown, <i>Poorly Graded Sand with Silt and Gravel (SP-SM)</i> ; moist
PB6S3	7/12/2017	Boring PB6, Sample 3	3.0	0.3	same as above
PB6S4	7/12/2017	Boring PB6, Sample 4	4.0	0.7	same as above (refusal)
<b>Quality Control Sample</b>					
* STB	7/12/2017	Soil Trip Blank	-	-	Ottawa sand with methanol added in the laboratory

## Notes:

- \* = Sample analyzed by the project laboratory (See Table 2 and Attachment 3)
- \*\* = Feet below ground surface
- ^ = Field screening instrument was a Thermo Environmental Instruments 580B photoionization detector (PID).
- = Measurement not recorded or not applicable
- bgs = below ground surface
- ppm = parts per million

**TABLE 2**  
**SOIL SAMPLE ANALYTICAL RESULTS**

Parameter Tested	Method*	Cleanup Level**	Boring ID, Sample Source, ID Number <sup>^</sup> , and Collection Depth in Feet bgs (See Table 1, Figure 2, and Attachment 3)						
			Boring PB1		Boring PB2	Boring PB3	Boring PB4	Boring PB5	Trip Blank
			PB1S3 4.0	~PB1S6 4.0	PB2S2 2.0	PB3S2 2.0	PB4S2 3.5	PB5S2 1.5	STB -
Headspace Reading - ppm	OVM 580B	-	966	966	826	10	7.0	2.6	-
Gasoline Range Organics (GRO) - mg/kg	AK 101	300	<b>4,450 J+</b>	<b>3,680 J+</b>	<b>2,760 J+</b>	<1.85	<b>1.33 J</b>	<1.37	<0.960
Volatile Organic Compounds (VOCs)									
Benzene - mg/kg	EPA 8260C/8021B	0.022	<b>74.4</b>	<b>75.8</b>	<b>28.5</b>	<0.00925	<0.0102	<0.00685	<0.00479
Toluene - mg/kg	EPA 8260C/8021B	6.7	<b>980</b>	<b>799</b>	<b>365</b>	<0.0185	<0.0406 B	<0.0274 B	<b>0.0107 J</b>
Ethylbenzene - mg/kg	EPA 8260C/8021B	0.13	<b>202</b>	<b>159</b>	<b>74.5</b>	<0.0185	<0.0203	<0.0137	<0.00960
Xylenes (total) - mg/kg	EPA 8260C/8021B	1.5	<b>1,290</b>	<b>971</b>	<b>969</b>	<0.0555	<0.122 B	<0.0821 B	<b>0.0123 J</b>
Naphthalene - mg/kg	EPA 8260C	0.038	<b>15.2 J-</b>	-	<b>10.1 J-</b>	-	-	-	<0.00960

## Notes:

\* = See Attachment 3 for compounds tested, methods, and laboratory reporting limits

\*\* = Soil cleanup level is the most stringent ADEC Method Two standard listed in Table B1 or B2, 18 Alaska Administrative Code (AAC) 75, for the "under 40 inches (precipitation) zone" (November 2016).

<sup>^</sup> = sample ID No. preceded by "17824-" on the chain of custody form.

**4,450** = reported concentration exceeds the ADEC cleanup level

**74.40** = analyte detected

<1.85 = analyte not detected; laboratory limit of detection of 1.85 mg/kg

ppm = parts per million

mg/kg = milligrams per kilogram

bgs = below ground surface

- = not applicable or sample not tested for this analyte

~ = duplicate of preceding sample

ND = analyte not detected

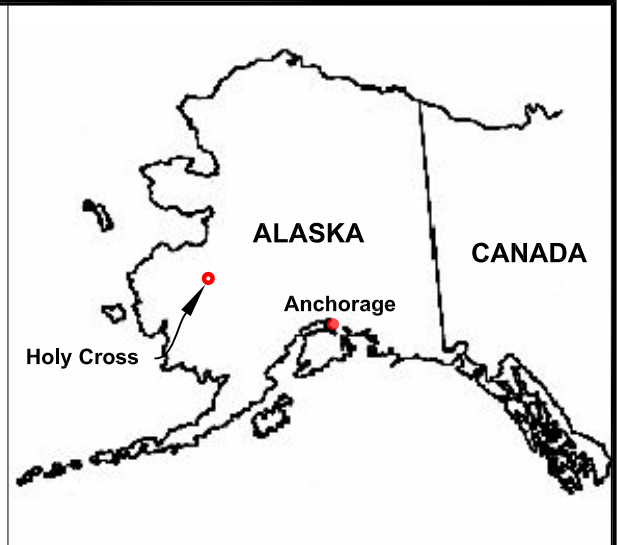
J = quantitation is an estimate less than the limit of quantitation (LOQ). See the SGS laboratory report for details.

J+ = analytical result is potentially biased high due to surrogate failure. See ADEC Laboratory Data Review Checklist (LDRC) in Attachment 3 for details.

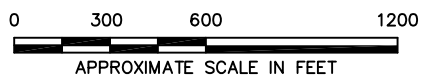
J- = analytical result is potentially biased low due to surrogate failure. See ADEC LDRC in Attachment 3 for details.


B = reported concentration potentially affected by trip blank detection. See ADEC LDRC in Attachment 3 for details.

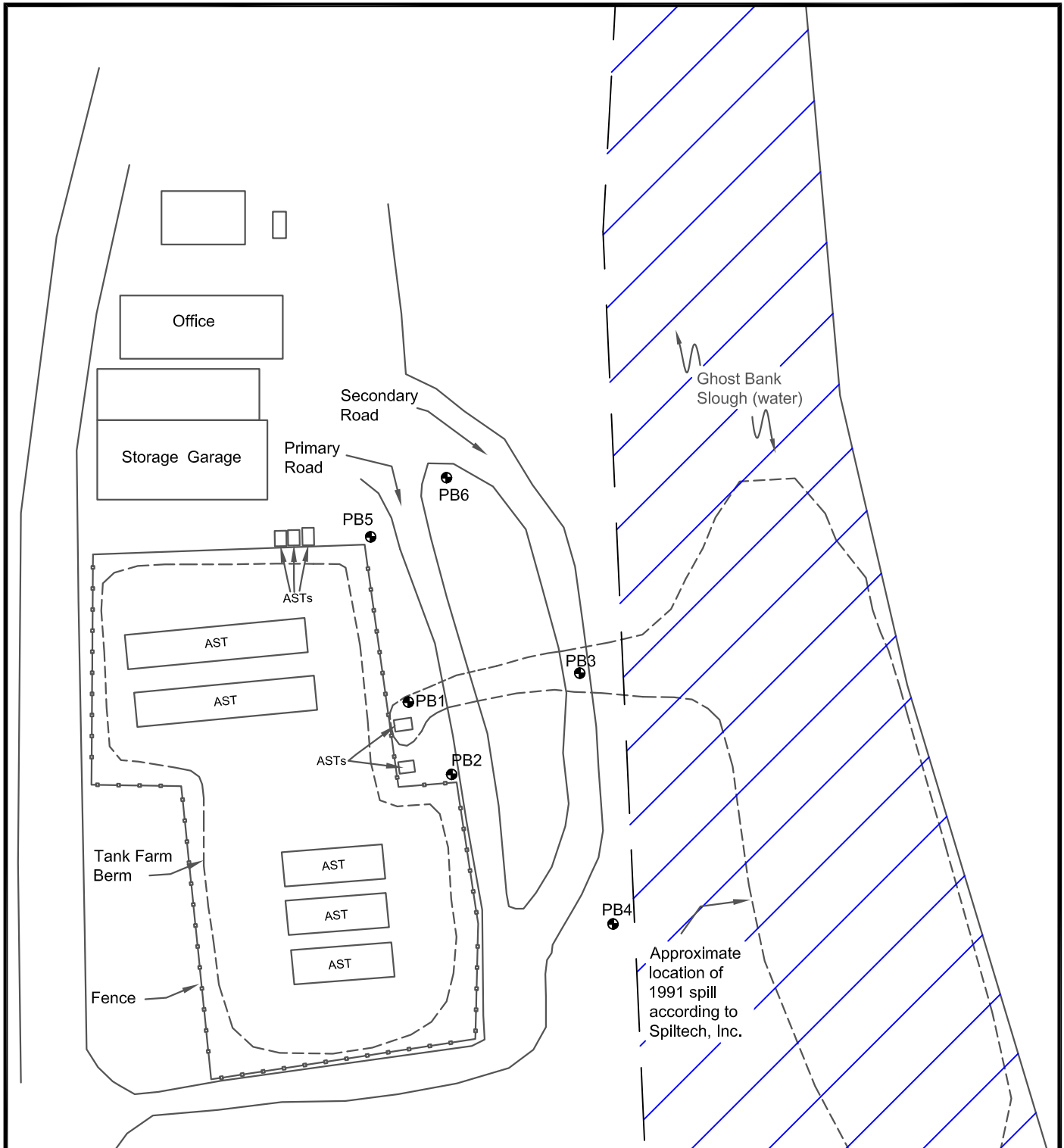




Map adapted from aerial imagery provided by Google Earth™ Pro, reproduced by permission granted by Google Earth Mapping Service.

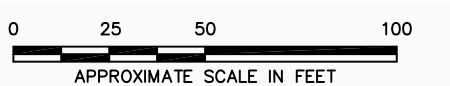


Holy Cross Oil Company Site Holy Cross, Alaska	
<b>VICINITY MAP</b>	
November 2017	32-1-17824-002
 SHANNON & WILSON, INC. Geotechnical and Environmental Consultants	<b>FIG. 1</b>



**LEGEND**

- PB1 Approximate location of Hand Boring PB1
- AST Aboveground Storage Tank



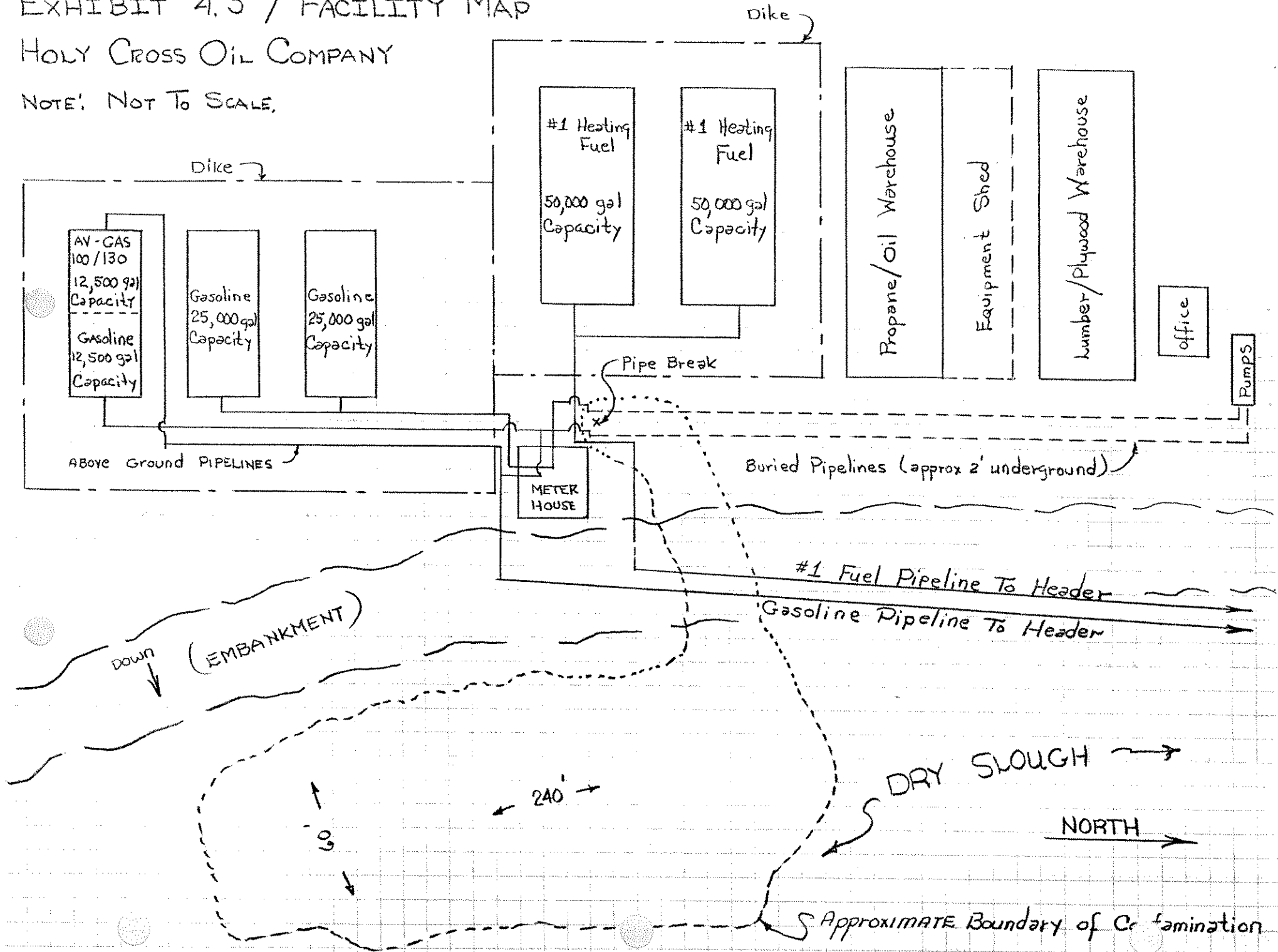
HOLY CROSS OIL COMPANY SITE HOLY CROSS, ALASKA	
SITE PLAN	
NOVEMBER 2017	32-I-17824-001
SHANNON & WILSON, INC. <small>Geotechnical &amp; Environmental Consultants</small>	FIG. 2

**ATTACHMENT 1**  
**SPILTECH, INC.'S JANUARY 29, 1991**  
***SPILL CLEANUP / SITE REMEDIATION PLAN***  
**SITE SKETCH**

# EXHIBIT 4.3 / FACILITY MAP

HOLY CROSS OIL COMPANY

NOTE: NOT TO SCALE.



**ATTACHMENT 2**  
**SITE PHOTOGRAPHS**



Photo 1: Looking south at the Holy Cross Oil Company Site.  
(July 12, 2017)



Photo 2: Looking north at the Holy Cross Oil Company Site.  
(July 12, 2017)

Holy Cross Oil Company Site  
Holy Cross, Alaska

**PHOTOS 1 AND 2**

November 2017

32-1-17824-002



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B-1





Photo 3: Looking south at the location of Hand Boring PB1.  
(July 12, 2017)



Photo 4: Looking southeast at the location of Hand Boring PB2.  
(July 12, 2017)

Holy Cross Oil Company Site  
Holy Cross, Alaska

**PHOTOS 3 AND 4**

November 2017

32-1-17824-002



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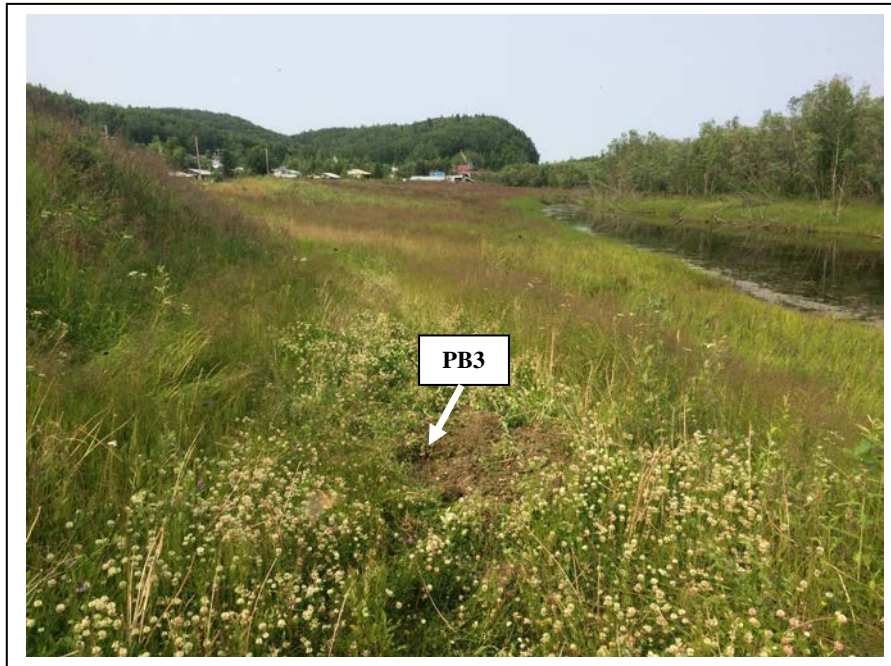


Photo 5: Looking north at the location of Hand Boring PB3.  
(July 12, 2017)



Photo 6: Looking north at the location of Hand Boring PB4.  
(July 12, 2017)





Photo 7: Looking south at the location of Hand Boring PB5.  
(July 12, 2017)

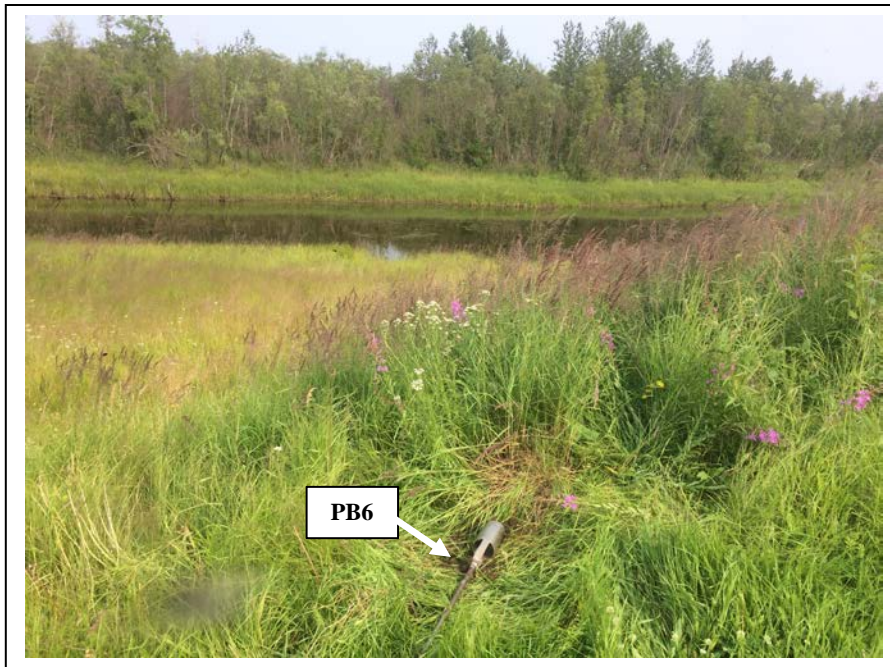


Photo 8: Looking southeast at the location of Hand Boring PB6.  
(July 12, 2017)

**ATTACHMENT 3**

**FIELD NOTES**



7/12/17

0815 ARRIVE @ ANCHORAGE AIRPORT - CHECKIN @ RAUN.  
 1115 ARRIVE @ ANIAR - HOLD FOR HOLY CROSS DEPARTURE  
 1250 ARRIVE @ HOLY CROSS - REBECCA (DELOLCHRETT) D/M FROM  
 RUNWAY.

- GET ROOM KEYS & TRUCK KEYS (HOLY CROSS OIL)

1315 SITE - MEET RONALD DEMIENTIEFF (HOLY CROSS OIL). @ FUEL  
 VISIT. FACILITY.

- D/M SAMPLE GRAB.
- QUICK SITE RECON OBSERVATIONS:

① SLOUGH FULL OF WATER.

② FORMER FUEL SHED EAST OF EXISTING TANK  
 FARM - NO LONGER PRESENT @ THE SITE.

③ PRIMARY ROAD EXISTING

④ SECONDARY ROAD - ADJACENT TO SLOUGH WATER  
 LINE.

Quick interview w/ Ron -

① WATER HEIGHTS IN SLOUGH DURING THE SPILL WERE  
 TO BE ADJACENT TO THE PRIMARY ROAD.

② PRIMARY ROAD WERE TO BE WHERE BOATS TIE  
 UP - AND SLOUGH WAS ACCESSIBLE BY BOAT.

③ HIS OBSERVATIONS - MOST FUEL WAS EITHER CLEANED  
 AT TIME OF SPILL OR HAS BEEN WASHED AWAY  
 DURING HIGH WATER EVENTS.

1340 COMPLETED SITE WALK THROUGH.

- 1 - SLOUGH FULL OF WATER - 1' TO 2.5' DEPTH - MAYBE DEEPER IN CENTER.  
 - SOFT ORGANICS ON BOTTOM

\* NO SURFACE WATER SEEN ON SLOUGH.

\* NO SIGN OF DISTRESSED VEGETATION. : NOTE GRASSES BETWEEN PRIMARY  
 & SECONDARY ROAD RANGE FROM 0.5' TO 7' FEET TALL.

\* NO OBVIOUS FUEL ODORS FROM EXISTING TANK FARM.

\* NO STAINED SOIL OBSERVED

NOTE:  
 RECONNAISSANCE  
 CONDUCTED  
 NEAR THE  
 SUSPECTED LOCATION  
 OF THE PIPE  
 BREAK / SPILL AREA.

2 - COLLECTED GPS POINTS OF TANK FARM FENCING CORNERS (SLOUGH  
 SIDE) (T01 - T05)

COLLECTED GPS POINTS OF SLOUGH EDGE (TANK FARM SIDE). (S01 - S04)

~~\* SEE #~~

1405 - 1900 CONDUCT DUST ~~AND~~ PROBE AND ANALYTICAL SAMPLING ACTIVITIES

SPE ① SAMPLE COLLECTION LOG (2 PAGES)

② Site sketch.

MOVED BACK TO DELBYCHET LODGE FOR EVENING

AFTER FIELD ACTIVITIES COMPLETED BOTTLE LABELING; PACKING FIELD  
EQUIP, ETC.

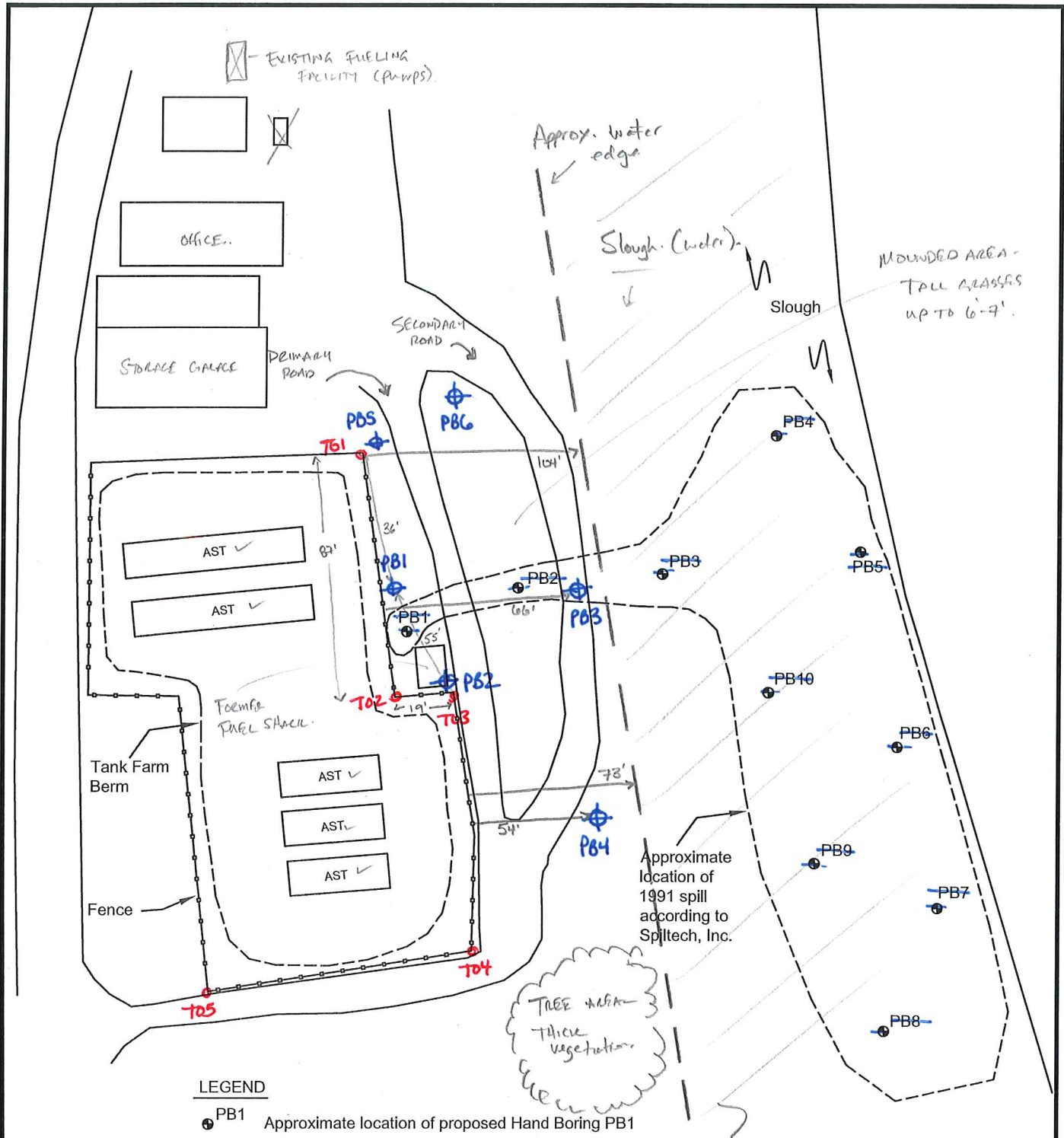
7/13/17

0830 CONTACT RANNAL - CHECK IN FOR FLIGHT. RON DE DIMENTIEFF (PRESIDENT)  
MET ME. AT THE RUNWAY - TRADED VEHICLES AND DELIVERED  
WORK TRUCK TO HOTEL.

0950  
~~1000~~ DEPARTED HOLY CROS. - STANDBY FOR ANC. DEPARTURE.

1155 DEPARTED ANVAL - FOR ANCHORAGE

12:20 ARRIVED IN ANCHORAGE -



**LEGEND**

● PB1 Approximate location of proposed Hand Boring PB1

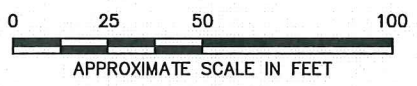
AST Aboveground Storage Tank

— PB - Not advanced; in location identified prior to field work.

● T01 - GPS location of TANK FARM FENCE

PRIMARY ROAD - OK to drive on

SECONDARY ROAD - OVERGROWN; VEGETATION - SOFT; SATURATED AREAS



HOLY CROSS OIL COMPANY SITE HOLY CROSS, ALASKA	
SITE PLAN	
NOVEMBER 2016	32-1-17824-001
SHANNON & WILSON, INC.	
Geotechnical & Environmental Consultants	
FIG. 1	



# SAMPLE COLLECTION LOG

SHANNON & WILSON, INC

Project Number: 32-1-17824							Location: Holy Cross, Ala	
Date: 7/12/17							Site: OIL COMPANY SITE	
Sampler: TREVOR CROSBY							Sheet Number: 1 of 2	
Sample Number	Location	Sample Time	Sample Depth * *	Sample Type	GPS Reading*	PID Reading	Soil Classification	Analyses
PB1 S1	NEAR FORMER FUEL SHACK	1405	1.6	FS	N62.19583 W159.76921	5.2	Dark brown; Organics w/ silt (OLS); organic wet; moist.	-
PB1 S2	see site sketch	1411	2.5	FS		98	Brown; Poorly Graded Sand (SP); moist hydrocarbon odor. (HC)	-
PB1 S3		1420	4.0	FS ES/FS		966	Grayish brown; Silty Sand (SM); moist hydrocarbon odor	GAO/BTEX + Naphthalene x Duplicate = PB1 S6
PB1 S4		1431	5.5	FS		367	Same as above - trace gravel @ 5.5'	-
PB1 S5		1438	7.5	FS		432	GRAYISH brown; Poorly graded Sand w/ gravel (SP); moist (difficult augering).	-
PB2 S1	Near fuel corner GPS POINT (TOP).	1500	0.5	FS	N62.19573 W159.76903	40	Dark brown; organics w/ silt (OLS); moist.	-
PB2 S2	see site sketch	1512	2.0	FS ES		826	Brown; Poorly graded Sand w/ silt (SP-SM); moist; hydrocarbon odor.	GAO/BTEX + Naphthalene
PB2 S3		1518	3.0	FS		789	GRAYISH brown; Silty Sand (SM); moist. hydrocarbon odor	-
PB2 S4		1527	4.5	FS		318	Same as above - trace gravel @ 6.0' bgs	-
PB2 S5		1538	8.0	FS		467	grayish brown; Poorly graded Sand w/ silt and gravel (SP-SM); moist; HC odor	-
PB3 S1	ON THE "SECONDARY" ROAD NEAREST THE	1549	1.0	FS	N62.19584 W159.76934	3.2	Dark brown; Organics w/ silt (OLS); moist.	-
PB3 S2	Storage. See site sketch.	1601	2.0	FS ES		10	Grayish brown; Silty Sand (SM); moist	GAO/BTEX
PB3 S3		1612	3.5	FS		3.9	Same as above.	-
PB3 S4		1618	4.5	FS		4.6	Same as above.	-
PB3 S5		1622	5.5	- (wet)		-	Brown; Poorly graded Sand w/ silt (SP-SM); (wet) (water)	-
/	/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/	/

**Sample Type**

- ES Environmental sample
- FD Field duplicate
- FM Field Screening
- TB Trip blank
- \* GPS readings only collected from analytical sample locations

\* \* Below ground surface (bgs).

# SAMPLE COLLECTION LOG

SHANNON & WILSON, INC

Project Number: 32-1-17824							Location: HOLY CROSS, ALA	
Date: 7/12/17							Site: <del>THE</del> OIL COMPANY SITE	
Sampler: TRU-VUE CLOSURE							Sheet Number: 2 of 2	
Sample Number	Location	Sample Time	Sample Depth	Sample Type	GPS Reading*	PID Reading	Soil Classification	Analyses
PB4	SOUTHWEST OF 'SECONDARY' ROAD - NEAREST SLOUGH	1635	2.0	FS	N62.19561 W159.76872	4.3	Dark brown; Organics w/ silt (Ovs); moist.	-
S1								
PB4	See site sketch	1644	3.5	FS ES		7.0	Brown; Poorly graded Sand w/ silt (SPS); moist.	GP0/BTEX
S2								
PB4	↓	1652	4.5	ES		(wet) -	Brown; Silty Sand (SM); wet.	-
S3							(- water)	
PB5	WEST of 'PRIMARY ROAD' NEAR FENCE CORNER	17:20	0.5	FS	N62.19594 W159.76918	1.2	Brown; Poorly graded gravel w/ Sand (GP); dry	-
S1								
PB5	TOL.	17:34	1.5	FS ES		2.6	Same as above	GP0/BTEX
S2								
PB5	↓	17:46	2.0	FS		1.8	Same as above; moist	-
S3								
PB5	↓	17:58	2.5	FS		0.7	(Refusal) Same as above; moist	-
S4								
PB6	AT THE NORTHEAST CORNER OF 'SECONDARY' AND PRIMARY ROAD	1821	1.0	FS	N62.19593 W159.76907	1.4	Dark brown; organics w/ silt (Ovs); moist	-
S1								
PB6	See site sketch	1835	2.5	FS		0.5	Brown; Poorly graded Sand w/ silt and gravel (SP-5M); moist.	-
S2								
PB6	↓	1842	3.0	FS		0.3	Same as above	-
S3								
PB6	↓	1854	4.0	FS		0.7	(Refusal). same as above	-
S4								

**Sample Type**

- ES Environmental sample
- FD Field duplicate
- FM Field Screening
- TB Trip blank
- \* GPS readings only collected from analytical sample locations

**ATTACHMENT 4**  
**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 Street Suite 3  
Anchorage, AK 99518  
(907)433-3246

Report Number: **1174447**

Client Project: **32-1-17824 Holy Cross**

Dear Trevor Crosby,

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.



SGS North America Inc.  
Environmental Services – Alaska Division  
Project Manager

Victoria Pennick

2017.07.24

13:42:26 -08'00'

Victoria Pennick  
Project Manager  
Victoria.Pennick@sgs.com

Date

## Case Narrative

SGS Client: **Shannon & Wilson, Inc.**  
SGS Project: **1174447**  
Project Name/Site: **32-1-17824 Holy Cross**  
Project Contact: **Trevor Crosby**

Refer to sample receipt form for information on sample condition.

### **17824-PB1S3 (1174447001) PS**

8260C - Surrogate recovery for 4-bromofluorobenzene (0.43%) does not meet QC criteria due to sample dilution (500X)

AK101 - Surrogate recovery for 4-bromofluorobenzene (8770%) does not meet QC criteria due to matrix interference (see AQA) (see AQA)

### **17824-PB1S6 (1174447002) PS**

AK101 - Surrogate recovery for 4-bromofluorobenzene (6990%) does not meet QC criteria due to matrix interference (see AQA) (see AQA)

### **17824-PB2S2 (1174447003) PS**

8260C - Surrogate recovery for 4-bromofluorobenzene (0.96%) does not meet QC criteria due to sample dilution (100X)

AK101 - Surrogate recovery for 4-bromofluorobenzene ( 2810%) does not meet QC criteria due to matrix interference (see AQA) (see AQA)

\*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: 07/21/2017 3:36:48PM

## 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, 8015C, 8021B, 8082A, 8260C, 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
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
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
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
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>
17824-PB1S3	1174447001	07/12/2017	07/13/2017	Soil/Solid (dry weight)
17824-PB1S6	1174447002	07/12/2017	07/13/2017	Soil/Solid (dry weight)
17824-PB2S2	1174447003	07/12/2017	07/13/2017	Soil/Solid (dry weight)
17824-PB3S2	1174447004	07/12/2017	07/13/2017	Soil/Solid (dry weight)
17824-PB4S2	1174447005	07/12/2017	07/13/2017	Soil/Solid (dry weight)
17824-PB5S2	1174447006	07/12/2017	07/13/2017	Soil/Solid (dry weight)
17824-STB	1174447007	07/12/2017	07/13/2017	Soil/Solid (dry weight)

<u>Method</u>	<u>Method Description</u>
AK101	AK101/8021 Combo. (S)
SW8021B	AK101/8021 Combo. (S)
SW8260C	BTEX 8260 w/Naphthalene (S)
AK101	Gasoline Range Organics (S)
SM21 2540G	Percent Solids SM2540G

Print Date: 07/21/2017 3:36:51PM

### Detectable Results Summary

Client Sample ID: **17824-PB1S3**

Lab Sample ID: 1174447001

**Volatile Fuels**

**Volatile GC/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	4450	mg/Kg
Benzene	74400	ug/Kg
Ethylbenzene	202000	ug/Kg
Naphthalene	15200J	ug/Kg
o-Xylene	380000	ug/Kg
P & M -Xylene	906000	ug/Kg
Toluene	980000	ug/Kg

Client Sample ID: **17824-PB1S6**

Lab Sample ID: 1174447002

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Benzene	75800	ug/Kg
Ethylbenzene	159000	ug/Kg
Gasoline Range Organics	3680	mg/Kg
o-Xylene	295000	ug/Kg
P & M -Xylene	676000	ug/Kg
Toluene	799000	ug/Kg

Client Sample ID: **17824-PB2S2**

Lab Sample ID: 1174447003

**Volatile Fuels**

**Volatile GC/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	2760	mg/Kg
Benzene	28500	ug/Kg
Ethylbenzene	74500	ug/Kg
Naphthalene	10100	ug/Kg
o-Xylene	318000	ug/Kg
P & M -Xylene	651000	ug/Kg
Toluene	365000	ug/Kg

Client Sample ID: **17824-PB4S2**

Lab Sample ID: 1174447005

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Gasoline Range Organics	1.33J	mg/Kg
o-Xylene	17.9J	ug/Kg
P & M -Xylene	43.5J	ug/Kg
Toluene	38.2J	ug/Kg

Client Sample ID: **17824-PB5S2**

Lab Sample ID: 1174447006

**Volatile Fuels**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
o-Xylene	9.30J	ug/Kg
P & M -Xylene	22.7J	ug/Kg
Toluene	16.7J	ug/Kg

Client Sample ID: **17824-STB**

Lab Sample ID: 1174447007

**Volatile GC/MS**

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
P & M -Xylene	12.3J	ug/Kg
Toluene	10.7J	ug/Kg

## Results of 17824-PB1S3

Client Sample ID: **17824-PB1S3**  
 Client Project ID: **32-1-17824 Holy Cross**  
 Lab Sample ID: 1174447001  
 Lab Project ID: 1174447

Collection Date: 07/12/17 14:20  
 Received Date: 07/13/17 16:38  
 Matrix: Soil/Solid (dry weight)  
 Solids (%):78.5  
 Location:

## Results by Volatile 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>
Gasoline Range Organics	4450		792	237	mg/Kg	200		07/19/17 16:07
<b>Surrogates</b>								
4-Bromofluorobenzene (surr)	8770	*	50-150		%	200		07/19/17 16:07

## Batch Information

Analytical Batch: VFC13755  
 Analytical Method: AK101  
 Analyst: ST  
 Analytical Date/Time: 07/19/17 16:07  
 Container ID: 1174447001-B

Prep Batch: VXX30903  
 Prep Method: SW5035A  
 Prep Date/Time: 07/12/17 14:20  
 Prep Initial Wt./Vol.: 61.434 g  
 Prep Extract Vol: 38.1905 mL



Results of 17824-PB1S3

Client Sample ID: 17824-PB1S3
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447001
Lab Project ID: 1174447

Collection Date: 07/12/17 14:20
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):78.5
Location:

Results by Volatile GC/MS

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

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include 1,2-Dichloroethane-D4 (surr), 4-Bromofluorobenzene (surr), Toluene-d8 (surr).

Batch Information

Analytical Batch: VMS16948
Analytical Method: SW8260C
Analyst: NRO
Analytical Date/Time: 07/19/17 02:52
Container ID: 1174447001-B

Prep Batch: VXX30895
Prep Method: SW5035A
Prep Date/Time: 07/12/17 14:20
Prep Initial Wt./Vol.: 61.434 g
Prep Extract Vol: 38.1905 mL



Results of 17824-PB1S6

Client Sample ID: 17824-PB1S6
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447002
Lab Project ID: 1174447

Collection Date: 07/12/17 14:30
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):78.5
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Gasoline Range Organics and 4-Bromofluorobenzene (surr).

Batch Information

Analytical Batch: VFC13755
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/19/17 16:25
Container ID: 1174447002-B

Prep Batch: VXX30903
Prep Method: SW5035A
Prep Date/Time: 07/12/17 14:30
Prep Initial Wt./Vol.: 69.05 g
Prep Extract Vol: 39.8385 mL

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 1,4-Difluorobenzene (surr).

Batch Information

Analytical Batch: VFC13755
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/19/17 16:25
Container ID: 1174447002-B

Prep Batch: VXX30903
Prep Method: SW5035A
Prep Date/Time: 07/12/17 14:30
Prep Initial Wt./Vol.: 69.05 g
Prep Extract Vol: 39.8385 mL



## Results of 17824-PB2S2

Client Sample ID: **17824-PB2S2**  
 Client Project ID: **32-1-17824 Holy Cross**  
 Lab Sample ID: 1174447003  
 Lab Project ID: 1174447

Collection Date: 07/12/17 15:12  
 Received Date: 07/13/17 16:38  
 Matrix: Soil/Solid (dry weight)  
 Solids (%):77.7  
 Location:

## Results by Volatile 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>
Gasoline Range Organics	2760		409	123	mg/Kg	100		07/19/17 16:44
<b>Surrogates</b>								
4-Bromofluorobenzene (surr)	2810	*	50-150		%	100		07/19/17 16:44

## Batch Information

Analytical Batch: VFC13755  
 Analytical Method: AK101  
 Analyst: ST  
 Analytical Date/Time: 07/19/17 16:44  
 Container ID: 1174447003-B

Prep Batch: VXX30903  
 Prep Method: SW5035A  
 Prep Date/Time: 07/12/17 15:12  
 Prep Initial Wt./Vol.: 60.7 g  
 Prep Extract Vol: 38.5465 mL



Results of 17824-PB2S2

Client Sample ID: 17824-PB2S2
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447003
Lab Project ID: 1174447

Collection Date: 07/12/17 15:12
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):77.7
Location:

Results by Volatile GC/MS

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

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include 1,2-Dichloroethane-D4 (surr), 4-Bromofluorobenzene (surr), Toluene-d8 (surr).

Batch Information

Analytical Batch: VMS16948
Analytical Method: SW8260C
Analyst: NRO
Analytical Date/Time: 07/19/17 03:10
Container ID: 1174447003-B

Prep Batch: VXX30895
Prep Method: SW5035A
Prep Date/Time: 07/12/17 15:12
Prep Initial Wt./Vol.: 60.7 g
Prep Extract Vol: 38.5465 mL



Results of 17824-PB3S2

Client Sample ID: 17824-PB3S2
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447004
Lab Project ID: 1174447

Collection Date: 07/12/17 16:01
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):80.6
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Gasoline Range Organics, 1.85 U, 3.70, 1.11, mg/Kg, 1, 07/19/17 17:03

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: 4-Bromofluorobenzene (surr), 88.6, 50-150, %, 1, 07/19/17 17:03

Batch Information

Analytical Batch: VFC13755
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/19/17 17:03
Container ID: 1174447004-B

Prep Batch: VXX30903
Prep Method: SW5035A
Prep Date/Time: 07/12/17 16:01
Prep Initial Wt./Vol.: 62.033 g
Prep Extract Vol: 37.0186 mL

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

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: 1,4-Difluorobenzene (surr), 86, 72-119, %, 1, 07/19/17 17:03

Batch Information

Analytical Batch: VFC13755
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/19/17 17:03
Container ID: 1174447004-B

Prep Batch: VXX30903
Prep Method: SW5035A
Prep Date/Time: 07/12/17 16:01
Prep Initial Wt./Vol.: 62.033 g
Prep Extract Vol: 37.0186 mL



Results of 17824-PB4S2

Client Sample ID: 17824-PB4S2
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447005
Lab Project ID: 1174447

Collection Date: 07/12/17 16:44
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):76.7
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: Gasoline Range Organics, 1.33 J, 4.06, 1.22, mg/Kg, 1, 07/19/17 01:58

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 4-Bromofluorobenzene (surr), 92.7, 50-150, %, 1, 07/19/17 01:58

Batch Information

Analytical Batch: VFC13753
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/19/17 01:58
Container ID: 1174447005-B

Prep Batch: VXX30893
Prep Method: SW5035A
Prep Date/Time: 07/12/17 16:44
Prep Initial Wt./Vol.: 63.959 g
Prep Extract Vol: 39.8913 mL

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

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row: 1,4-Difluorobenzene (surr), 85.6, 72-119, %, 1, 07/19/17 01:58

Batch Information

Analytical Batch: VFC13753
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/19/17 01:58
Container ID: 1174447005-B

Prep Batch: VXX30893
Prep Method: SW5035A
Prep Date/Time: 07/12/17 16:44
Prep Initial Wt./Vol.: 63.959 g
Prep Extract Vol: 39.8913 mL



Results of 17824-PB5S2

Client Sample ID: 17824-PB5S2
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447006
Lab Project ID: 1174447

Collection Date: 07/12/17 17:34
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):87.4
Location:

Results by Volatile Fuels

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: Gasoline Range Organics, 1.37 U, 2.74, 0.821, mg/Kg, 1, 07/19/17 02:54

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: 4-Bromofluorobenzene (surr), 99.7, 50-150, %, 1, 07/19/17 02:54

Batch Information

Analytical Batch: VFC13753
Analytical Method: AK101
Analyst: ST
Analytical Date/Time: 07/19/17 02:54
Container ID: 1174447006-B

Prep Batch: VXX30893
Prep Method: SW5035A
Prep Date/Time: 07/12/17 17:34
Prep Initial Wt./Vol.: 70.999 g
Prep Extract Vol: 33.9509 mL

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

Surrogates

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Row 1: 1,4-Difluorobenzene (surr), 86.8, 72-119, %, 1, 07/19/17 02:54

Batch Information

Analytical Batch: VFC13753
Analytical Method: SW8021B
Analyst: ST
Analytical Date/Time: 07/19/17 02:54
Container ID: 1174447006-B

Prep Batch: VXX30893
Prep Method: SW5035A
Prep Date/Time: 07/12/17 17:34
Prep Initial Wt./Vol.: 70.999 g
Prep Extract Vol: 33.9509 mL

## Results of 17824-STB

Client Sample ID: **17824-STB**  
 Client Project ID: **32-1-17824 Holy Cross**  
 Lab Sample ID: 1174447007  
 Lab Project ID: 1174447

Collection Date: 07/12/17 18:00  
 Received Date: 07/13/17 16:38  
 Matrix: Soil/Solid (dry weight)  
 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>
Gasoline Range Organics	0.960 U	1.92	0.575	mg/Kg	1		07/14/17 15:59
<b>Surrogates</b>							
4-Bromofluorobenzene (surr)	92.2	50-150		%	1		07/14/17 15:59

## Batch Information

Analytical Batch: VFC13746  
 Analytical Method: AK101  
 Analyst: ST  
 Analytical Date/Time: 07/14/17 15:59  
 Container ID: 1174447007-A

Prep Batch: VXX30874  
 Prep Method: SW5035A  
 Prep Date/Time: 07/12/17 18:00  
 Prep Initial Wt./Vol.: 65.27 g  
 Prep Extract Vol: 25 mL



Results of 17824-STB

Client Sample ID: 17824-STB
Client Project ID: 32-1-17824 Holy Cross
Lab Sample ID: 1174447007
Lab Project ID: 1174447

Collection Date: 07/12/17 18:00
Received Date: 07/13/17 16:38
Matrix: Soil/Solid (dry weight)
Solids (%):
Location:

Results by Volatile GC/MS

Table with 8 columns: Parameter, Result Qual, LOQ/CL, DL, Units, DF, Allowable Limits, Date Analyzed. Rows include Benzene, Ethylbenzene, Naphthalene, o-Xylene, P & M -Xylene, Toluene, and Surrogates (1,2-Dichloroethane-D4, 4-Bromofluorobenzene, Toluene-d8).

Batch Information

Analytical Batch: VMS16946
Analytical Method: SW8260C
Analyst: NRO
Analytical Date/Time: 07/18/17 23:32
Container ID: 1174447007-A

Prep Batch: VXX30880
Prep Method: SW5035A
Prep Date/Time: 07/12/17 18:00
Prep Initial Wt./Vol.: 65.27 g
Prep Extract Vol: 25 mL



### Method Blank

Blank ID: MB for HBN 1763478 [SPT/10221]  
Blank Lab ID: 1398002

Matrix: Soil/Solid (dry weight)

QC for Samples:  
1174447001, 1174447002, 1174447003, 1174447004, 1174447005, 1174447006

### Results by SM21 2540G

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Total Solids	100			%

### Batch Information

Analytical Batch: SPT10221  
Analytical Method: SM21 2540G  
Instrument:  
Analyst: EWW  
Analytical Date/Time: 7/14/2017 12:07:00AM

Print Date: 07/21/2017 3:36:55PM



## Duplicate Sample Summary

Original Sample ID: 1173489001

Duplicate Sample ID: 1398003

QC for Samples:

1174447001, 1174447002, 1174447003, 1174447004, 1174447005, 1174447006

Analysis Date: 07/14/2017 00:07

Matrix: Soil/Solid (dry weight)

## Results by SM21 2540G

<u>NAME</u>	<u>Original</u>	<u>Duplicate</u>	<u>Units</u>	<u>RPD (%)</u>	<u>RPD CL</u>
Total Solids	73.3	73.0	%	0.43	(< 15 )

## Batch Information

Analytical Batch: SPT10221

Analytical Method: SM21 2540G

Instrument:

Analyst: EWW

Print Date: 07/21/2017 3:36:56PM

## Method Blank

Blank ID: MB for HBN 1763562 [VXX/30874]  
 Blank Lab ID: 1398232

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447007

## Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	1.25U	2.50	0.750	mg/Kg
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	89.3	72-119		%
4-Bromofluorobenzene (surr)	102	50-150		%

## Batch Information

Analytical Batch: VFC13746  
 Analytical Method: AK101  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/14/2017 3:40:00PM

Prep Batch: VXX30874  
 Prep Method: SW5035A  
 Prep Date/Time: 7/14/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

Print Date: 07/21/2017 3:36:59PM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30874]  
 Blank Spike Lab ID: 1398233  
 Date Analyzed: 07/14/2017 13:29

Spike Duplicate ID: LCSD for HBN 1174447 [VXX30874]  
 Spike Duplicate Lab ID: 1398234  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447007

## Results by AK101

Parameter	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	12.5	13.0	104	12.5	13.1	104	( 60-120 )	0.80	(< 20 )

### Surrogates

4-Bromofluorobenzene (surr)	1.25	104	104	1.25	105	105	( 50-150 )	0.84	
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## Batch Information

Analytical Batch: VFC13746  
 Analytical Method: AK101  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST

Prep Batch: VXX30874  
 Prep Method: SW5035A  
 Prep Date/Time: 07/14/2017 08:00  
 Spike Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL

Print Date: 07/21/2017 3:37:00PM

## Method Blank

Blank ID: MB for HBN 1763779 [VXX/30880]  
 Blank Lab ID: 1398502

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447007

## Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	6.25U	12.5	3.90	ug/Kg
Ethylbenzene	12.5U	25.0	7.80	ug/Kg
Naphthalene	12.5U	25.0	7.80	ug/Kg
o-Xylene	12.5U	25.0	7.80	ug/Kg
P & M -Xylene	25.0U	50.0	15.0	ug/Kg
Toluene	12.5U	25.0	7.80	ug/Kg
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	110	71-136		%
4-Bromofluorobenzene (surr)	92.3	55-151		%
Toluene-d8 (surr)	96.3	85-116		%

## Batch Information

Analytical Batch: VMS16946  
 Analytical Method: SW8260C  
 Instrument: Agilent 7890-75MS  
 Analyst: NRO  
 Analytical Date/Time: 7/18/2017 7:11:00PM

Prep Batch: VXX30880  
 Prep Method: SW5035A  
 Prep Date/Time: 7/18/2017 6:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30880]  
 Blank Spike Lab ID: 1398503  
 Date Analyzed: 07/18/2017 19:27

Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447007

## Results by SW8260C

### Blank Spike (ug/Kg)

Parameter	Spike	Result	Rec (%)	CL
Benzene	750	801	107	( 77-121 )
Ethylbenzene	750	791	105	( 76-122 )
Naphthalene	750	703	94	( 62-129 )
o-Xylene	750	796	106	( 77-123 )
P & M -Xylene	1500	1580	105	( 77-124 )
Toluene	750	779	104	( 77-121 )

### Surrogates

1,2-Dichloroethane-D4 (surr)	750	99.9	100	( 71-136 )
4-Bromofluorobenzene (surr)	750	93.4	93	( 55-151 )
Toluene-d8 (surr)	750	100	100	( 85-116 )

## Batch Information

Analytical Batch: **VMS16946**  
 Analytical Method: **SW8260C**  
 Instrument: **Agilent 7890-75MS**  
 Analyst: **NRO**

Prep Batch: **VXX30880**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/18/2017 06:00**  
 Spike Init Wt./Vol.: 750 ug/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: Extract Vol:



### Matrix Spike Summary

Original Sample ID: 1174397002  
MS Sample ID: 1398504 MS  
MSD Sample ID: 1398505 MSD

Analysis Date: 07/19/2017 0:36  
Analysis Date: 07/18/2017 20:35  
Analysis Date: 07/18/2017 20:51  
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447007

### Results by SW8260C

Parameter	Sample	Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	8.60U	910	845	93	910	863	95	77-121	2.00	(< 20 )
Ethylbenzene	17.2U	910	838	92	910	856	94	76-122	2.20	(< 20 )
Naphthalene	17.2U	910	657	72	910	789	87	62-129	18.20	(< 20 )
o-Xylene	17.2U	910	830	91	910	857	94	77-123	3.20	(< 20 )
P & M -Xylene	34.4U	1816	1686	92	1816	1730	95	77-124	2.80	(< 20 )
Toluene	17.2U	910	802	88	910	857	94	77-121	6.70	(< 20 )
<b>Surrogates</b>										
1,2-Dichloroethane-D4 (surr)		910	926	102	910	914	100	71-136	1.40	
4-Bromofluorobenzene (surr)		1514	1622	107	1514	1600	106	55-151	0.92	
Toluene-d8 (surr)		910	878	97	910	925	102	85-116	5.30	

### Batch Information

Analytical Batch: VMS16946  
Analytical Method: SW8260C  
Instrument: Agilent 7890-75MS  
Analyst: NRO  
Analytical Date/Time: 7/18/2017 8:35:00PM

Prep Batch: VXX30880  
Prep Method: Vol. Extraction SW8260 Field Extracted L  
Prep Date/Time: 7/18/2017 6:00:00AM  
Prep Initial Wt./Vol.: 44.56g  
Prep Extract Vol: 25.00mL

Print Date: 07/21/2017 3:37:05PM

## Method Blank

Blank ID: MB for HBN 1763935 [VXX/30893]  
 Blank Lab ID: 1398957

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447005, 1174447006

## Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	1.25U	2.50	0.750	mg/Kg
<b>Surrogates</b>				
4-Bromofluorobenzene (surr)	104	50-150		%

## Batch Information

Analytical Batch: VFC13753  
 Analytical Method: AK101  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/18/2017 11:09:00PM

Prep Batch: VXX30893  
 Prep Method: SW5035A  
 Prep Date/Time: 7/18/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

Print Date: 07/21/2017 3:37:06PM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30893]  
 Blank Spike Lab ID: 1398960  
 Date Analyzed: 07/18/2017 22:13

Spike Duplicate ID: LCSD for HBN 1174447  
 [VXX30893]  
 Spike Duplicate Lab ID: 1398961  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447005, 1174447006

## Results by AK101

Parameter	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	12.5	12.1	97	12.5	12.4	99	( 60-120 )	1.90	(< 20 )

### Surrogates

4-Bromofluorobenzene (surr)	1.25	106	106	1.25	107	107	( 50-150 )	0.26	
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## Batch Information

Analytical Batch: **VFC13753**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **ST**

Prep Batch: **VXX30893**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/18/2017 08:00**  
 Spike Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL

Print Date: 07/21/2017 3:37:08PM



## Method Blank

Blank ID: MB for HBN 1763935 [VXX/30893]  
 Blank Lab ID: 1398957

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447005, 1174447006

## Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	6.25U	12.5	4.00	ug/Kg
Ethylbenzene	12.5U	25.0	7.80	ug/Kg
o-Xylene	12.5U	25.0	7.80	ug/Kg
P & M -Xylene	25.0U	50.0	15.0	ug/Kg
Toluene	12.5U	25.0	7.80	ug/Kg

### Surrogates

1,4-Difluorobenzene (surr)	87.2	72-119		%
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## Batch Information

Analytical Batch: VFC13753  
 Analytical Method: SW8021B  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/18/2017 11:09:00PM

Prep Batch: VXX30893  
 Prep Method: SW5035A  
 Prep Date/Time: 7/18/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30893]  
 Blank Spike Lab ID: 1398958  
 Date Analyzed: 07/18/2017 21:35

Spike Duplicate ID: LCSD for HBN 1174447  
 [VXX30893]  
 Spike Duplicate Lab ID: 1398959  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447005, 1174447006

## Results by SW8021B

Parameter	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	1250	1240	99	1250	1210	97	( 75-125 )	2.80	(< 20 )
Ethylbenzene	1250	1270	102	1250	1240	99	( 75-125 )	2.80	(< 20 )
o-Xylene	1250	1260	101	1250	1240	99	( 75-125 )	2.30	(< 20 )
P & M -Xylene	2500	2570	103	2500	2500	100	( 80-125 )	2.90	(< 20 )
Toluene	1250	1280	102	1250	1240	100	( 70-125 )	2.90	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	1250	89.4	89	1250	90.2	90	( 72-119 )	0.89	

## Batch Information

Analytical Batch: **VFC13753**  
 Analytical Method: **SW8021B**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **ST**

Prep Batch: **VXX30893**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/18/2017 08:00**  
 Spike Init Wt./Vol.: 1250 ug/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: 1250 ug/Kg Extract Vol: 25 mL

## Matrix Spike Summary

Original Sample ID: 1174447005  
 MS Sample ID: 1398962 MS  
 MSD Sample ID: 1398963 MSD

Analysis Date: 07/19/2017 1:58  
 Analysis Date: 07/19/2017 2:17  
 Analysis Date: 07/19/2017 2:35  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447005, 1174447006

## Results by SW8021B

Parameter	Sample	Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	10.2U	1274	1205	95	1274	1219	96	75-125	1.20	(< 20 )
Ethylbenzene	20.3U	1274	1209	95	1274	1219	96	75-125	0.88	(< 20 )
o-Xylene	17.9J	1274	1199	93	1274	1211	94	75-125	1.00	(< 20 )
P & M -Xylene	43.5J	2542	2412	93	2542	2425	94	80-125	0.79	(< 20 )
Toluene	38.2J	1274	1215	92	1274	1226	93	70-125	0.92	(< 20 )

## Surrogates

1,4-Difluorobenzene (surr)		1274	1138	89	1274	1141	90	72-119	0.25	
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## Batch Information

Analytical Batch: VFC13753  
 Analytical Method: SW8021B  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/19/2017 2:17:00AM

Prep Batch: VXX30893  
 Prep Method: AK101 Extraction (S)  
 Prep Date/Time: 7/18/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 63.96g  
 Prep Extract Vol: 25.00mL

## Method Blank

Blank ID: MB for HBN 1763955 [VXX/30895]  
 Blank Lab ID: 1399041

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447001, 1174447003

## Results by SW8260C

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	6.25U	12.5	3.90	ug/Kg
Ethylbenzene	12.5U	25.0	7.80	ug/Kg
Naphthalene	12.5U	25.0	7.80	ug/Kg
o-Xylene	12.5U	25.0	7.80	ug/Kg
P & M -Xylene	25.0U	50.0	15.0	ug/Kg
Toluene	12.5U	25.0	7.80	ug/Kg
<b>Surrogates</b>				
1,2-Dichloroethane-D4 (surr)	112	71-136		%
4-Bromofluorobenzene (surr)	102	55-151		%
Toluene-d8 (surr)	104	85-116		%

## Batch Information

Analytical Batch: VMS16948  
 Analytical Method: SW8260C  
 Instrument: VRA Agilent GC/MS 7890B/5977A  
 Analyst: NRO  
 Analytical Date/Time: 7/18/2017 7:24:00PM

Prep Batch: VXX30895  
 Prep Method: SW5035A  
 Prep Date/Time: 7/18/2017 6:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30895]  
 Blank Spike Lab ID: 1399042  
 Date Analyzed: 07/18/2017 19:42

Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447003

## Results by SW8260C

### Blank Spike (ug/Kg)

Parameter	Spike	Result	Rec (%)	CL
Benzene	750	688	92	( 77-121 )
Ethylbenzene	750	754	101	( 76-122 )
Naphthalene	750	686	91	( 62-129 )
o-Xylene	750	746	99	( 77-123 )
P & M -Xylene	1500	1580	105	( 77-124 )
Toluene	750	756	101	( 77-121 )

### Surrogates

1,2-Dichloroethane-D4 (surr)	750	110	110	( 71-136 )
4-Bromofluorobenzene (surr)	750	104	104	( 55-151 )
Toluene-d8 (surr)	750	105	105	( 85-116 )

## Batch Information

Analytical Batch: **VMS16948**  
 Analytical Method: **SW8260C**  
 Instrument: **VRA Agilent GC/MS 7890B/5977A**  
 Analyst: **NRO**

Prep Batch: **VXX30895**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/18/2017 06:00**  
 Spike Init Wt./Vol.: 750 ug/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: Extract Vol:

## Matrix Spike Summary

Original Sample ID: 1174232001  
 MS Sample ID: 1399043 MS  
 MSD Sample ID: 1399044 MSD

Analysis Date: 07/19/2017 1:06  
 Analysis Date: 07/18/2017 20:24  
 Analysis Date: 07/18/2017 20:41  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447003

## Results by SW8260C

Parameter	Sample	Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	16.2U	1558	1294	83	1558	1307	83	77-121	0.12	(< 20 )
Ethylbenzene	32.5U	1558	1457	94	1558	1432	92	76-122	1.80	(< 20 )
o-Xylene	32.5U	1558	1457	93	1558	1445	93	77-123	0.32	(< 20 )
P & M -Xylene	65.0U	3128	3028	97	3128	3028	97	77-124	0.24	(< 20 )
Toluene	32.5U	1558	1470	95	1558	1445	93	77-121	1.80	(< 20 )
<b>Surrogates</b>										
1,2-Dichloroethane-D4 (surr)		1558	1633	105	1558	1696	109	71-136	3.70	
4-Bromofluorobenzene (surr)		2601	2111	81	2601	2048	79	55-151	2.60	
Toluene-d8 (surr)		1558	1646	106	1558	1633	105	85-116	1.10	

## Batch Information

Analytical Batch: VMS16948  
 Analytical Method: SW8260C  
 Instrument: VRA Agilent GC/MS 7890B/5977A  
 Analyst: NRO  
 Analytical Date/Time: 7/18/2017 8:24:01PM

Prep Batch: VXX30895  
 Prep Method: Vol. Extraction SW8260 Field Extracted L  
 Prep Date/Time: 7/18/2017 6:00:00AM  
 Prep Initial Wt./Vol.: 30.15g  
 Prep Extract Vol: 25.00mL

Print Date: 07/21/2017 3:37:17PM

## Method Blank

Blank ID: MB for HBN 1764004 [VXX/30903]  
 Blank Lab ID: 1399275

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447001, 1174447002, 1174447003, 1174447004

## Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.00625U	0.0125	0.00400	mg/Kg
Ethylbenzene	0.0125U	0.0250	0.00780	mg/Kg
Gasoline Range Organics	1.25U	2.50	0.750	mg/Kg
o-Xylene	0.0125U	0.0250	0.00780	mg/Kg
P & M -Xylene	0.0250U	0.0500	0.0150	mg/Kg
Toluene	0.0125U	0.0250	0.00780	mg/Kg
<b>Surrogates</b>				
1,4-Difluorobenzene (surr)	87.7	72-119		%
4-Bromofluorobenzene (surr)	102	50-150		%

## Batch Information

Analytical Batch: VFC13755  
 Analytical Method: AK101  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/19/2017 3:11:00PM

Prep Batch: VXX30903  
 Prep Method: SW5035A  
 Prep Date/Time: 7/19/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30903]  
 Blank Spike Lab ID: 1399276  
 Date Analyzed: 07/19/2017 13:18

Spike Duplicate ID: LCSD for HBN 1174447 [VXX30903]  
 Spike Duplicate Lab ID: 1399277  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447002, 1174447003, 1174447004

## Results by AK101

Parameter	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	1.25	1.16	93	1.25	1.18	95	( 75-125 )	1.70	(< 20 )
Ethylbenzene	1.25	1.18	95	1.25	1.22	98	( 75-125 )	2.90	(< 20 )
o-Xylene	1.25	1.17	93	1.25	1.20	96	( 75-125 )	2.50	(< 20 )
P & M -Xylene	2.50	2.36	94	2.50	2.42	97	( 80-125 )	2.30	(< 20 )
Toluene	1.25	1.18	95	1.25	1.21	96	( 70-125 )	2.00	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	1.25	91.3	91	1.25	90.7	91	( 72-119 )	0.64	

## Batch Information

Analytical Batch: **VFC13755**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **ST**

Prep Batch: **VXX30903**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/19/2017 08:00**  
 Spike Init Wt./Vol.: 1.25 mg/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: 1.25 mg/Kg Extract Vol: 25 mL



## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30903]  
 Blank Spike Lab ID: 1399278  
 Date Analyzed: 07/19/2017 13:56

Spike Duplicate ID: LCSD for HBN 1174447  
 [VXX30903]  
 Spike Duplicate Lab ID: 1399279  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447002, 1174447003, 1174447004

## Results by AK101

Parameter	Blank Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	12.5	12.9	103	12.5	13.5	108	( 60-120 )	4.70	(< 20 )

### Surrogates

4-Bromofluorobenzene (surr)	1.25	105	105	1.25	105	105	( 50-150 )	0.61	
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## Batch Information

Analytical Batch: **VFC13755**  
 Analytical Method: **AK101**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **ST**

Prep Batch: **VXX30903**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/19/2017 08:00**  
 Spike Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: 12.5 mg/Kg Extract Vol: 25 mL

Print Date: 07/21/2017 3:37:19PM

## Matrix Spike Summary

Original Sample ID: 1174574004  
 MS Sample ID: 1399280 MS  
 MSD Sample ID: 1399281 MSD

Analysis Date: 07/19/2017 20:10  
 Analysis Date: 07/19/2017 20:29  
 Analysis Date: 07/19/2017 20:47  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447002, 1174447003, 1174447004

## Results by AK101

Parameter	Sample	Matrix Spike (mg/Kg)			Spike Duplicate (mg/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	0.00650U	1.13	1.07	95	1.13	1.10	97	75-125	2.20	(< 20 )
Ethylbenzene	0.0130U	1.13	1.10	97	1.13	1.11	99	75-125	1.50	(< 20 )
o-Xylene	0.0130U	1.13	1.09	96	1.13	1.10	97	75-125	1.20	(< 20 )
P & M -Xylene	0.0260U	2.25	2.18	97	2.25	2.21	98	80-125	1.40	(< 20 )
Toluene	0.0130U	1.13	1.09	97	1.13	1.11	99	70-125	1.90	(< 20 )
<b>Surrogates</b>										
1,4-Difluorobenzene (surr)		1.13	0.986	87	1.13	1.01	89	72-119	2.20	

## Batch Information

Analytical Batch: VFC13755  
 Analytical Method: AK101  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/19/2017 8:29:00PM

Prep Batch: VXX30903  
 Prep Method: AK101 Extraction (S)  
 Prep Date/Time: 7/19/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 59.12g  
 Prep Extract Vol: 25.00mL

## Method Blank

Blank ID: MB for HBN 1764004 [VXX/30903]  
 Blank Lab ID: 1399275

Matrix: Soil/Solid (dry weight)

QC for Samples:  
 1174447001, 1174447002, 1174447003, 1174447004

## Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	6.25U	12.5	4.00	ug/Kg
Ethylbenzene	12.5U	25.0	7.80	ug/Kg
o-Xylene	12.5U	25.0	7.80	ug/Kg
P & M -Xylene	25.0U	50.0	15.0	ug/Kg
Toluene	12.5U	25.0	7.80	ug/Kg

### Surrogates

1,4-Difluorobenzene (surr)	87.7	72-119		%
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## Batch Information

Analytical Batch: VFC13755  
 Analytical Method: SW8021B  
 Instrument: Agilent 7890A PID/FID  
 Analyst: ST  
 Analytical Date/Time: 7/19/2017 3:11:00PM

Prep Batch: VXX30903  
 Prep Method: SW5035A  
 Prep Date/Time: 7/19/2017 8:00:00AM  
 Prep Initial Wt./Vol.: 50 g  
 Prep Extract Vol: 25 mL

Print Date: 07/21/2017 3:37:21PM

## Blank Spike Summary

Blank Spike ID: LCS for HBN 1174447 [VXX30903]  
 Blank Spike Lab ID: 1399276  
 Date Analyzed: 07/19/2017 13:18

Spike Duplicate ID: LCSD for HBN 1174447 [VXX30903]  
 Spike Duplicate Lab ID: 1399277  
 Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447002, 1174447003, 1174447004

## Results by SW8021B

Parameter	Blank Spike (ug/Kg)			Spike Duplicate (ug/Kg)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	1250	1160	93	1250	1180	95	( 75-125 )	1.70	(< 20 )
Ethylbenzene	1250	1180	95	1250	1220	98	( 75-125 )	2.90	(< 20 )
o-Xylene	1250	1170	93	1250	1200	96	( 75-125 )	2.50	(< 20 )
P & M -Xylene	2500	2360	94	2500	2420	97	( 80-125 )	2.30	(< 20 )
Toluene	1250	1180	95	1250	1210	96	( 70-125 )	2.00	(< 20 )
<b>Surrogates</b>									
1,4-Difluorobenzene (surr)	1250	91.3	91	1250	90.7	91	( 72-119 )	0.64	

## Batch Information

Analytical Batch: **VFC13755**  
 Analytical Method: **SW8021B**  
 Instrument: **Agilent 7890A PID/FID**  
 Analyst: **ST**

Prep Batch: **VXX30903**  
 Prep Method: **SW5035A**  
 Prep Date/Time: **07/19/2017 08:00**  
 Spike Init Wt./Vol.: 1250 ug/Kg Extract Vol: 25 mL  
 Dupe Init Wt./Vol.: 1250 ug/Kg Extract Vol: 25 mL



### Matrix Spike Summary

Original Sample ID: 1174574004  
MS Sample ID: 1399280 MS  
MSD Sample ID: 1399281 MSD

Analysis Date: 07/19/2017 20:10  
Analysis Date: 07/19/2017 20:29  
Analysis Date: 07/19/2017 20:47  
Matrix: Soil/Solid (dry weight)

QC for Samples: 1174447001, 1174447002, 1174447003, 1174447004

### Results by SW8021B

Parameter	Sample	Matrix Spike (ug/Kg)			Spike Duplicate (ug/Kg)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	6.50U	1131	1067	95	1131	1099	97	75-125	2.20	(< 20 )
Ethylbenzene	13.0U	1131	1099	97	1131	1110	99	75-125	1.50	(< 20 )
o-Xylene	13.0U	1131	1089	96	1131	1099	97	75-125	1.20	(< 20 )
P & M -Xylene	25.9U	2252	2177	97	2252	2209	98	80-125	1.40	(< 20 )
Toluene	13.0U	1131	1089	97	1131	1110	99	70-125	1.90	(< 20 )
<b>Surrogates</b>										
1,4-Difluorobenzene (surr)		1131	986	87	1131	1007	89	72-119	2.20	

### Batch Information

Analytical Batch: VFC13755  
Analytical Method: SW8021B  
Instrument: Agilent 7890A PID/FID  
Analyst: ST  
Analytical Date/Time: 7/19/2017 8:29:00PM

Prep Batch: VXX30903  
Prep Method: AK101 Extraction (S)  
Prep Date/Time: 7/19/2017 8:00:00AM  
Prep Initial Wt./Vol.: 59.12g  
Prep Extract Vol: 25.00mL

Print Date: 07/21/2017 3:37:23PM

1174447



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

**CHAIN-OF-CUSTODY RECORD**

Laboratory SAS Page 1 of 1  
Attn: TORI

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

2043 Westport Center Drive  
St. Louis, MO 63146-3564  
(314) 699-9660

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

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

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

3990 Collins Way, Suite 100  
Lake Oswego, OR 97035  
(503) 223-6147

1821 Bannock Street, Suite 200  
Denver, CO 80204  
(303) 825-3800

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	GPO/BTEX	ALIX/BZ/B	GPO/BTEX +	NO <sub>2</sub> /Methane -	mod-9260	Total Number of Containers	Remarks/Matrix
17824 - PB153	①A-B	14:20	7/12/17	✓		✓					2	SOIL SAMPLE
- PB156	②A-B	14:30	↓	✓	✓						2	↓
- PB252	③A-B	15:12	↓	✓		✓					2	↓
- PB352	④A-B	16:01	↓	✓	✓						2	↓
- PB452	⑤A-B	16:44	↓	✓	✓						2	↓
- PB552	⑥A-B	17:34	↓	✓	✓						2	↓
- STB	⑦A	18:00				✓					1	LAB TRIP BLANK

Project Information	Sample Receipt
Project Number: <u>32-1-17824</u>	Total Number of Containers: _____
Project Name: <u>Holy cross</u>	COC Seals/Intact? Y/N/NA: <u>ADSENT</u>
Contact: <u>TWC, DXM</u>	Received Good Cond./Cold: <u>5.2</u>
Ongoing Project? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Delivery Method: <u>HD</u> <u>PO30</u>
Sampler: <u>TWC</u>	(attach shipping bill, if any)

Instructions
Requested Turnaround Time: <u>STANDARD</u>
Special Instructions: <u>LEVEL II REPORT</u>

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

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: <u>[Signature]</u> Time: <u>11:00</u>	Signature: <u>[Signature]</u> Time: <u>16:38</u>	Signature: _____ Time: _____
Printed Name: <u>TREVOR CROSBY</u> Date: <u>7/13/17</u>	Printed Name: <u>TREVOR CROSBY</u> Date: <u>7/13/17</u>	Printed Name: _____ Date: _____
Company: <u>SW</u>	Company: <u>SW</u>	Company: _____
Received By: 1.	Received By: 2.	Received By: 3.
Signature: <u>[Signature]</u> Time: <u>13:18</u>	Signature: _____ Time: _____	Signature: <u>[Signature]</u> Time: <u>16:38</u>
Printed Name: <u>TREVOR CROSBY</u> Date: <u>7/13/17</u>	Printed Name: _____ Date: _____	Printed Name: <u>ANNE COLLE</u> Date: <u>7/13/17</u>
Company: <u>SW</u>	Company: _____	Company: <u>SGS</u>



e-Sample Receipt Form

SGS Workorder #:

1174447



1 1 7 4 4 4 7

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
<b>Chain of Custody / Temperature Requirements</b>	<input checked="" type="checkbox"/> Yes	Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	<input type="checkbox"/> N/A	ABSENT
COC accompanied samples?	<input checked="" type="checkbox"/> Yes	
<input type="checkbox"/> N/A **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required		
Temperature blank compliant* (i.e., 0-6 °C after CF)?	<input checked="" type="checkbox"/> Yes	Cooler ID: 1 @ 5.2 °C Therm. ID: D36
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
	<input type="checkbox"/>	Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	<input type="checkbox"/> N/A	
If <0°C, were sample containers ice free?	<input type="checkbox"/> N/A	
If samples 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 nor cooler temp can be obtained, note "ambient" or "chilled".		
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.		
<b>Holding Time / Documentation / Sample Condition Requirements</b>		Note: Refer to form F-083 "Sample Guide" for specific holding times.
Were samples received within holding time?	<input checked="" type="checkbox"/> Yes	
Do samples <b>match COC**</b> (i.e., sample IDs, dates/times collected)?	<input checked="" type="checkbox"/> Yes	
**Note: If times differ <1hr, record details & login per COC.		
Were analyses requested unambiguous? (i.e., method is specified for analyses with >1 option for analysis)	<input checked="" type="checkbox"/> Yes	
Were proper containers (type/mass/volume/preservative***) used?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> N/A ***Exemption permitted for metals (e.g.200.8/6020A).
<b>Volatile / LL-Hg Requirements</b>		
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	<input checked="" type="checkbox"/> Yes	
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?	<input type="checkbox"/> N/A	
Were all soil VOAs field extracted with MeOH+BFB?	<input checked="" type="checkbox"/> Yes	
<b>Note to Client:</b> Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.		
Additional notes (if applicable):		





## 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>
1174447001-A	No Preservative Required	OK			
1174447001-B	Methanol field pres. 4 C	OK			
1174447002-A	No Preservative Required	OK			
1174447002-B	Methanol field pres. 4 C	OK			
1174447003-A	No Preservative Required	OK			
1174447003-B	Methanol field pres. 4 C	OK			
1174447004-A	No Preservative Required	OK			
1174447004-B	Methanol field pres. 4 C	OK			
1174447005-A	No Preservative Required	OK			
1174447005-B	Methanol field pres. 4 C	OK			
1174447006-A	No Preservative Required	OK			
1174447006-B	Methanol field pres. 4 C	OK			
1174447007-A	Methanol field pres. 4 C	OK			

### 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

**CS Report Name:** Site Characterization Activities  
Holy Cross Oil Company Site  
Holy Cross, Alaska

**Date:** November 2017

**Laboratory Report Date:** July 24, 2017

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

**Completed by:** Trevor Crosby

**Title:** Environmental Scientist

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

**Work Order Number:** 1174447

**ADEC File Number:** 2417.38.002

(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**

Comments: *The samples were not transferred to another "network" laboratory or sub-contracted to an alternate laboratory.*

### 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: *Although not requested, the laboratory also analyzed the trip blank for naphthalene.*

### 3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

**Yes** / No / NA (Please explain.)

Comments: *One cooler was submitted to the laboratory. The temperature blank was 5.2° C.*

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

Comments:

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

Comments:

- d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? **Yes** / No / **NA** (Please explain.)

Comments: *The laboratory did not note any discrepancies.*

- e. Data quality or usability affected? **Yes** / **No** (Please Explain.)

Comments:

#### 4. Case Narrative

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

Comments:

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

Comments:

- *GRO surrogate 4-bromofluorobenzene recovery for Project Samples PB1S3, PB1S6 (duplicate of Sample PB1S3), and PB2S2 do not meet the QC criteria due to matrix interference and dilution.*
- *VOC surrogate 4-bromofluorobenzene recovery for Project Samples PB1S3 and PB2S2 do not meet the QC criteria due to sample dilution.*

- 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:

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

Comments:

- d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes** / No / NA (Please explain.)  
Comments:
- e. Data quality or usability affected? **NA** (Please explain.)  
Comments:

## 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?  
Comments:
- iv. Do the affected sample(s) have data flags? **Yes** / No / **NA**  
Comments:
- If so, are the data flags clearly defined? **Yes** / No / **NA**  
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: *Samples were not tested for metals/inorganics.*
- 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%; 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? **Yes**/ No / NA

Comments:

If so, are the data flags clearly defined? **Yes**/ No / NA

Comments:

- vii. Data quality or usability affected? 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:

- Recovery of GRO surrogate 4-bromofluorobenzene for Project Samples PB1S3, PB1S6 (duplicate of Sample PB1S3), and PB2S2 are above QC criteria.
- Recovery of VOC surrogate 4-bromofluorobenzene for Project Samples PB1S3 and PB2S2 are below QC criteria.

- iii. Do the sample results with failed surrogate recoveries have data flags? **Yes**/ No / NA (Please explain.)

Comments: *Project samples affected by surrogate recovery failures due to matrix interference are flagged “J+” or “J-” on Table 2 of the report, as appropriate.*

If so, are the data flags clearly defined? **Yes**/ No / NA

Comments:

- iv. Data quality or usability affected? Explain.

Comments: *The flagged data are considered estimates biased high and low for the GRO and VOC surrogate failures, respectively.*

**d. Trip Blank** - Volatile analyses only (GRO, BTEX, VOCs, etc.)

- i. One trip blank reported per matrix, analysis and cooler? **Yes** / No / NA (Please explain.)

Comments: *One trip blank, designated STB, was submitted to the laboratory with the project samples.*

- ii. Is the cooler used to transport the trip blank and volatile samples clearly indicated on the COC? **Yes** / **No** / NA (Please explain if NA or no.)

Comments: *Only one cooler was submitted to the laboratory.*

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

Comments: *The trip blank contained estimated (J-flagged) concentrations of toluene (0.0107 mg/kg) and P & M -Xylene (0.0123 mg/kg).*

- iv. If above LOQ, what samples are affected?

Comments: *Toluene and P & M -Xylene were detected at estimated concentrations less than the LOQ in soil Samples PB4S2 and PB5S2. Therefore, results for these samples are reported as non-detect at the LOQ and B-qualified in Table 2.*

- v. Data quality or usability affected? Explain.

Comments: *Data quality/usability is unaffected.*

**e. Field Duplicate**

- i. One field duplicate submitted per matrix, analysis and 10 project samples? **Yes** / No / NA (Please explain.)

Comments: *Sample PB1S6 is a field duplicate of Sample PB1S3.*

- ii. Were the field duplicates 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? Explain. NA

Comments:

- f. Decontamination or Equipment Blank** (if not applicable, a comment stating why must be entered below)

Yes **No** / NA (Please explain.) *The use of a decontamination or equipment blank was not included in our ADEC-approved work plan.*

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

Comments:

- ii.** If results are above LOQ, what samples are affected? **NA**

Comments:

- iii.** Data quality or usability affected? Explain. **NA**

Comments:

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

- a.** Are they defined and appropriate? **Yes** / No / NA

Comments: *A key is provided on Page 3 of the SGS Laboratory Report.*



**ATTACHMENT 5**

**IMPORTANT INFORMATION ABOUT YOUR**

**GEOTECHNICAL/ENVIRONMENTAL REPORT**



Date: November 2017

To: Deloycheet, Inc.

## **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