Site Characterization
Chefornak Light Plant Former Tank Farm and Former Chefarnmute Corporation Tank Farm
Chefornak, Alaska

December 2012

Submitted To:
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TABLE OF CONTENTS

Page

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AK	Alaska Method
bgs	Below ground surface
CCIC	Conditional closure with institutional controls
COC	Contaminant of concern
CSM	Conceptual Site Model
DQO	Data quality objective
DRO	Diesel range organics
EPA	Environmental Protection Agency
GPS	Global Positioning System
LCS/LCSD	Laboratory control sample/laboratory control sample duplicate
mg/kg	Milligrams per kilogram
MS/MSD	Matrix spike/matrix spike duplicate
Oasis	Oasis Environmental
PID	Photoionization detector
ppm	Parts per million
RRO	Residual range organics
SGS	SGS North America Inc.
WGS84	World Geodetic System 1984

SITE CHARACTERIZATION
CHEFORNAK LIGHT PLANT FORMER TANK FARM AND FORMER CHEFARNMUTE CORPORATION TANK FARM,
CHEFORNAK, ALASKA
ADEC FILE NUMBERS 2408.38.002 AND 2408.38.005

1.0 INTRODUCTION

This report presents the results of our site characterizations at the Chefornak Light Plant Former Tank Farm and Former Chefarnmute Corporation Tank Farm located in Chefornak, Alaska. Both sites are listed on the Alaska Department of Environmental Conservation (ADEC) contaminated site database as File No. 2408.38.002 (Chefornak Light Plant) and 2408.38.005 (Chefarnmute Tank Farm). The project purpose is to collect data to assess the each site's potential eligibility for closure with institutional controls (Cleanup Complete with Institutional Controls [CCIC]) without further remedial action. The specific data collection objectives are to evaluate and define the extent of soil contamination associated with the former tank farms.

The project tasks were conducted in accordance with our September 13, 2012 work plan, which was approved by Grant Lidren of the ADEC on September 14, 2012. Authorization to proceed with the project described in this report was provided by Alexic Jimmy of the City of Chefornak, in the form of a signed proposal dated September 6, 2012.

2.0 PROJECT DESCRIPTION AND BACKGROUND

The former Chefornak Light Plant Former Tank Farm is located adjacent to the Former Chefarnmute Corporation Tank Farm in the Village of Chefornak. A vicinity map is provided as Figure 1. Although there were no known or documented large spills related to the tank farms, diesel contamination is suspected to be associated with the former site activities.

Oasis Environmental (Oasis) conducted a site assessment for both sites in August 2001. At the Chefornak Light Plant Former Tank Farm, 16 shallow test pits were advanced and six shallow soil analytical samples were collected between 0.7 foot and 2 feet below ground surface (bgs). Diesel range organic (DRO) concentrations exceeded the ADEC Method 2 Cleanup Level (250 milligrams per kilogram [mg/kg]) in three of the samples. In the soil borings where samples were collected from two depths, the concentrations appeared to decrease to concentrations less than the ADEC Method 2 Cleanup Level in the deeper of the two samples. The approximate locations of these soil samples are shown on Figure 2.

At the Former Chefarnmute Corporation Tank Farm 25 shallow test pits were advanced by OASIS in 2001. Seven shallow soil analytical samples were collected from between 1 foot and 2

feet bgs. DRO concentrations exceeded the ADEC Method 2 Cleanup Level in two of the samples, both collected from 2 feet bgs. The approximate location of these soil samples are shown on Figure 3.

3.0 FIELD ACTIVITES

A total of seventeen hand borings were advanced during the project, nine (designated Borings B1 through B-9) on the Chefornak Light Plant Former Tank Farm site and eight (designated Borings B10 through B17) on the Former Chefarnmute Corporation Tank Farm site. The sampling activities were conducted on September 18, 2012 and were performed by an ADEC-Qualified Person as defined by 18 AAC 75.990. Photographs of field activities are included in Appendix A.

At the time of the September 18, 2012 site visit, the Chefornak Light Plant Former Tank Farm site was largely vegetated and two connex containers were observed at the northern portion of site adjacent to the road, as shown in Photo 1 included in Appendix A. The Former Chefarnmute Corporation Tank Farm site was similarly vegetated and no structures were observed on the site (Photo 2). Ponded water was observed at both sites as shown in Photos 3 and 4.

Prior to conducting the hand boring activities, local personnel knowledgeable of the area were contacted to identify utilities within the project areas. The boring locations were chosen based on the approximate location of previous samples collected by OASIS in 2001 and were placed laterally outward from each of the OASIS locations. The hand boring locations were recorded with a hand held global positioning system (GPS) receiver in World Geodetic System 1984 (WGS84) format. The GPS points were recorded in the field notes, which are included as Appendix B.

Field screening and analytical samples were collected from each location following procedures outlined in our ADEC approved work plan. As such, soil samples collected from the hand borings were “screened” for organic vapors using a photoionization detector (PID) calibrated with 100 parts per million (ppm) isobutylene standard gas. The PID was used to sample the volatile vapors released from the soil using an ADEC-approved headspace sampling method. Headspace samples were collected in re-sealable plastic bags by filling them with freshly exposed soil to between one-third to one-half of capacity and then sealed at the top. Headspace samples were warmed to at least 40ºF and allowed to develop for at least 10 minutes prior to field headspace screening. Field PID readings were obtained within 60 minutes of the sample collection and the maximum reading was recorded in the field notes. Each sample was also visually classified. The results of the field screening and classification are included in Table 1.

Most sample locations were covered with a vegetative mat from 0 to 1 foot bgs; therefore, samples were collected below 1 foot bgs.

A total of nine hand borings were advanced at the Chefornak Light Plant Former Tank Farm site. The hand borings generally extended to depths of approximately 1.5 to 2.5 feet bgs. Borings B4 and B7 were extended to approximately 3 feet bgs based on field observations of contamination. With the exception of Boring B6, at least two samples were obtained from the hand borings which extended to 1.5 to 2.5 feet bgs. Boring B6 could not be advanced further due to a cobble located at approximately 1 foot bgs in the boring. Three field screening samples each were collected from Borings B4 and B7.

Eight hand borings were advanced at the Former Chefarnmute Corporation Tank Farm site. The bottom of the hand borings ranged in depths from 1.2 feet bgs (Boring B17) to 4 feet bgs (Boring B10). With the exception of Borings B10 and B15, two screening samples were collected from each boring. Three field screening samples each were collected from Borings B10 and B15 based on field observations of contamination.

Upon the completion of sampling, all excavated material was backfilled in to their individual borings with excess material spread on the ground surface near the backfilled holes. All water used to decontaminate the hand shovel was discharged to the ground surface at the sites.

4.0 LABORATORY ANALYSIS

Based on the field screening results, a total of 18 soil samples, including two duplicates, were collected and submitted to SGS North America, Inc. (SGS) for laboratory analysis. The samples were submitted for DRO by Alaska Method (AK) 102 and residual range organics (RRO) analysis by AK 103.

Under the sample numbering scheme used for this project, a typical analytical sample identification number is “17533-B1-1” for the soil samples. The ‘17533-’ portion of the ID indicates the Shannon & Wilson job number, the ‘B1’ is for the hand boring, and the ‘1’ is the sample identification number. For brevity in the text of this report, the ‘17533-’ prefix is omitted.

5.0 SUBSURFACE CONDITIONS

From the ground surface to approximately 1 foot bgs, both sites appear to be covered by a vegetative mat. Below the mat, from approximately 1 to 4 feet bgs, the subsurface soil generally consists of a gray, moist, silt across both sites. Ponded surface water was observed at both sites,

and water was encountered at the base of each borehole. A representative borehole filled with water is included as Photo 5.

6.0 DISCUSSION OF RESULTS

The soil sample results are compared to the most stringent ADEC Method Two cleanup levels listed in 18 AAC 75.341 (April 2012), Table B2 for the "under 40 inch (precipitation) zone". The applicable cleanup levels are provided in Table 2 with the associated sample results.

6.1 Chefornak Light Plant Former Tank Farm

Nine analytical samples (including one duplicate sample) were collected from the Chefornak Light Plant Former Tank Farm site. Concentrations of DRO exceeding the ADEC Method 2 Cleanup Level of 250 mg/kg were measured in three of the samples, including Samples B8-1, B8-3 (duplicate of B8-1), and B7-2. The highest DRO concentration (643 mg/kg) was measured in Sample B8-1. The remaining samples contained concentrations of DRO less than the applicable cleanup level. Concentrations of RRO were detected in each of the samples but at concentrations less than the applicable cleanup level.

Boreholes B7 and B8 were located outside the approximate area of stressed vegetation, but within the path of the surface drainage from the site.

6.2 Former Chefarnmute Corporation Tank Farm

At the Former Chefarnmute Corporation Tank Farm site nine analytical samples, including one duplicate sample, were collected for analytical testing. DRO was detected in two of the nine soil samples at concentrations that exceeded the ADEC Method 2 Cleanup Level of 250 mg/kg. The highest DRO concentration was measured in Sample B15-2 which contained 18,600 mg/kg DRO. Boring B15 was located along the eastern portion of the stressed vegetation area (shown on Figure 3) and adjacent to the southern former AST location. It is noted that the DRO concentration in Sample B15-2 exceeds the ADEC's maximum allowable concentration (12,500 mg/kg DRO).

A DRO concentration of 262 mg/kg was detected in Sample B18-2 which was a duplicate of Sample B10-2 (186 mg/kg DRO). Boring B10 was positioned in the southeastern portion of the stressed vegetation area adjacent to the new fuel lines running parallel to the road.

The remaining analytical samples did not contain concentrations of DRO or RRO greater than the applicable cleanup levels.

6.3 Quality Assurance/Quality Control

The project laboratory follows on-going quality control procedures to evaluate conformance to applicable ADEC data quality objectives (DQOs). Internal laboratory controls to address data quality for this project include surrogate spikes, method blanks, matrix spike/matrix spike duplicates (MS/MSD), and laboratory control sample/laboratory control sample duplicates (LCS/LCSD) to determine recovery rates, precision, accuracy, and matrix bias. If a DQO was not met, the project laboratory provides a brief narrative identifying the problem in the Case Narrative of their Laboratory Report (See Appendix C).

Two duplicate sample sets, Samples B8-1 and B8-3, and Sample B10-2 and B18-2 were collected to assess sample homogeneity and analytical precision for the project. DRO and RRO were detected in both samples sets and the relative percent difference for each analyte was within their respective DQOs of 50 percent for soil. Based on our opinion the data is usable for the purpose of this project.

Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review Checklist, which is included in Appendix C. Surrogate recoveries exceeded the DQO (biased low) for DRO in Sample B15-2. This result is flagged as an estimate in Table 2. No other non-conformances that would adversely affected data quality or usability were found.

7.0 CONCEPTUAL SITE MODEL

Two Conceptual Site Models (CSMs) were prepared to identify known and potential exposure pathways associated with contaminants of concern at the Chefornak Light Plant Former Tank Farm site, ADEC File No. 2408.38.002 and the Former Chefarnmute Corporation Tank Farm site, ADEC File No. 2408.38.005. The CSMs were developed in general accordance with the ADEC's Policy Guidance on Developing Conceptual Site Models (October 2010), using ADEC's CSM Human Health Graphic and Scoping Forms. Method 2 soil cleanup levels listed in Tables B1 and B2, 18 AA 75.341, were used for the CSM to assess the risk associated with the exposure pathways. Copies of the Human Health Graphic and Scoping Forms are included as Appendix D. The CSM for each site includes a discussion of exposure routes, potential receptors, and potentially complete or complete exposure pathways.

7.1 Chefornak Light Plant Former Tank Farm – ADEC File No. 2408.38.002

The CSM for the Chefornak Light Plant Former Tank Farm site is based on the current site use as undeveloped and presently not in use. Potential current receptors include commercial site workers, visitors, and trespassers. Residents and construction workers are reasonably considered potential future receptors.

The primary contaminant of concern (COC) for this site is DRO because it was detected at a concentration greater than the ADEC Method 2 soil cleanup level. RRO is a secondary COC because it was detected at the site but at concentrations less than the most stringent applicable Method 2 soil cleanup levels. When concentrations are less than 1/10th the applicable ADEC Method 2 cleanup levels for the corresponding exposure pathways, the pathway can be considered insignificant per ADEC guidance.

7.1.1 Soil Ingestion

The incidental soil ingestion exposure pathway is complete for current and future on-site commercial workers, site visitors, trespassers and/or construction workers as well as future residents. However, because the concentrations of COCs found in the soil samples are less than 1/10th the ADEC direct contact cleanup levels, this pathway is considered insignificant.

7.1.2 Groundwater Ingestion, Dermal Absorption of Contaminants in Groundwater, and Inhalation of Volatile Compounds in Tap Water

Groundwater ingestion, dermal absorption, and inhalation of volatile compounds in tap water are considered complete exposure pathways for future on-site commercial workers, construction workers, or future residents because concentrations of COCs found in several soil samples collected exceed the ADEC migration to groundwater screening level.

While DRO concentrations were detected in the soil samples collected from this site, the presence of impacted groundwater water has not been determined. Groundwater is not currently used as a drinking water source at this site; however, it is possible that groundwater could be used in the future as a drinking water source. Further investigation of this pathway would be necessary if the current land use was changed and/or prior to installation of a drinking water well at this site. Groundwater ingestion, dermal absorption, and inhalation of volatile compounds in tap water remain potentially complete pathways for the future.

7.1.3 Outdoor Air Inhalation and Indoor Air Inhalation/Vapor Intrusion

Volatile COCs have the potential to impact receptors through outdoor air inhalation. The presence of DRO and RRO concentrations in soil within the top 15 feet bgs creates a potentially complete exposure pathway for outdoor air inhalation for current and/or future site users. However, the concentrations in soil for these contaminants are less than 1/10th the Table B2 Method Two Inhalation criteria, and therefore this pathway is considered insignificant.

Based on the information provided in Note 3 of Appendix D of the ADEC CSM Guidance the "DEC does not require evaluation of petroleum ranges GRO, DRO, or RRO for the indoor air inhalation (vapor intrusion) pathway." As such, this pathway was not further evaluated.

7.1.4 Dermal Absorption of Surface Water

The presence of impacted surface water has not been documented at the site; however, surface water at the site has the potential be impacted by contaminated soil documented at the site. Analytical results indicated that shallow subsurface soil samples collected exceed the ADEC migration to groundwater screening level in couple of locations. It is unknown if the surface water is seasonal, but it does not appear to be of sufficient volume to be used as a viable drinking water source for human consumption or for other household use (bathing/cleaning). The ingestion of surface water pathway is considered incomplete for human risk assessment purposes.

7.1.5 CSM Summary

Complete or potentially complete exposure pathways have been identified at the subject site. Potentially complete pathways for future residents, commercial or industrial workers, site visitors, trespassers, recreational users, or construction workers include ingestion of groundwater, dermal absorption of contaminants in groundwater, and inhalation of volatile compounds in tap water. It is important to note that these pathways are only a concern if the current land use changes and a water well is installed at this site.

7.2 Former Chefarnmute Corporation Tank Farm – ADEC File No. 2408.38.005

The CSM for the Former Chefarnmute Corporation Tank Farm site site is based on the current site use as undeveloped and presently not in use. Potential current receptors include commercial site workers, visitors, and trespassers. Residents and construction workers are reasonably considered potential future receptors.

The primary COC for this site is DRO because it was detected at a concentration greater than the ADEC Method 2 soil cleanup level. RRO is a secondary COC because it was detected at the site but at concentrations less than the most stringent applicable Method 2 soil cleanup levels. When concentrations are less than $1/10^{th}$ the applicable ADEC Method 2 cleanup levels for the corresponding exposure pathways, the pathway can be considered insignificant per ADEC guidance.

7.2.1 Soil Ingestion

The incidental soil ingestion exposure pathway is complete for current and future on-site commercial workers, site visitors, trespassers and/or construction workers as well as future residents. One soil sample, Sample B15-2, contained concentrations of DRO that exceed the ADEC ingestion cleanup level of 10,250 mg/kg DRO. The presence of vegetation and surface water at the site may reduce the significance of this pathway; however, this pathway remains complete for future residents and construction workers and current and/or future commercial/industrial workers, site visitors, trespassers, and recreational users.

7.2.2 Groundwater Ingestion, Dermal Absorption of Contaminants in Groundwater, and Inhalation of Volatile Compounds in Tap Water

Groundwater ingestion, dermal absorption, and inhalation of volatile compounds in tap water are considered complete exposure pathways for future on-site commercial workers, construction workers, or future residents because concentrations of COCs found in several soil samples collected exceed the ADEC migration to groundwater screening level.

While DRO concentrations were detected in the soil samples collected from this site, the presence of impacted groundwater water has not been determined. Groundwater is not currently used as a drinking water source at this site; however, it is possible that groundwater could be used in the future as a drinking water source. Further investigation of this pathway would be necessary if the current land use was changed and/or prior to installation of a drinking water well at this site. Groundwater ingestion, dermal absorption, and inhalation of volatile compounds in tap water remain potentially complete pathways for the future.

7.2.3 Outdoor Air Inhalation and Indoor Air Inhalation/Vapor Intrusion

Volatile COCs have the potential to impact receptors through outdoor air inhalation. The presence of DRO, and RRO, concentrations in soil within the top 15 feet bgs creates a potentially complete exposure pathway for current and/or future site users. One soil sample, Sample B15-2, contained concentrations of DRO that exceed the ADEC ingestion cleanup level of 12,500 mg/kg DRO. The outdoor air inhalation pathway remains complete for future residents and construction workers, and for current and/or future commercial or industrial workers, site visitors, trespassers, or recreational users.

Based on the information provided in Note 3 of Appendix D of the ADEC CSM Guidance the "DEC does not require evaluation of petroleum ranges GRO, DRO, or RRO for the indoor air inhalation (vapor intrusion) pathway." As such, this pathway was not further evaluated.

7.2.4 Dermal Absorption of Surface Water

The presence of impacted surface water has not been documented at the site; however, surface water at the site has the potential be impacted by contaminated soil documented at the site. Analytical results indicated that shallow subsurface soil samples collected exceed the ADEC migration to groundwater screening level in couple of locations. It is unknown if the surface water is seasonal, but it does not appear to be of sufficient volume to be used as a viable drinking water source for human consumption or for other household use (bathing/cleaning). The ingestion of surface water pathway is considered incomplete for human risk assessment purposes.

7.2.5 CSM Summary

Complete or potentially complete exposure pathways have been identified at the subject site. In particular, proposed construction activities may result in construction workers having direct contact with potentially contaminated soil and ground/surface water.

Potentially complete pathways for future residents, commercial or industrial workers, site visitors, trespassers, recreational users, or construction workers include incidental soil ingestion, ingestion of groundwater, dermal absorption of contaminants in groundwater, inhalation of volatile compounds in tap water, and inhalation of outdoor air. It is important to note that the ingestion of groundwater, dermal absorption of contaminants in groundwater, and inhalation of volatile compounds in tap water pathways are only a concern if the current land use changes and a water well is installed at this site.

8.0 SUMMARY AND CONCLUSIONS

Shannon & Wilson conducted a site characterization on two sites on September 18, 2012, which included advancing nine hand borings on the Chefornak Light Plant Former Tank Farm site, and eight hand borings on the Former Chefarnmute Corporation Tank Farm site in locations laterally located outward from locations previously sampled by OASIS in August 2001. Soil samples were collected from select borings on each site for analytical analysis.

Analytical results of the soil samples collected on the Chefornak Light Plant Former Tank Farm site indicate that DRO was present at concentrations that exceed the ADEC cleanup level in two locations. Even though the detected concentrations exceeded state cleanup levels in these locations, they were less than previously detected concentrations of samples collected in the same area in August 2001. Sample results from the remaining soil samples did not contain contaminant concentrations for either DRO or RRO greater than their individual ADEC cleanup levels.

The analytical results of the soil samples collected on the Former Chefarnmute Corporation Tank Farm indicate that DRO and RRO are present in all of the samples collected at concentrations that were similar to previously detected concentrations of samples collected during the August 2001 site assessment. DRO was detected in two locations on the site that did exceed ADEC cleanup levels with one of the samples, Sample B15-1, containing a concentration of 18,600 mg/kg which was significantly higher than any of the samples collected on the site. Sample B15-1 is located adjacent to the location of former ASTs.

The DRO and RRO contamination at both sites have been largely delineated, although the extent of contamination is unknown in the vicinity of Boring B15. Based on our evaluation of potentially complete exposure pathways, these sites may be eligible for conditional closure with institutional controls. It is noted that the ADEC may require remediation of the DRO impacted soil in the vicinity of Boring B15 as it exceeds the ADEC's maximum allowable concentration.

9.0 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 we conducted for this project. As a result, the analyses and sampling performed can only provide you with our professional judgment as to the environmental characteristics of this site, and in no way guarantee that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes due to natural forces or human activity can occur on the site. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

Shannon & Wilson has prepared the attachment in Appendix E, "Important Information About Your Geotechnical/Environmental Report," to assist you 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 except upon your authorization or as required by law.

Copies of documents that may be relied upon by our client are limited to the printed copies (also known as hard copies) that are signed or sealed by Shannon & Wilson with a wet, blue ink signature. Files provided in electronic media format are furnished solely for the convenience of the client. Any conclusion or information obtained or derived from such electronic files shall be

at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, or you question the authenticity of the report please contact the undersigned.

We appreciate this opportunity to be of service and your confidence in our firm. If you have questions or comments concerning this report, please call the undersigned at (907) 561-2120.

SHANNON & WILSON, INC.

Shayla Marshall
Senior Scientist

Stafford Glashan, P.E.
Vice President

TABLE 1
SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location (See Figures 2 and 3)	Depth (feet)	Headspace (ppm) ^	Sample Classification
Hand Borings					
Chefornak Light Plant Former Tank Farm Samples					
* B1-1	9/18/2012	Boring B1, Sample 1	1	0.8	Brown -gray, SILT; moist
B1-2	9/18/2012	Boring B1, Sample 2	1.5	0.2	Gray, SILT; moist
B2-1	9/18/2012	Boring B2, Sample 1	1	0.8	Gray, SILT; moist
B2-2	9/18/2012	Boring B2, Sample 2	1.5	0.2	Gray, SILT; moist
* B3-1	9/18/2012	Boring B3, Sample 1	1	2.0	Gray, SILT; moist
B3-2	9/18/2012	Boring B3, Sample 2	1.5	1.4	Gray, SILT; moist
B4-1	9/18/2012	Boring B4, Sample 1	1	0.6	Gray, SILT; moist
B4-2	9/18/2012	Boring B4, Sample 2	1.5-2	1.4	Gray, SILT; moist
* B4-3	9/18/2012	Boring B4, Sample 3	2.5-3	1.9	Black, SILT; moist
* B5-1	9/18/2012	Boring B5, Sample 1	1-2	28	Gray, SILT; moist; hydrocarbon odor
B5-2	9/18/2012	Boring B5, Sample 2	2-2.5	4.8	Gray, SILT; moist
* B6-1	9/18/2012	Boring B6, Sample 1	0.5-1	0.9	Gray, SILT; moist
B7-1	9/18/2012	Boring B7, Sample 1	1	-	No recovery, encountered sand bag fabric
* B7-2	9/18/2012	Boring B7, Sample 2	1.5-2	32	Gray, SILT; moist
B7-3	9/18/2012	Boring B7, Sample 3	2.5-3	4.8	Gray, SILT; moist
* B8-1	9/18/2012	Boring B8, Sample 1	0.5-1	85	Gray, SILT; moist
* B8-3	9/18/2012	Duplicate of Sample B8-1	0.5-1	85	Gray, SILT; moist
B8-2	9/18/2012	Boring B8, Sample 2	1.5-2	42	Gray, SILT; moist
* B9-1	9/18/2012	Boring B9, Sample 1	1-1.5	0.4	Gray, SILT; moist
B9-2	9/18/2012	Boring B9, Sample 2	2	0.3	Black, SILT; moist

Notes:

* = Sample analyzed by the project laboratory (See Table 2)

^ = Field screening instrument was a Thermo Environmental Instruments Organic Vapor Meter 580B photoionization detector (PID).

- = Measurement not recorded or not applicable

ppm = parts per million

TABLE 1
SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location (See Figures 2 and 3)	Depth (feet)	Headspace (ppm) ^	Sample Classification
Hand Borings					
Former Chefarnmute Corporation Tank Farm Samples					
B10-1	9/18/2012	Boring B10, Sample 1	1.5-2	23	Gray, SILT; wet; hydrocarbon odor
* B10-2	9/18/2012	Boring B10, Sample 2	2.5-3	25	Gray, SILT; moist; hydrocarbon odor
* B18-2	9/18/2012	Duplicate of B10-2	2.5-3	25	Gray, SILT; moist; hydrocarbon odor
B10-3	9/18/2012	Boring B10, Sample 3	3.5-4	24	Black, SILT; moist
B11-1	9/18/2012	Boring B11, Sample 1	1.5-2	2.7	Gray, SILT; moist
* B11-2	9/18/2012	Boring B11, Sample 2	2.5-3	4.5	Gray, SILT; moist
B12-1	9/18/2012	Boring B12, Sample 1	0.5-1	1.7	Gray, SILT; moist
* B12-2	9/18/2012	Boring B12, Sample 2	1.5-2	1.7	Gray, SILT; moist
* B13-1	9/18/2012	Boring B13, Sample 1	1.5-2	1.3	Gray, SILT; moist
B13-2	9/18/2012	Boring B13, Sample 2	2.5-3	0.7	Gray, SILT; moist
* B14-1	9/18/2012	Boring B14, Sample 1	1	1.3	Gray, SILT; moist
B14-2	9/18/2012	Boring B14, Sample 2	1.5-2	0.9	Gray, SILT; moist
B15-1	9/18/2012	Boring B15, Sample 1	0.5-1	580	Gray, SILT; moist; hydrocarbon odor
* B15-2	9/18/2012	Boring B15, Sample 2	1.5-2	650	Gray, SILT; moist; hydrocarbon odor
B15-3	9/18/2012	Boring B15, Sample 3	2.5-3	430	Gray, SILT; moist; hydrocarbon odor
* B16-1	9/18/2012	Boring B16, Sample 1	1-1.5	360	Gray, SILT; moist; hydrocarbon odor
B16-2	9/18/2012	Boring B16, Sample 2	2-2.5	250	Gray, SILT; moist; hydrocarbon odor
* B17-1	9/18/2012	Boring B17, Sample 1	0.5-1	6.2	Gray, SILT; moist
B17-2	9/18/2012	Boring B17, Sample 2	1.2	5.2	Gray, SILT; moist

Notes:

* = Sample analyzed by the project laboratory (See Table 2)

^ = Field screening instrument was a Thermo Environmental Instruments Organic Vapor Meter 580B photoionization detector (PID).

\- = Measurement not recorded or not applicable

ppm = parts per million

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level** (mg/kg)	Sample Source, ID Number^, and Collection Depth in Feet (See Table 1, Figures 2 and 3, and Appendix C)								
			Chefornak Light Plant Former Tank Farm Samples								
			B1-1	B3-1	B4-3	B5-1	B6-1	B7-2	B8-1	B8-3~	B9-1
			1	1	2.5-3	1-2	0.5-1	1.5-2	0.5-1	0.5-1	1-1.5
PID Headspace Reading - ppm	580B PID	-	0.8	2.0	1.9	28	0.9	32	85	85	0.4
Total Solids - percent	SM 20 2540G	-	48.2	64.3	63.1	62.7	61.6	71.9	65.4	67.7	69.6
Diesel Range Organics (DRO) - mg/kg	AK 102	250	**213**	**156**	**33.7**	**107**	**198**	**277**	**643**	**434**	**86.3**
Residual Range Organics (RRO) - mg/kg	AK 103	10,000	**1,840**	**1,560**	**295**	**539**	**922**	**636**	**665**	**679**	**841**

Parameter Tested	Method*	Cleanup Level** (mg/kg)	Sample Source, ID Number^, and Collection Depth in Feet (See Table 1, Figures 2 and 3, and Appendix C)								
			Former Chefarnmute Corporation Tank Farm Samples								
			B10-2	B18-2~	B11-2	B12-2	B13-1	B14-1	B15-2	B16-1	B17-1
			2.5-3	2.5-3	2.5-3	1.5-2	1.5-2	1	1.5-2	1-1.5	0.5-1
PID Headspace Reading - ppm	580B PID	-	25	25	4.5	1.7	1.3	1.3	650	360	6.2
Total Solids - percent	SM 20 2540G	-	59.9	61.9	64.9	72.6	69.9	65.7	61.3	66.9	63.9
Diesel Range Organics (DRO) - mg/kg	AK 102	250	**186**	**262**	**43.9**	**37.2**	**69.1**	**227**	**18,600 J-**	**135**	**64.8**
Residual Range Organics (RRO) - mg/kg	AK 103	10,000	**420**	**452**	**488**	**414**	**803**	**552**	**644**	**877**	**507**

Notes:

* See Appendix C for compounds tested, methods, and laboratory reporting limits

** Soil cleanup level is the most stringent standard listed in Table B1 or B2, 18 AAC 75, for the "under 40 inches (precipitation) zone" (April 2012)

^ Sample ID No. preceded by "17533-" on the chain of custody form

262 = Sample result is greater than the ADEC cleanup level

ppm = Parts per million

mg/kg = Milligram per kilogram

\- = Not applicable or sample not tested for this analyte

J- = Result is an estimated concentration (biased low) due to surrogate recovery

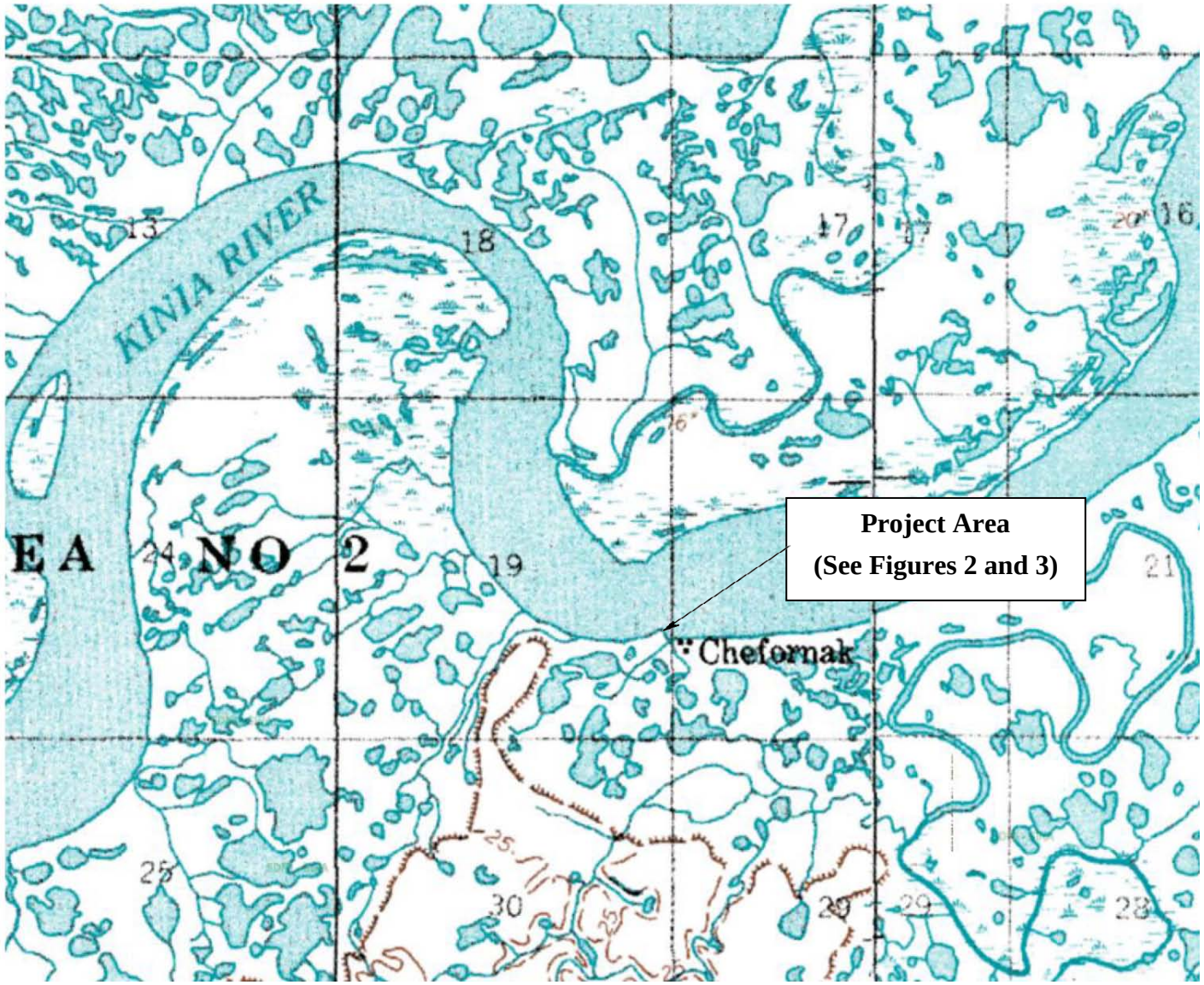
~ = Duplicate of preceding sample

TABLE 3
QUALITY CONTROL DATA

Parameter	Primary Sample B8-1	Duplicate Sample B8-3	Precision (RPD)	Precision QC Limit
Total Solids - percent	65.4	67.7	3%	50%
Diesel Range Organics (DRO) - mg/kg	**643**	**434**	39%	50%
Residual Range Organics (RRO) - mg/kg	**665**	**679**	2%	50%
Parameter	**Primary Sample B10-2**	**Duplicate Sample B18-2**	**Precision (RPD)**	**Precision QC Limit**
Total Solids - percent	59.9	61.9	3%	50%
Diesel Range Organics (DRO) - mg/kg	**186**	**262**	34%	50%
Residual Range Organics (RRO) - mg/kg	**420**	**452**	7%	50%

Notes:

RPD	Relative Percent Difference
QC	Quality Control
mg/kg	Milligrams per kilogram



0 0.5 1.0

Approximate Scale in Miles

Elevation in Feet
Taken From
Baird Inlet A-7
U.S. Geological Survey

N

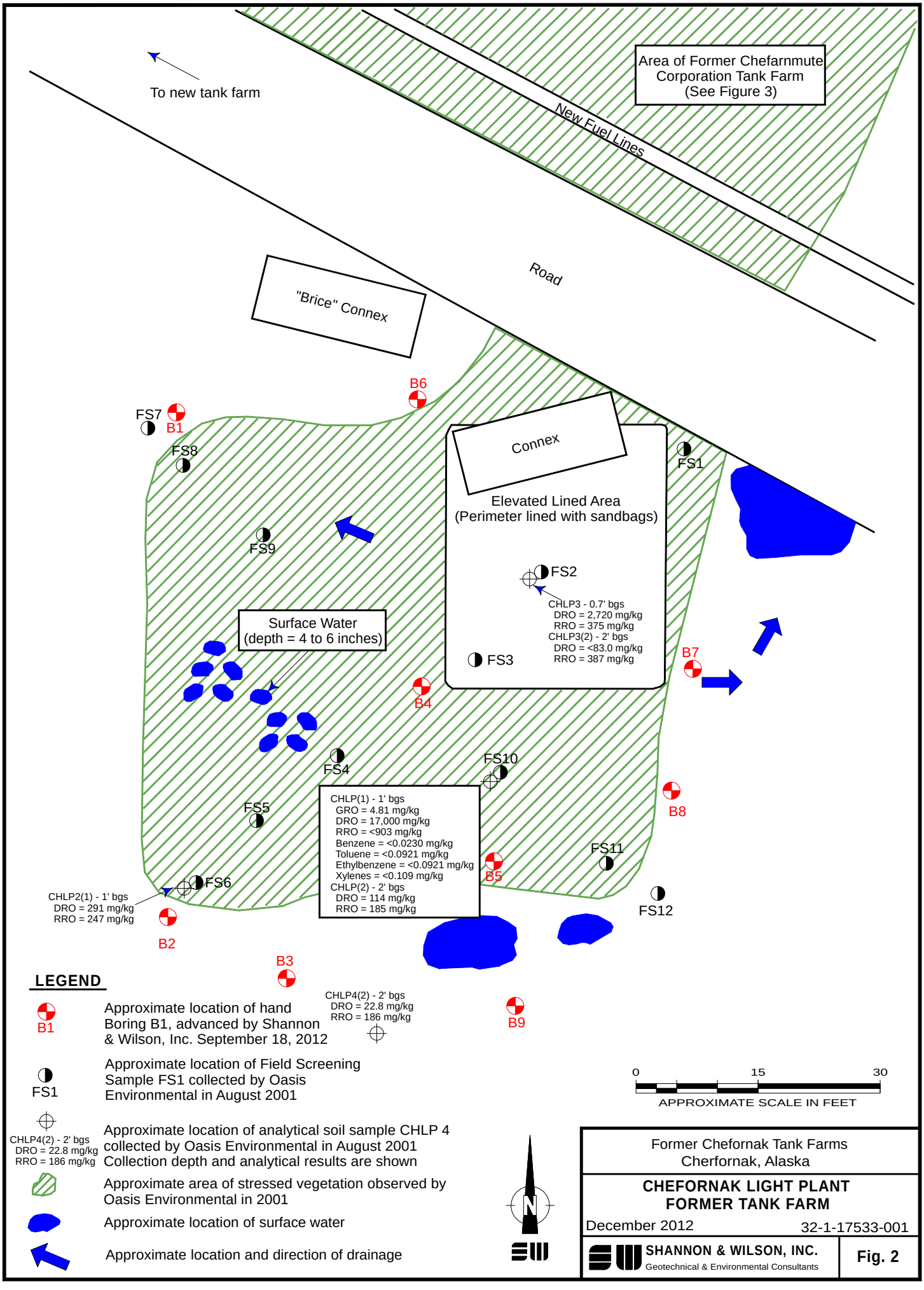
Former Chefornak Tank Farms
Chefornak, Alaska

VICINITY MAP

December 2012 32-1-17533-001

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 1



Former Chefornak Tank Farms
Cherfornak, Alaska

CHEFORNAK LIGHT PLANT FORMER TANK FARM

December 2012 32-1-17533-001

SHANNON & WILSON, INC.
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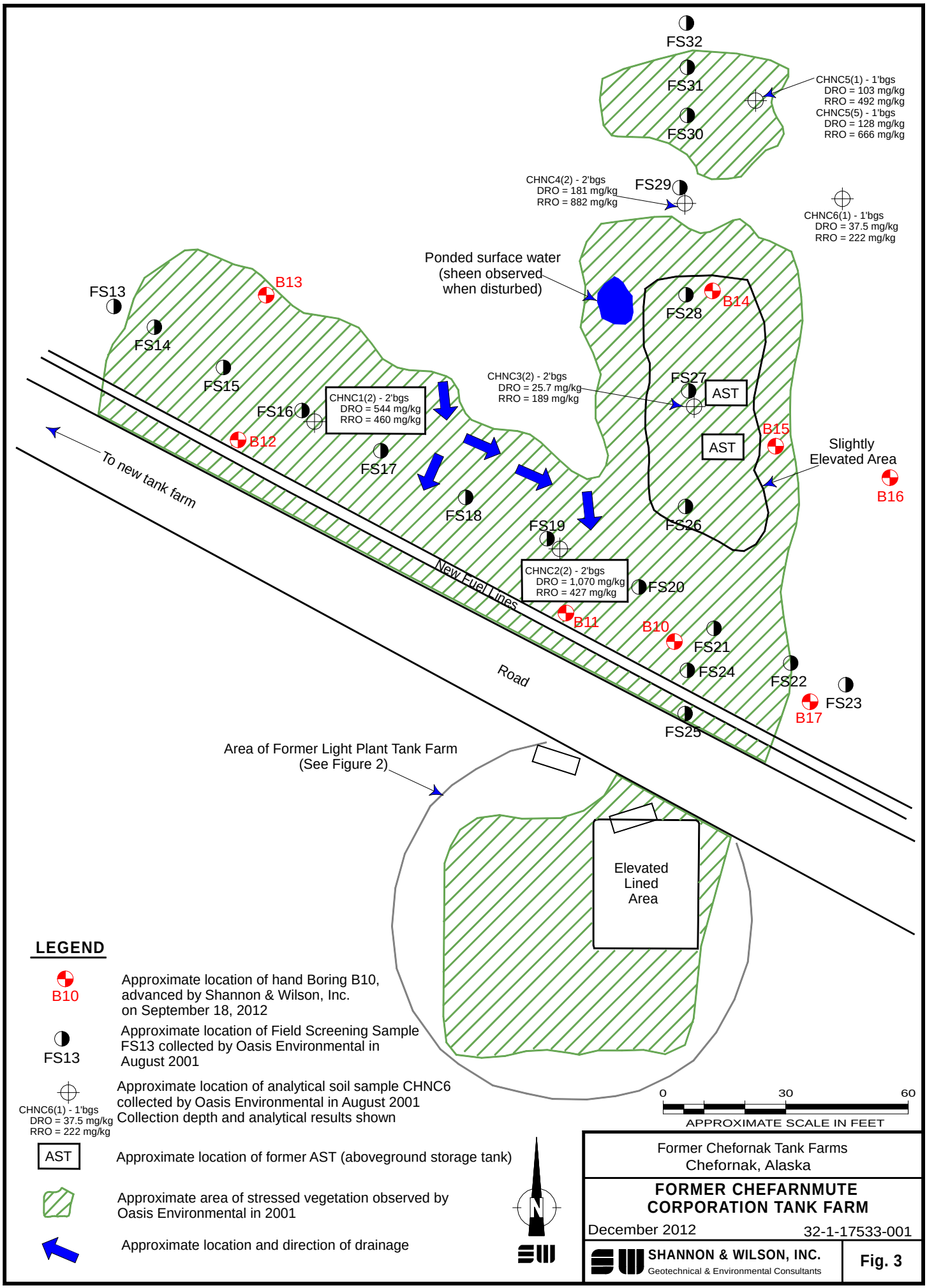
Fig. 2



Former Chefornak Tank Farms
Chefornak, Alaska

FORMER CHEFARNMUTE CORPORATION TANK FARM

December 2012 32-1-17533-001

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 3

APPENDIX A

SITE PHOTOGRAPHS

Photo 1: Looking north at the Chefornak Light Plant Former Tank Farm location. (9/18/2012)

Photo 2: Looking northwest at the location of the Former Chefarnmute Tank Farm. (9/18/2012)

Photo 3: Looking north at standing water on the Chefornak Light Plant Former Tank Farm site. (9/18/2012)

Photo 4: Looking southeast at standing water on the former Chefarnmute Tank Farm site. (9/18/2012)

Photo 5: Looking at the location of Sample B1-1 collected at the Chefornak Light Plant Former Tank Farm. Water with an organic sheen was encountered in the bore hole. (9/18/2012)

Former Chefornak Tank Farms
Chefornak, Alaska

PHOTO 5

December 2012 32-1-17533

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

APPENDIX B

FIELD NOTES

17533-001 Chefornak Tank farms

Tues 9-18-12 845 prepare gear, talk to Shayla

945 Check locates / inform city of work - talked to Mayor Gooden.

→ no utilities

(~~9:10~~ - 9:50 - 10:10 at BIA job site)

Weather Rain on/off, 40s°F

10:10 on site - take photos to document wet site

hard to figure out where old site was. Inaccurate figure from oasis -

1145 Grant Lidren / ADEC on site for about ½ hr.

1240 Take photos of site - Calibrate PID #2

ID	Waypoint	Direction	What
27	99	SW	Light Tank area
28	100	W	liner in Light Plant area
29	101	—	liner - discolored soil
30	102	E	light tank area
31	102	S	"
32	102	N	"
33	103	N	"
34	104	N	"
35	105	N	"
36	106	SW	"
37	106	S	"
38	107	NW	Chefornak Tank Area
39	107	NW	"
40	108	NW	"
41	108	N	"
42	109	ESE	"
43	110	E	"
44	111	SE	"
45	112	S	"
46	112	SW	" ← (Time 1259 or 1300)
47	113	—	" saturated ground mostly
48	114	—	BI light Tank area

1403 Calibrate PID #2 to 100 ppm isobutylene

Screen / Sample - South of road first

→ most sample locations have vegetative mat 0 to about 1' bgs

→ Soil back filled into holes. ~~as appropriate~~

19:55 Done Sampling - Dinner break.

1920 package samples, clean up, do COC.

"Rite in the Rain" ALL-WEATHER WRITING PAPER

SAMPLE COLLECTION LOG

SHANNON & WILSON, INC

Project Number: 17533-1 Chefornak Light Plant & Chefornak Tank Farms

Location:

Date: 9-18-12

Site:

Sampler: [illegible] & Jacob Tracy

Sheet Number: 1

Sample Number	Location (See Sketch)	Sample Time	Sample Depth	Sample Type	GPS Reading*	PID Reading	Soil Classification	Analytical Time Analyses
* B1-1	Light Plant	13:10	1'	Soil	114	0.8	Brown gray SILT; moist	15:25
B1-2	Tanks	13:13	1.5'	Soil	114	0.2	gray silt; moist	
B2-1	↓	13:26	1		115	0.1	"	
NO B2-2		13:28	1.5'		115	0.2	"	15:30
* B3-1		13:33	1		116	2.0	"	15:35
B3-2		13:37	1.5		116	1.4	"	
B4-1		13:43	1		117	0.6	"	
* B4-2		13:48	1.5-2		117	1.4	"	
* B4-3		13:50	2.5-3		117	1.9	Black SILT, moist	15:40 2T
* B5-1		13:55	1-2		118	0.0	Gray SILT, moist; HC odor	1545 ([illegible])
B5-2		13:58	2-2.5		118	4.8	Gray SILT; moist	
* B6-1		14:06	0.5-1		119	0.9	Gray SILT; moist	1550
Rock below B6-1								
B7-1			1		120	—	No recovery [illegible] sand [illegible]	
* B7-2		1440	1.5-2		120	32.8	Gray SILT; moist	1555
B7-3		14:45	2.5-3		120	4.8	Gray SILT; moist	
* B8-1		14:49	0.5-1		121	85.0	Gray SILT; moist	1600
B8-2		14:52	1.5-2		121	42	"	
* B8-3	dup. of B8-1				—		—	16:05
* B9-1		15:52	1-1.5		123	0.4	Gray SILT; moist	16:15
B9-2	↓	15:54			123	0.3	Black SILT; moist	

Sample Type

ES Environmental sample

FD Field duplicate

FM Field Screening

TB Trip blank

* GPS readings only collected from analytical sample locations

SAMPLE COLLECTION LOG

SHANNON & WILSON, INC

Project Number: 32-1-17533-1 Chetoimuk Tanks - Chetoimuk area Location:

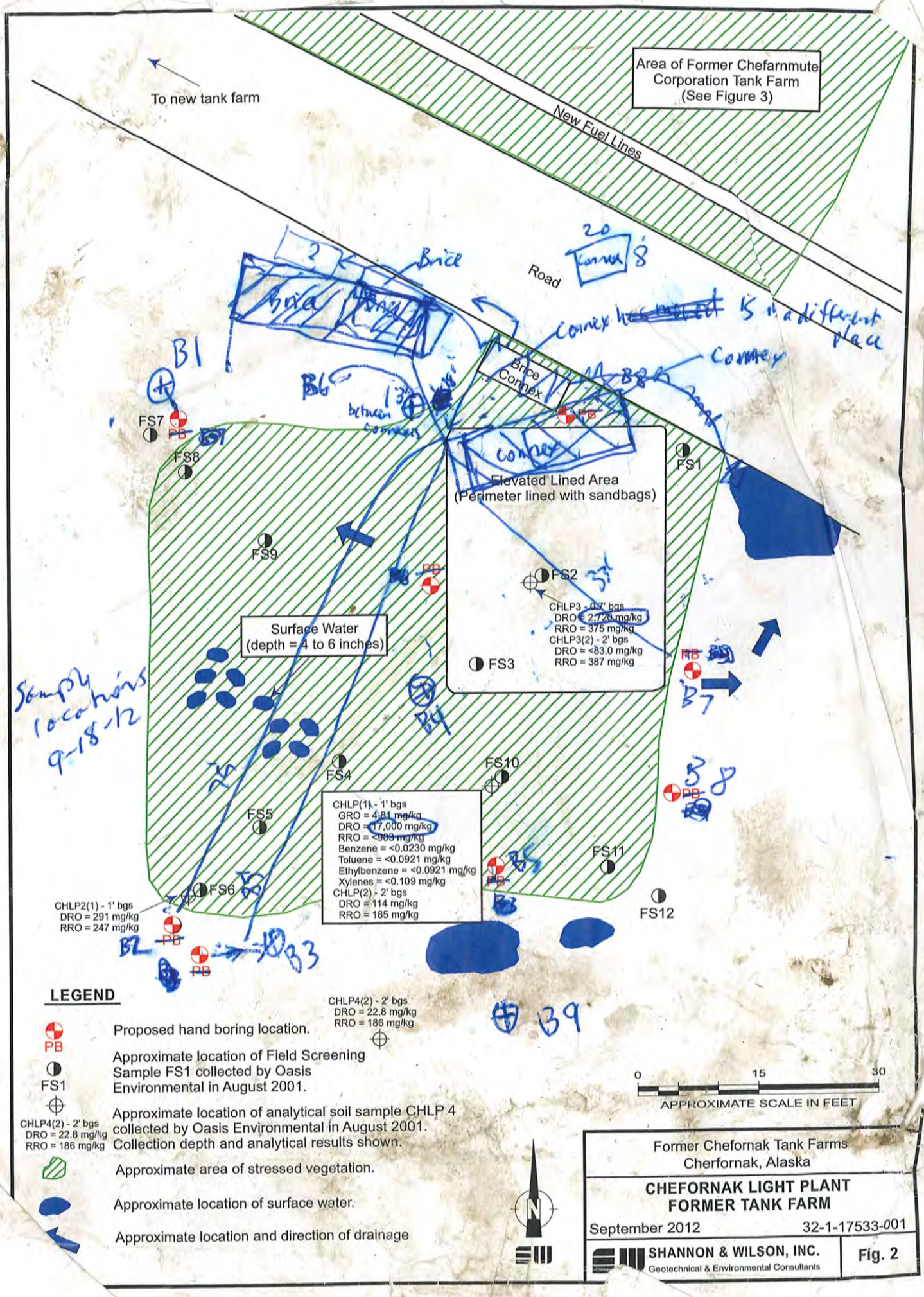
Date: 9-18-12 Site:

Sampler: Andrew Litt & Jacob Tracy Sheet Number: 2

Sample Number	Location	Sample Time	Sample Depth	Sample Type	GPS Reading*	PID Reading	Soil Classification	Analyses
B10-1	Chetoimuk Tanks	16:28	1.5-2	Soil	129	23	Gray silt; wet; hydrocarbon odor	
B10-2		16:32	2.5-3		129	25	Gray SILT; moist; HC odor	18:10
B10-3		16:36	3.5-4		129	24	~~Black~~ SILT; moist (ash)	
B11-1		16:41	1.5-2		130	2.7	Gray SILT; moist	
B11-2		16:43	2.5-3		130	4.5	"	1815
B12-1		16:48	~~1.5-2~~	0.5-1	131	1.7	Gray SILT; moist	
B12-2		16:51	1.5-2		131	1.7	"	18:20
B13-1		16:59	1.5-2		132	1.3	"	18:25
B13-2		17:01	2.5-3		132	0.7	"	
B14-1		17:06	1		133	1.3	"	1830
B14-2		17:08	1.5-2		133	0.9	"	
B15-1		17:13	0.5-1		134	~~1080~~ 350 ppm	Gray SILT; moist; HC odor	
B15-2		17:17	1.5-2		134	~~460~~ 650 ppm	"	18:35
B15-3		17:19	2.5-3		134	430	"	
B16-1		17:28	~~1.5-2~~	1-1.5 ASL	135	360	"	1840
B16-2		17:30	2-2.5		135	250	"	
B17-1		17:52	0.5-1		144	6.2	"	1845
B17-2		17:55	1.2		144	5.2	"	
								~~18:05~~
B18-2	Dup of B10-2	→					→	1805

Sample Type

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



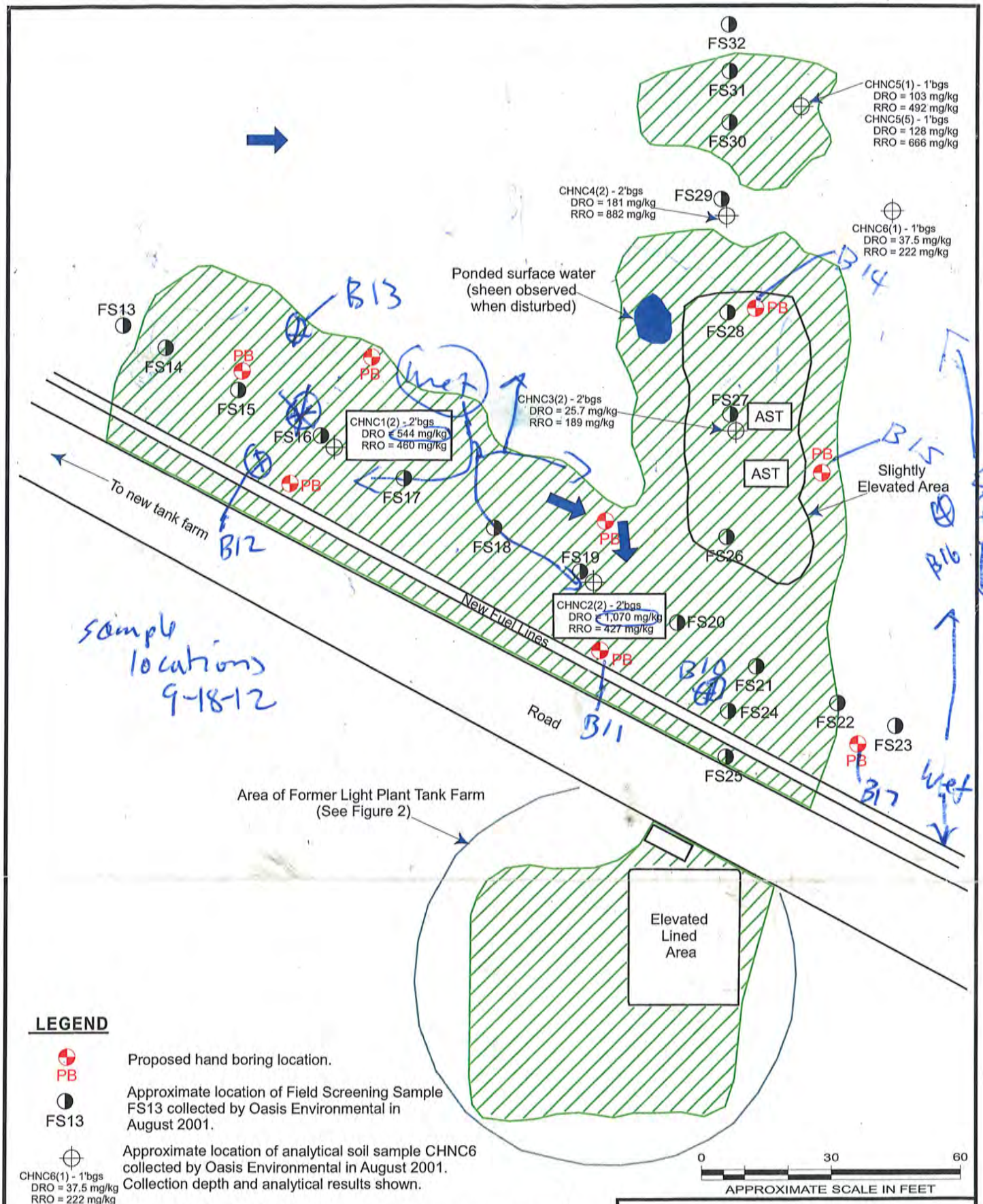
Former Chefornak Tank Farms
Cherfornak, Alaska

CHEFORNAK LIGHT PLANT FORMER TANK FARM

September 2012 32-1-17533-001

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 2



Former Chefornak Tank Farms
Chefornak, Alaska

FORMER CHEFARNMUTE CORPORATION TANK FARM

September 2012 32-1-17533-001

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 3

CHEFORNAK LIGHT PLANT AND
CHEFARNMUTE CORPORATION FORMER TANK FARMS
WAYPOINT DATA

Waypoint No.	Location	Latitude	Longitude
99	Light Plant Tank area	60.15983739	-164.2856063
100	Liner in Light Plant Tank area	60.15976589	-164.285726
101	Liner - discolored soil	60.15974846	-164.2858384
102	Light Plant Tank area - E boundary	60.15983756	-164.2860692
103	Light Plant Tank area - N boundary	60.15968157	-164.2862704
104	Light Plant Tank area - N boundary	60.15965684	-164.2860776
105	Light Plant Tank area - N boundary	60.15969448	-164.2858814
106	Light Plant Tank area - SW corner	60.1597757	-164.2857777
107	Chefarnmute Tank Area - NW corner	60.15988802	-164.2858612
108	Chefarnmute Tank Area - N boundary	60.15995834	-164.2860264
109	Chefarnmute Tank Area - E-SE Corner	60.16011659	-164.2866682
110	Chefarnmute Tank Area - E boundary	60.16014894	-164.2865504
111	Chefarnmute Tank Area - SE Corner	60.16026068	-164.2864115
112	Chefarnmute Tank Area - S boundary	60.16024701	-164.286092
114	Samples B1-1 and B1-2	60.15983689	-164.2860796
115	Samples B2-1 and B2-2	60.15972348	-164.2862566
116	Samples B3-1 and B3-2	60.15970051	-164.2862501
117	Samples B4-1 through B4-3	60.15973614	-164.285973
118	Samples B5-1 and B5-2	60.15965827	-164.2860464
119	Sample B6-1	60.15981895	-164.2859063
120	Samples B7-1 through B7-3	60.15968459	-164.2857723
121	Samples B8-1 throug B8-3	60.15966883	-164.2859098
123	Samples B9-1 and B9-2	60.15964963	-164.2860933
129	Samples B10-1 through B10-3	60.1599938	-164.2860372
130	Samples B11-1 and B11-2	60.16000385	-164.2861419
131	Samples B12-1 and B12-2	60.16010921	-164.2866006
132	Samples B13-1 and B13-2	60.16019312	-164.2865574
133	Samples B14-1 and B14-2	60.16018163	-164.2861034
134	Samples B15-1 through B15-3	60.16012983	-164.2860452
135	Samples B16-1 and B16-2	60.16010569	-164.2859478
144	Samples B17-1 and B17-2	60.15997033	-164.2859759

Waypoints 113, 122, 124 through 128, and 136 through 143 were collected for a separate Chefornak project
Waypoints collected on September 18, 2012 using a Garmin eTrex GPS; WGS84 Datum

APPENDIX C

RESULTS OF ANALYTICAL TESTING BY

SGS NORTH AMERICA INC.

OF ANCHORAGE, ALASKA AND

ADEC LABORATORY DATA REVIEW CHECKLIST

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

Project:	Chefornak Fomer Tanks
Client:	Shannon & Wilson, Inc.
SGS Work Order:	1124586

Released by:

Alaska Division Project Manager

Carmon Beene
2012.10.03
14:44:11 -08'00'

Contents:

Client Name: Shannon & Wilson, Inc.
Project Name: Chefornak Fomer Tanks
Workorder No.: 1124586

Sample Comments

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

Lab Sample ID	Sample Type	Client Sample ID
1124586001	PS	17533-B1-1
	AK102 - Unknown hydrocarbon with several peaks is present. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586002	PS	17533-B3-1
	AK102 - Unknown hydrocarbon with several peaks is present. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586003	PS	17533-B4-3
	AK102/103 - Unknown hydrocarbon with several peaks is present.	
1124586004	PS	17533-B5-1
	AK102 - The pattern is consistent with a weathered middle distillate. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586005	PS	17533-B6-1
	AK102/103 - Unknown hydrocarbon with several peaks is present.	
1124586006	PS	17533-B7-2
	AK102 - The pattern is consistent with a weathered middle distillate. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586007	PS	17533-B8-1
	AK102 - The pattern is consistent with a weathered middle distillate. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586008	PS	17533-B8-3
	AK102 - The pattern is consistent with a weathered middle distillate. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586009	PS	17533-B9-1
	AK102/103 - Unknown hydrocarbon with several peaks is present.	
1124586010	PS	17533-B10-2
	AK102 - The pattern is consistent with a weathered middle distillate. AK103 - Unknown hydrocarbon with several peaks is present.	
1124586011	PS	17533-B11-2
	AK102/103 - Unknown hydrocarbon with several peaks is present.	
1124586012	PS	17533-B12-2
	AK102/103 - Unknown hydrocarbon with several peaks is present.	
1124586013	PS	17533-B13-1
	AK102/103 - Unknown hydrocarbon with several peaks is present.	
1124586014	PS	17533-B14-1
	AK102 - The pattern is consistent with a weathered middle distillate. AK103 - Unknown hydrocarbon with several peaks is present.	

1124586015	PS	17533-B15-2

AK103 - Unknown hydrocarbon with several peaks is present.
AK102 - The pattern is consistent with a weathered gasoline.
AK102 - The pattern is consistent with a weathered middle distillate.
AK102 - 5a-Androstane (surrogate) recovery is outside QC criteria due to sample dilution.

1124586016	PS	17533-B16-1

AK102/103 - Unknown hydrocarbon with several peaks is present.

1124586017	PS	17533-B17-1

AK102/103 - Unknown hydrocarbon with several peaks is present.

1124586018	PS	17533-B18-2

AK102 - The pattern is consistent with a weathered middle distillate.
AK103 - Unknown hydrocarbon with several peaks is present.

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

Laboratory Analytical Report

Client: **Shannon & Wilson, Inc.**
5430 Fairbanks St., Ste 3
Anchorage, AK 99518

Attn: **Shayla Marshall**
T: (907)433-3246 F:
sim@shanwil.com

Project: **Chefornak Fomer Tanks**

Workorder No.: **1124586**

Certification:

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

Steve Crupi

steven.crupi@sgs.com
Project Manager

Contents (Bookmarked in PDF):

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

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO 17025 (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6020, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

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

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

Client Name: Shannon & Wilson, Inc.
Project Name: Chefornak Fomer Tanks
Workorder No.: 1124586

Analytical Methods

Method Description	Analytical Method
Diesel/Residual Range Organics	AK102
Diesel/Residual Range Organics	AK103
Percent Solids SM2540G	SM21 2540G

Sample ID Cross Reference

Lab Sample ID	Client Sample ID
1124586001	17533-B1-1
1124586002	17533-B3-1
1124586003	17533-B4-3
1124586004	17533-B5-1
1124586005	17533-B6-1
1124586006	17533-B7-2
1124586007	17533-B8-1
1124586008	17533-B8-3
1124586009	17533-B9-1
1124586010	17533-B10-2
1124586011	17533-B11-2
1124586012	17533-B12-2
1124586013	17533-B13-1
1124586014	17533-B14-1
1124586015	17533-B15-2
1124586016	17533-B16-1
1124586017	17533-B17-1
1124586018	17533-B18-2

Detectable Results Summary

Print Date: 10/3/2012 1:11 pm

Client Sample ID: **17533-B1-1**
SGS Ref. #: 1124586001

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	213	mg/Kg
Residual Range Organics	1840	mg/Kg

Client Sample ID: **17533-B3-1**
SGS Ref. #: 1124586002

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	156	mg/Kg
Residual Range Organics	1560	mg/Kg

Client Sample ID: **17533-B4-3**
SGS Ref. #: 1124586003

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	33.7	mg/Kg
Residual Range Organics	295	mg/Kg

Client Sample ID: **17533-B5-1**
SGS Ref. #: 1124586004

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	107	mg/Kg
Residual Range Organics	539	mg/Kg

Client Sample ID: **17533-B6-1**
SGS Ref. #: 1124586005

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	198	mg/Kg
Residual Range Organics	922	mg/Kg

Client Sample ID: **17533-B7-2**
SGS Ref. #: 1124586006

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	277	mg/Kg
Residual Range Organics	636	mg/Kg

Client Sample ID: **17533-B8-1**
SGS Ref. #: 1124586007

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	643	mg/Kg
Residual Range Organics	665	mg/Kg

Detectable Results Summary

Print Date: 10/3/2012 1:11 pm

Client Sample ID: **17533-B8-3**
SGS Ref. #: 1124586008

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	434	mg/Kg
Residual Range Organics	679	mg/Kg

Client Sample ID: **17533-B9-1**
SGS Ref. #: 1124586009

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	86.3	mg/Kg
Residual Range Organics	841	mg/Kg

Client Sample ID: **17533-B10-2**
SGS Ref. #: 1124586010

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	186	mg/Kg
Residual Range Organics	420	mg/Kg

Client Sample ID: **17533-B11-2**
SGS Ref. #: 1124586011

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	43.9	mg/Kg
Residual Range Organics	488	mg/Kg

Client Sample ID: **17533-B12-2**
SGS Ref. #: 1124586012

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	37.2	mg/Kg
Residual Range Organics	414	mg/Kg

Client Sample ID: **17533-B13-1**
SGS Ref. #: 1124586013

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	69.1	mg/Kg
Residual Range Organics	803	mg/Kg

Client Sample ID: **17533-B14-1**
SGS Ref. #: 1124586014

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	227	mg/Kg
Residual Range Organics	552	mg/Kg

Detectable Results Summary

Print Date: 10/3/2012 1:11 pm

Client Sample ID: **17533-B15-2**
SGS Ref. #: 1124586015

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	18600	mg/Kg
Residual Range Organics	644	mg/Kg

Client Sample ID: **17533-B16-1**
SGS Ref. #: 1124586016

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	135	mg/Kg
Residual Range Organics	877	mg/Kg

Client Sample ID: **17533-B17-1**
SGS Ref. #: 1124586017

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	64.8	mg/Kg
Residual Range Organics	507	mg/Kg

Client Sample ID: **17533-B18-2**
SGS Ref. #: 1124586018

Parameter	Result	Units
Semivolatile Organic Fuels Department		
Diesel Range Organics	262	mg/Kg
Residual Range Organics	452	mg/Kg

Client Sample ID: **17533-B1-1**
SGS Ref. #: 1124586001
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 48.2

Collection Date/Time: 09/18/12 15:25
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	213	41.1	12.7	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	1840	164	50.9	mg/Kg	4	XFC10632	XXX28120	
5a Androstane <surr>	68.4	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	61	50-150		%	4	XFC10632	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 21:57
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.286 g
Prep Extract Vol.: 1 mL
Container ID:1124586001-A
Analyst: MEM

Analytical Batch: XFC10632
Analytical Method: AK103
Analysis Date/Time: 10/03/12 04:37
Dilution Factor: 4
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.286 g
Prep Extract Vol.: 1 mL
Container ID:1124586001-A
Analyst: MEM

Client Sample ID: **17533-B1-1**
SGS Ref. #: 1124586001
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 48.2

Collection Date/Time: 09/18/12 15:25
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	48.2			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586001-A
Analyst: CNP

Client Sample ID: **17533-B3-1**
SGS Ref. #: 1124586002
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 64.3

Collection Date/Time: 09/18/12 15:35
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	156	30.8	9.56	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	1560	123	38.2	mg/Kg	4	XFC10632	XXX28120	
5a Androstane <surr>	78.8	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	91.4	50-150		%	4	XFC10632	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 22:07
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.24 g
Prep Extract Vol.: 1 mL
Container ID:1124586002-A
Analyst: MEM

Analytical Batch: XFC10632
Analytical Method: AK103
Analysis Date/Time: 10/03/12 04:27
Dilution Factor: 4
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.24 g
Prep Extract Vol.: 1 mL
Container ID:1124586002-A
Analyst: MEM

Client Sample ID: **17533-B3-1**
SGS Ref. #: 1124586002
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 64.3

Collection Date/Time: 09/18/12 15:35
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	64.3			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586002-A
Analyst: CNP

Client Sample ID: **17533-B4-3**
SGS Ref. #: 1124586003
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 63.1

Collection Date/Time: 09/18/12 15:40
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	33.7	31.5	9.75	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	295	31.5	9.75	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	63.3	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	62.2	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/02/12 01:19
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.251 g
Prep Extract Vol.: 1 mL
Container ID:1124586003-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/02/12 01:19
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.251 g
Prep Extract Vol.: 1 mL
Container ID:1124586003-A
Analyst: MEM

Client Sample ID: **17533-B4-3**
SGS Ref. #: 1124586003
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 63.1

Collection Date/Time: 09/18/12 15:40
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	63.1			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586003-A
Analyst: CNP

Client Sample ID: **17533-B5-1**
SGS Ref. #: 1124586004
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 62.7

Collection Date/Time: 09/18/12 15:45
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	107	31.7	9.84	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	539	31.7	9.84	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	84.4	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	86.5	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 23:48
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.168 g
Prep Extract Vol.: 1 mL
Container ID:1124586004-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 23:48
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.168 g
Prep Extract Vol.: 1 mL
Container ID:1124586004-A
Analyst: MEM

Client Sample ID: **17533-B5-1**
SGS Ref. #: 1124586004
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 62.7

Collection Date/Time: 09/18/12 15:45
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	62.7			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586004-A
Analyst: CNP

Client Sample ID: **17533-B6-1**
SGS Ref. #: 1124586005
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 61.6

Collection Date/Time: 09/18/12 15:50
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	198	32.2	9.98	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	922	32.2	9.98	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	75.8	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	80.2	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 22:17
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.238 g
Prep Extract Vol.: 1 mL
Container ID:1124586005-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 22:17
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.238 g
Prep Extract Vol.: 1 mL
Container ID:1124586005-A
Analyst: MEM

Client Sample ID: **17533-B6-1**
SGS Ref. #: 1124586005
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 61.6

Collection Date/Time: 09/18/12 15:50
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	61.6			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586005-A
Analyst: CNP

Client Sample ID: **17533-B7-2**
SGS Ref. #: 1124586006
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 71.9

Collection Date/Time: 09/18/12 15:55
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	277	27.8	8.63	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	636	27.8	8.63	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	74.3	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	75.1	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 22:27
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30 g
Prep Extract Vol.: 1 mL
Container ID:1124586006-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 22:27
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30 g
Prep Extract Vol.: 1 mL
Container ID:1124586006-A
Analyst: MEM

Client Sample ID: **17533-B7-2**
SGS Ref. #: 1124586006
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 71.9

Collection Date/Time: 09/18/12 15:55
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	71.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586006-A
Analyst: CNP

Client Sample ID: **17533-B8-1**
SGS Ref. #: 1124586007
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 65.4

Collection Date/Time: 09/18/12 16:00
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	643	30.2	9.35	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	665	30.2	9.35	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	81.2	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	80	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 22:37
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.418 g
Prep Extract Vol.: 1 mL
Container ID:1124586007-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 22:37
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.418 g
Prep Extract Vol.: 1 mL
Container ID:1124586007-A
Analyst: MEM

Client Sample ID: **17533-B8-1**
SGS Ref. #: 1124586007
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 65.4

Collection Date/Time: 09/18/12 16:00
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	65.4			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586007-A
Analyst: CNP

Client Sample ID: **17533-B8-3**
SGS Ref. #: 1124586008
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 67.7

Collection Date/Time: 09/18/12 16:05
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	434	29.1	9.03	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	679	29.1	9.03	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	78.8	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	81.4	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 23:18
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.435 g
Prep Extract Vol.: 1 mL
Container ID:1124586008-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 23:18
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.435 g
Prep Extract Vol.: 1 mL
Container ID:1124586008-A
Analyst: MEM

Client Sample ID: **17533-B8-3**
SGS Ref. #: 1124586008
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 67.7

Collection Date/Time: 09/18/12 16:05
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	67.7			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586008-A
Analyst: CNP

Client Sample ID: **17533-B9-1**
SGS Ref. #: 1124586009
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 69.6

Collection Date/Time: 09/18/12 16:15
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	86.3	28.6	8.86	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	841	28.6	8.86	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	80.6	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	84	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 23:28
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.143 g
Prep Extract Vol.: 1 mL
Container ID:1124586009-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 23:28
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.143 g
Prep Extract Vol.: 1 mL
Container ID:1124586009-A
Analyst: MEM

Client Sample ID: **17533-B9-1**
SGS Ref. #: 1124586009
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 69.6

Collection Date/Time: 09/18/12 16:15
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	69.6			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586009-A
Analyst: CNP

Client Sample ID: **17533-B10-2**
SGS Ref. #: 1124586010
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 59.9

Collection Date/Time: 09/18/12 18:10
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	186	33.2	10.3	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	420	33.2	10.3	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	74	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	71.9	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 19:45
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.222 g
Prep Extract Vol.: 1 mL
Container ID:1124586010-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 19:45
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.222 g
Prep Extract Vol.: 1 mL
Container ID:1124586010-A
Analyst: MEM

Client Sample ID: **17533-B10-2**
SGS Ref. #: 1124586010
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 59.9

Collection Date/Time: 09/18/12 18:10
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	59.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586010-A
Analyst: CNP

Client Sample ID: **17533-B11-2**
SGS Ref. #: 1124586011
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 64.9

Collection Date/Time: 09/18/12 18:15
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	43.9	30.7	9.52	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	488	30.7	9.52	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	81.6	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	71.8	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 19:55
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.071 g
Prep Extract Vol.: 1 mL
Container ID:1124586011-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 19:55
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.071 g
Prep Extract Vol.: 1 mL
Container ID:1124586011-A
Analyst: MEM

Client Sample ID: **17533-B11-2**
SGS Ref. #: 1124586011
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 64.9

Collection Date/Time: 09/18/12 18:15
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	64.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586011-A
Analyst: CNP

Client Sample ID: **17533-B12-2**
SGS Ref. #: 1124586012
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 72.6

Collection Date/Time: 09/18/12 18:20
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	37.2	27.4	8.50	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	414	27.4	8.50	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	86	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	74.6	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 20:06
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.132 g
Prep Extract Vol.: 1 mL
Container ID:1124586012-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 20:06
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.132 g
Prep Extract Vol.: 1 mL
Container ID:1124586012-A
Analyst: MEM

Client Sample ID: **17533-B12-2**
SGS Ref. #: 1124586012
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 72.6

Collection Date/Time: 09/18/12 18:20
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	72.6			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586012-A
Analyst: CNP

Client Sample ID: **17533-B13-1**
SGS Ref. #: 1124586013
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 69.9

Collection Date/Time: 09/18/12 18:25
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	69.1	28.2	8.73	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	803	28.2	8.73	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	81.8	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	81.1	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 20:16
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.484 g
Prep Extract Vol.: 1 mL
Container ID:1124586013-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 20:16
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.484 g
Prep Extract Vol.: 1 mL
Container ID:1124586013-A
Analyst: MEM

Client Sample ID: **17533-B13-1**
SGS Ref. #: 1124586013
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 69.9

Collection Date/Time: 09/18/12 18:25
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	69.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586013-A
Analyst: CNP

Client Sample ID: **17533-B14-1**
SGS Ref. #: 1124586014
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 65.7

Collection Date/Time: 09/18/12 18:30
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	227	30.0	9.30	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	552	30.0	9.30	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	70.9	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	73.4	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 20:36
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.451 g
Prep Extract Vol.: 1 mL
Container ID:1124586014-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 20:36
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.451 g
Prep Extract Vol.: 1 mL
Container ID:1124586014-A
Analyst: MEM

Client Sample ID: **17533-B14-1**
SGS Ref. #: 1124586014
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 65.7

Collection Date/Time: 09/18/12 18:30
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	65.7			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586014-A
Analyst: CNP

Client Sample ID: **17533-B15-2**
SGS Ref. #: 1124586015
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 61.3

Collection Date/Time: 09/18/12 18:35
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result		LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	18600		1630	505	mg/Kg	50	XFC10632	XXX28120	
Residual Range Organics	644		32.6	10.1	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	0	*	50-150		%	50	XFC10632	XXX28120	
n-Triacontane-d62 <surr>	68.2		50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 22:48
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.038 g
Prep Extract Vol.: 1 mL
Container ID:1124586015-A
Analyst: MEM

Analytical Batch: XFC10632
Analytical Method: AK102
Analysis Date/Time: 10/02/12 23:52
Dilution Factor: 50
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.038 g
Prep Extract Vol.: 1 mL
Container ID:1124586015-A
Analyst: MEM

Client Sample ID: **17533-B15-2**
SGS Ref. #: 1124586015
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 61.3

Collection Date/Time: 09/18/12 18:35
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	61.3			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586015-A
Analyst: CNP

Client Sample ID: **17533-B16-1**
SGS Ref. #: 1124586016
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 66.9

Collection Date/Time: 09/18/12 18:40
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	135	29.7	9.22	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	877	29.7	9.22	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	75.8	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	76.5	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 20:46
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.149 g
Prep Extract Vol.: 1 mL
Container ID:1124586016-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 20:46
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.149 g
Prep Extract Vol.: 1 mL
Container ID:1124586016-A
Analyst: MEM

Client Sample ID: **17533-B16-1**
SGS Ref. #: 1124586016
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 66.9

Collection Date/Time: 09/18/12 18:40
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	66.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586016-A
Analyst: CNP

Client Sample ID: **17533-B17-1**
SGS Ref. #: 1124586017
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 63.9

Collection Date/Time: 09/18/12 18:45
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	64.8	30.9	9.59	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	507	30.9	9.59	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	81.8	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	85.8	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 23:08
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.347 g
Prep Extract Vol.: 1 mL
Container ID:1124586017-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 23:08
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.347 g
Prep Extract Vol.: 1 mL
Container ID:1124586017-A
Analyst: MEM

Client Sample ID: **17533-B17-1**
SGS Ref. #: 1124586017
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 63.9

Collection Date/Time: 09/18/12 18:45
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	63.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586017-A
Analyst: CNP

Client Sample ID: **17533-B18-2**
SGS Ref. #: 1124586018
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 61.9

Collection Date/Time: 09/18/12 18:05
Receipt Date/Time: 09/24/12 15:19

Semivolatile Organic Fuels Department

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Diesel Range Organics	262	32.0	9.93	mg/Kg	1	XFC10629	XXX28120	
Residual Range Organics	452	32.0	9.93	mg/Kg	1	XFC10629	XXX28120	
5a Androstane <surr>	88.1	50-150		%	1	XFC10629	XXX28120	
n-Triacontane-d62 <surr>	85.7	50-150		%	1	XFC10629	XXX28120	

Batch Information

Analytical Batch: XFC10629
Analytical Method: AK102
Analysis Date/Time: 10/01/12 21:06
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.275 g
Prep Extract Vol.: 1 mL
Container ID:1124586018-A
Analyst: MEM

Analytical Batch: XFC10629
Analytical Method: AK103
Analysis Date/Time: 10/01/12 21:06
Dilution Factor: 1
Prep Batch: XXX28120
Prep Method: SW3550C
Prep Date/Time: 09/29/12 07:30
Initial Prep Wt./Vol.: 30.275 g
Prep Extract Vol.: 1 mL
Container ID:1124586018-A
Analyst: MEM

Client Sample ID: **17533-B18-2**
SGS Ref. #: 1124586018
Project ID: Chefornak Fomer Tanks
Matrix: Soil/Solid (dry weight)
Percent Solids: 61.9

Collection Date/Time: 09/18/12 18:05
Receipt Date/Time: 09/24/12 15:19

Solids

Parameter	Result	LOQ/CL	DL	Units	DF	Analytical Batch	Prep Batch	Qualifiers
Total Solids	61.9			%	1	SPT8813		

Batch Information

Analytical Batch: SPT8813
Analytical Method: SM21 2540G
Analysis Date/Time: 09/26/12 21:58
Dilution Factor: 1

Initial Prep Wt./Vol.: 1 mL
Container ID:1124586018-A
Analyst: CNP

SGS Ref.#	1117915	Method Blank	**Printed Date/Time**	10/03/2012	13:11
Client Name	Shannon & Wilson, Inc.		**Prep Batch**		
Project Name/#	Chefornak Fomer Tanks		**Method**		
Matrix	Soil/Solid (dry weight)		**Date**		

QC results affect the following production samples:

1124586001, 1124586002, 1124586003, 1124586004, 1124586005, 1124586006, 1124586007, 1124586008, 1124586009, 1124586010, 1124586011, 1124586012, 1124586013, 1124586014, 1124586015, 1124586016, 1124586017, 1124586018

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
Solids					
Total Solids	100			%	09/26/12
Batch SPT8813					
Method SM21 2540G					
Instrument					

SGS Ref.#	1118561	Method Blank	**Printed Date/Time**	10/03/2012 13:11
Client Name	Shannon & Wilson, Inc.		**Prep Batch**	XXX28120
Project Name/#	Chefornak Fomer Tanks		**Method**	SW3550C
Matrix	Soil/Solid (dry weight)		**Date**	09/29/2012

QC results affect the following production samples:

1124586001, 1124586002, 1124586003, 1124586004, 1124586005, 1124586006, 1124586007, 1124586008, 1124586009, 1124586010, 1124586011, 1124586012, 1124586013, 1124586014, 1124586015, 1124586016, 1124586017, 1124586018

Parameter	Results	LOQ/CL	DL	Units	Analysis Date
Semivolatile Organic Fuels Department					
Diesel Range Organics	12.4 U	20.0	6.20	mg/Kg	10/01/12
Surrogates					
5a Androstane <surr>	82	60-120		%	10/01/12
Batch XFC10629					
Method AK102					
Instrument HP 6890 Series II FID SV D R					
Residual Range Organics	12.4 U	20.0	6.20	mg/Kg	10/01/12
Surrogates					
n-Triacontane-d62 <surr>	76.2	60-120		%	10/01/12
Batch XFC10629					
Method AK103					
Instrument HP 6890 Series II FID SV D R					

SGS Ref.#	1117916	Duplicate	**Printed Date/Time**	10/03/2012 13:11
Client Name	Shannon & Wilson, Inc.		**Prep Batch**	
Project Name/#	Chefornak Fomer Tanks		**Method**	
Original	1124640001		**Date**	
Matrix	Soil/Solid (dry weight)			

QC results affect the following production samples:

1124586001, 1124586002, 1124586003, 1124586004, 1124586005, 1124586006, 1124586007, 1124586008, 1124586009, 1124586010, 1124586011, 1124586012, 1124586013, 1124586014, 1124586015, 1124586016, 1124586017, 1124586018

Parameter	Original Result	QC Result	Units	RPD	RPD Limits	Analysis Date
Solids						
Total Solids	92.5	92.4	%	0	(< 15)	09/26/2012

Batch SPT8813
Method SM21 2540G
Instrument

SGS Ref.#	1118562	Lab Control Sample	**Printed Date/Time**	10/03/2012	13:11
	1118563	Lab Control Sample Duplicate	**Prep Batch**	XXX28120	
Client Name	Shannon & Wilson, Inc.		**Method**	SW3550C	
Project Name/#	Chefornak Fomer Tanks		**Date**	09/29/2012	
Matrix	Soil/Solid (dry weight)				

QC results affect the following production samples:

1124586001, 1124586002, 1124586003, 1124586004, 1124586005, 1124586006, 1124586007, 1124586008, 1124586009, 1124586010, 1124586011, 1124586012, 1124586013, 1124586014, 1124586015, 1124586016, 1124586017, 1124586018

Parameter		QC Results	Pct Recov	LCS/LCSD Limits	RPD	RPD Limits	Spiked Amount	Analysis Date
Semivolatile Organic Fuels Department								
Diesel Range Organics	LCS	149	89	(75-125)			167 mg/Kg	10/01/2012
	LCSD	142	85		5	(< 20)	167 mg/Kg	10/01/2012
Surrogates								
5a Androstane <surr>	LCS		88	(60-120)				10/01/2012
	LCSD		84		5			10/01/2012
Batch XFC10629 **Method** AK102 **Instrument** HP 6890 Series II FID SV D R								
Residual Range Organics	LCS	161	97	(60-120)			167 mg/Kg	10/01/2012
	LCSD	151	91		7	(< 20)	167 mg/Kg	10/01/2012
Surrogates								
n-Triacontane-d62 <surr>	LCS		78	(60-120)				10/01/2012
	LCSD		73		6			10/01/2012
Batch XFC10629 **Method** AK103 **Instrument** HP 6890 Series II FID SV D R								

CHAIN-OF-CUSTODY RECORD

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303 Wellsian Way
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Laboratory SGS
Attn: Steve Crupi

1124586

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

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	DRO/RRO AK102/AK103						
17533-B1-1		15:25	9-18-12		X	X					1	Soil
~~17533-B2-2~~		~~15:30~~			X	X					1	
17533-B3-1		15:35			X	X					1	
17533-B4-3		15:40			X	X					1	
17533-B5-1		15:45			X	X					1	
17533-B6-1		15:50			X	X					1	
17533-B7-2		15:55			X	X					1	
17533-B8-1		16:00			X	X					1	
17533-B8-3		16:05			X	X					1	
17533-B9-1		16:15			X	X					1	

Project Information	Sample Receipt
Project Number: 32-1-17533-1	Total Number of Containers
Project Name: Chefornak Former Tanks	COC Seals/Intact? Y/N/NA
Contact: Shayla Swetland/Marshall/Andrew Lee	Received Good Cond./Cold
Ongoing Project? Yes ☒ No ☐	Delivery Method:
Sampler: Andrew Lee	(attach shipping bill, if any)

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	ADEC Level IV deliverables

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: Time: 15:19	Signature: Time:	Signature: Time:
Printed Name: Andrew Lee Date: 9-24-12	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 15:19
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: 9/24/12
Company:	Company:	Company: SGS

2.6 R02

No: 29960

F-19-91/UR

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

CHAIN-OF-CUSTODY RECORD

Laboratory SGS
Attn: Steve Crupi

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1124586 7

Analysis Parameters/ (include p

Sample Identity	Lab No.	Time	Date Sampled	Comp.	Grab	DRO/RRO AK102/AK103						Tot. of	Remarks/Matrix
17533-B10-2		18:10	9-18-12		X	X						1	Soil
17533-B11-2		18:15			X	X						1	
17533-B12-2		18:20			X	X						1	
17533-B13-1		18:25			X	X						1	
17533-B14-1		18:30			X	X						1	
17533-B15-2		18:35			X	X						1	
17533-B16-1		18:40			X	X						1	
17533-B17-1		18:45			X	X						1	
17533-B18-1		18:05	↓		X	X						1	

(10A) (11A) (2A) (3A) (4A) (5A) (6A) (7A) (8A) (9A)

Project Information	Sample Receipt
Project Number: 32-1-17533	Total Number of Containers
Project Name: Chetarnat Former Tanks	COC Seals/Intact? Y/N/NA
Contact: Andrew Lee/Shayla Marshall	Received Good Cond./Cold
Ongoing Project? Yes ☒ No ☐	Delivery Method:
Sampler: Andrew Lee	(attach shipping bill, if any)

Instructions	
Requested Turnaround Time:	Standard
Special Instructions:	ADEC Level II Deliverables

Relinquished By: 1.	Relinquished By: 2.	Relinquished By: 3.
Signature: Andrew Lee Time: 15:19	Signature: Time:	Signature: Time:
Printed Name: Andrew Lee Date: 9-24-12	Printed Name: Date:	Printed Name: Date:
Company: Shannon & Wilson	Company:	Company:

Received By: 1.	Received By: 2.	Received By: 3.
Signature: Time:	Signature: Time:	Signature: Time: 1519
Printed Name: Date:	Printed Name: Date:	Printed Name: Annette Woodard Date: 9/24/12
Company:	Company:	Company: SGS

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

F-19-91/UR

2.6 202

No. 29961

SGS

1124586

SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were **custody seals** intact? Note # & location, if applicable. COC accompanied samples?	Yes No (N/A) (Yes) No N/A	
Temperature blank compliant* (i.e., 0-6°C after correction factor)? * *Note: Exemption permitted for chilled samples collected less than 8 hours ago.* Cooler ID: 1 @ 2.6 w/ Therm.ID: 202 Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ Cooler ID: _____ @ _____ w/ Therm.ID: _____ *Note: If non-compliant, use form FS-0029 to document affected samples/analyses.* If samples are received without 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." **If temperature(s) <0°C, were all sample containers ice free?**	(Yes) No N/A Yes No (N/A)	
Delivery method (specify all that apply): (Client) USPS Alert Courier Road Runner AK Air Lynden Carlile ERA PenAir FedEx UPS NAC Other: → *For WO# with airbills, was the WO# & airbill info recorded in the Front Counter eLog?*	Note ABN/ tracking # See Attached or (N/A) Yes No (N/A)	
→ For samples received with payment, note amount ($) and cash / check / CC **(circle one)** or note:		(N/A)
→ For samples **received in FBKS**, ANCH staff will verify all criteria are reviewed.	SRF Initiated by:	(N/A)
Were samples received within hold time? *Note: Refer to form F-083 "Sample Guide" for hold time information.* Do samples **match COC*** (i.e., sample IDs, dates/times collected)? * *Note: Exemption permitted if times differ <1hr; in which case, use times on COC.* Were analyses requested unambiguous?	(Yes) No N/A (Yes) No N/A (Yes) No N/A	
Were samples in **good condition** (no leaks/cracks/breakage)? Packing material used (specify all that apply): Bubble Wrap Separate plastic bags Vermiculite Other:	(Yes) No N/A	
Were all VOA vials **free of headspace** (i.e., bubbles ≤6 mm)? Were all soil VOAs **field extracted** with MeOH+BFB?	Yes No (N/A) Yes No (N/A)	
Were **proper containers** (type/mass/volume/preservative*) used? * *Note: Exemption permitted for waters to be analyzed for metals.* Were **Trip Blanks** (i.e., VOAs, LL-Hg) in cooler with samples?	(Yes) No N/A Yes No (N/A)	
For **special handling** (e.g., "MI" or foreign soils, lab filter, limited volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?	Yes No (N/A)	
For preserved waters (other than VOA vials, LL-Mercury or microbiological analyses), was **pH verified and compliant?** If pH was adjusted, were bottles flagged (i.e., stickers)?	Yes No (N/A) Yes No (N/A)	
For **RUSH/SHORT Hold Time** or **site-specific QC** (e.g., BMS/BMSD/BDUP) samples, were the COC & bottles flagged (e.g., stickers) accordingly? For RUSH/SHORT HT, was email sent?	Yes No (N/A)	
For any question answered "No," has the PM been notified and the problem resolved (or paperwork put in their bin)?	Yes No (N/A)	SRF Completed by: VS PM = N/A
Was **PEER REVIEW** of ***sample numbering/labeling completed?***	Yes No (N/A)	Peer Reviewed by: N/A

Additional notes (if applicable):

Sample 18A reads 17533-B18-2, while COC reads 17533-B18-1.
Used sample ID from sample

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

LABORATORY DATA REVIEW CHECKLIST

CS Report Name: Site Characterization, Chefornak Light Plant Former Tank Farm and Former Chefarnmute Corporation Tank Farm, Chefornak, Alaska
Date: December 2012
Laboratory Report Date: October 3, 2012

Consultant Firm: Shannon & Wilson, Inc.

Completed by: Amanda Compton
Title: Environmental Scientist

Laboratory Name: SGS Environmental Services, Inc.
Work Order Number: 1124586

ADEC File No.: 2408.38.002 and 2408.38.005
(**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**
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?
NA **/ Yes / No**
Comments:

2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?
Yes / No
Comments**:**

b. Correct analyses requested? **Yes / No**
Comments**:**

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
Yes / No
Comments: *Temperature blank = 2.6° C*

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

c. Sample condition documented - broken, leaking (soil MeOH), zero headspace (VOC vials)? **Yes / No**
Comments: *No problems noted*

d. If there were any discrepancies, were they documented (e.g., incorrect sample containers/preservation, sample temperatures outside range, insufficient sample size, missing samples)? ***NA*** **/ Yes / No**
Comments: *Sample 18A (project sample 17533-B18-2) reads 17533-B18-2 but COC reads 17533-B18-1. The laboratory used the sample ID from the sample jar.*

e. Data quality or usability affected? Explain. ***NA***
Comments: *No, the only discrepancy noted was resolved using the sample jar label. The data quality and usability should not be affected.*

4. Case Narrative

a. Present and understandable? **Yes / No**
Comments:

b. Discrepancies, errors or QC failures noted by the lab? ***None Noted*** **/ Yes**
Comments:
Surrogate recovery was outside of QC criteria for DRO in Project Sample 17533-B15-2 due to dilution.

c. Were corrective actions documented? ***None Noted*** **/ Yes**
Comments:

d. What is the effect on data quality/usability, according to the case narrative?
Comments: *Case narrative does not comment on data quality or usability.*

5. Sample Results

a. Correct analyses performed/reported as requested on COC? **Yes / No**
Comments:

b. All applicable holding times met? **Yes / No**
Comments:

c. All soils reported on a dry-weight basis? ***NA*** **/ Yes / No**
Comments:

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project? **Yes / No**
Comments: *For samples without detections.*

e. Data quality or usability affected? Explain. ***NA***
Comments:

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis, and 20 samples?
Yes / No
Comments:

ii. All method blank results less than LOQ? **Yes / No**
Comments:

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

iv. Do the affected sample(s) have data flags? ***NA*** **/ Yes / No**
Comments:

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

v. Data quality or usability affected? Explain. ***NA***
Comments:

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

i. Organics - One LCS/LCSD reported per matrix, analysis, and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846) ***N/A*** **/ Yes / No**
Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples? ***N/A*** **/ Yes / No**
Comments:

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

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

vii. Data quality or usability affected? Explain.
Comments: *Based on the LCS/LCSD results, the data quality and usability is not affected.*

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses, field, QC and laboratory samples? ***NA*** **/ Yes / No**
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) ***NA*** **/ Yes / No**
Comments: *DRO surrogate recovery is outside of QC criteria for DRO by AK102 in Project Sample 17533-B15-2.*

iii. Do the sample results with failed surrogate recoveries have data flags? ***NA*** **/ Yes / No**
Comments: *The surrogate recovery is flagged in the laboratory report and the results are flagged in our report Table 2.*

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

iv. Data quality or usability affected? Explain.
Comments: *The case narrative noted that the surrogate recovery is outside of QC objectives due to sample dilution (50 times). The DRO sample results associated with the surrogate are greater than the LOQ and the cleanup level for DRO. The data is considered usable.*

d. Trip Blank - Volatile analyses only (GRO, BTEX, VOCs, etc.) [soil and water]

i. One trip blank reported per matrix, analysis and cooler? ***NA*** **/ Yes / No**
Comments: *No volatile analyses requested.*

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

iii. All results less than LOQ? ***NA*** **/ Yes / No**
Comments:

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

v. Data quality or usability affected? Explain. ***NA***
Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?
Yes / No
Comments: *Sample 17533-B8-3 is a duplicate of Sample 17533-B8-1 and 17533-B18-2 is a duplicate of 17533-B10-2.*

ii. Were the field duplicates submitted blind to the lab? ***NA*** **/ Yes / No**
Comments:

iii. Precision – All relative percent differences (RPDs) less than specified DQOs? (Recommended: 30% for water, 50% for soil) ***NA*** **/ Yes / No**
Comments: *RPDs for DRO were 38% and 34%, respectively, and the RPDs for RRO were 2% and 7%, respectively.*

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)
No decontamination or equipment blank submitted due to the use of disposable sampling equipment, per the ADEC-approved work plan.

i. All results less than PQL? ***NA*** **/ Yes / No**
Comments:

ii. If results are above PQL, 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? ***NA*** **/ Yes / No**
Comments: *Lab-specific qualifiers are defined on Page 5.*

APPENDIX D

CONCEPTUAL SITE MODEL

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Chefornak Light Plant Former Tank Farm, Chefornak, Alaska
ADEC File No. 2408.38.002

Completed By: Shannon & Wilson, Inc.
Date Completed: November 15, 2012

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

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

Media	Transport Mechanisms
☑ Surface Soil (0-2 ft bgs)	☑ Direct release to surface soil — check soil
	☑ Migration to subsurface — check soil
	☑ Migration to groundwater — check groundwater
	☑ Volatilization — check air
	☐ Runoff or erosion — check surface water
	☐ Uptake by plants or animals — check biota
	☐ Other (list):
☑ Subsurface Soil (2-15 ft bgs)	☑ Direct release to subsurface soil — check soil
	☑ Migration to groundwater — check groundwater
	☑ Volatilization — check air
	☐ Uptake by plants or animals — check biota
	☐ Other (list):
☑ Ground-water	☑ Direct release to groundwater — check groundwater
	☑ Volatilization — check air
	☐ Flow to surface water body — check surface water
	☐ Flow to sediment — check sediment
	☐ Uptake by plants or animals — check biota
	☐ Other (list):
☑ Surface Water	☑ Direct release to surface water — check surface water
	☐ Volatilization — check air
	☐ Sedimentation — check sediment
	☐ Uptake by plants or animals — check biota
	☐ Other (list):
☐ Sediment	☐ Direct release to sediment — check sediment
	☐ Resuspension, runoff, or erosion — check surface water
	☐ Uptake by plants or animals — check biota
	☐ Other (list):

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ soil	☑ Incidental Soil Ingestion	I	I	I	I			
	☐ Dermal Absorption of Contaminants from Soil							
	☐ Inhalation of Fugitive Dust							
☑ groundwater	☑ Ingestion of Groundwater	F	F	F	F			
	☑ Dermal Absorption of Contaminants in Groundwater	F	F	F	F			
	☑ Inhalation of Volatile Compounds in Tap Water	F	F	F	F			
☑ air	☑ Inhalation of Outdoor Air	I	I	I	I			
	☐ Inhalation of Indoor Air							
	☐ Inhalation of Fugitive Dust							
☐ surface water	☐ Ingestion of Surface Water							
	☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Inhalation of Volatile Compounds in Tap Water							
☐ sediment	☐ Direct Contact with Sediment							
☐ biota	☐ Ingestion of Wild or Farmed Foods							

Revised, 10/01/2010

Print Form

Human Health Conceptual Site Model
Scoping Form

Site Name: Chefornak Light Plant Former Tank Farm , Chefornak, Alaska

File Number: 2408.38.002

Completed by: Shannon & Wilson, Inc.

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☒ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☐ Other:

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

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

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

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☐ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

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

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☒ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

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

a) Direct Contact -

1. Incidental Soil Ingestion

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

If the box is checked, label this pathway complete: Complete

Comments:

2. Dermal Absorption of Contaminants from Soil

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

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

If both boxes are checked, label this pathway complete: Incomplete

Comments:

b) Ingestion -

1. Ingestion of Groundwater

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

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

If both boxes are checked, label this pathway complete: Complete

Comments:

2. Ingestion of Surface Water

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

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

If both boxes are checked, label this pathway complete: Incomplete

Comments:

Surface water was observed at the time of our site visit. It is unknown if the surface water is seasonable, but it does not appear to be of sufficient volume to be used as a viable drinking water source for human consumption. Surface water was not sampled as part of this investigation.

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

If both boxes are checked, label this pathway complete: Complete

Comments:

Diesel range organics are present in the soil at the site.

2. Inhalation of Indoor Air

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

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

If both boxes are checked, label this pathway complete: Incomplete

Comments:

Per ADEC Guidance Document - Note #3 to Appendix D indicates that "DEC does not require evaluation of petroleum ranges of GRO, DRO, or RRO for the indoor air inhalation (vapor intrusion) pathway."

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

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

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

Comments:

The presence of impacted groundwater is unknown at this site; however, DRO and RRO contamination were identified in the soil and further investigation is warranted if drinking water wells were installed in the future at this site or if land use changes.

Inhalation of Volatile Compounds in Tap Water

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

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

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

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

Comments:

The presence of impacted groundwater is unknown at this site; however, DRO and RRO contamination were identified in the soil and further investigation is warranted if drinking water wells were installed in the future at this site or if land use changes.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

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

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

Comments:

Direct Contact with Sediment

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

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

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

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

Comments:

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

APPENDIX A

BIOACCUMULATIVE COMPOUNDS OF POTENTIAL CONCERN

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

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

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

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

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

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

APPENDIX B

VOLATILE COMPOUNDS OF POTENTIAL CONCERN

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

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

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

Notes:

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

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Former Chefarnmute Corporation Tank Farm, Chefornak, Alaska
ADEC File No .2408.38.005

Completed By: Shannon & Wilson, Inc.
Date Completed: November 15, 2012

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

(1)
Check the media that could be directly affected by the release.

(2)
For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.

(3)
Check all exposure media identified in (2).

(4)
*Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5)
Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.

Media / Transport Mechanisms

Surface Soil (0-2 ft bgs) ☑
- ☑ Direct release to surface soil — check soil
- ☑ Migration to subsurface — check soil
- ☑ Migration to groundwater — check groundwater
- ☑ Volatilization — check air
- ☐ Runoff or erosion — check surface water
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Subsurface Soil (2-15 ft bgs) ☑
- ☑ Direct release to subsurface soil — check soil
- ☑ Migration to groundwater — check groundwater
- ☑ Volatilization — check air
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Ground-water ☑
- ☑ Direct release to groundwater — check groundwater
- ☑ Volatilization — check air
- ☐ Flow to surface water body — check surface water
- ☐ Flow to sediment — check sediment
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Surface Water ☑
- ☑ Direct release to surface water — check surface water
- ☐ Volatilization — check air
- ☐ Sedimentation — check sediment
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Sediment ☐
- ☑ Direct release to sediment — check sediment
- ☐ Resuspension, runoff, or erosion — check surface water
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

Exposure Media / Exposure Pathway/Route

Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ soil	☑ Incidental Soil Ingestion	F	C/F	C/F	F			
	☐ Dermal Absorption of Contaminants from Soil							
	☐ Inhalation of Fugitive Dust							
☑ groundwater	☑ Ingestion of Groundwater	F	F	F	F			
	☐ Dermal Absorption of Contaminants in Groundwater	F	F	F	F			
	☑ Inhalation of Volatile Compounds in Tap Water	F	F	F	F			
☑ air	☑ Inhalation of Outdoor Air	F	C/F	C/F	C/F			
	☐ Inhalation of Indoor Air							
	☐ Inhalation of Fugitive Dust							
☑ surface water	☐ Ingestion of Surface Water							
	☐ Dermal Absorption of Contaminants in Surface Water							
	☐ Inhalation of Volatile Compounds in Tap Water							
☐ sediment	☐ Direct Contact with Sediment							
☐ biota	☐ Ingestion of Wild or Farmed Foods							

Revised, 10/01/2010

Print Form

Human Health Conceptual Site Model
Scoping Form

Site Name: Former Chefarnmute Corporation Tank Farm, Chefornak, Alaska

File Number: 2408.38.005

Completed by: Shannon & Wilson, Inc.

Introduction

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

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

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☒ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☐ Other:

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

- ☒ Spills
- ☒ Leaks
- ☐ Direct discharge
- ☐ Burning
- ☐ Other:

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

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☐ Air
- ☐ Sediment
- ☒ Groundwater
- ☐ Surface water
- ☐ Biota
- ☐ Other:

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

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☒ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

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

a) Direct Contact -

1. Incidental Soil Ingestion

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

If the box is checked, label this pathway complete: Complete

Comments:

2. Dermal Absorption of Contaminants from Soil

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

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

If both boxes are checked, label this pathway complete: Incomplete

Comments:

b) Ingestion -

1. Ingestion of Groundwater

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

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

If both boxes are checked, label this pathway complete: Complete

Comments:

2. Ingestion of Surface Water

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

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

If both boxes are checked, label this pathway complete: Incomplete

Comments:

Surface water was observed at the time of the site visit. It is unknown if surface water is seasonal, but it does not appear to be of sufficient volume to be used as a viable drinking water source for human consumption. Surface water was not sampled as part of this investigation.

3. Ingestion of Wild and Farmed Foods

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

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

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

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

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

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

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

If both boxes are checked, label this pathway complete: Complete

Comments:

Diesel range organics are present in the soil at the site.

2. Inhalation of Indoor Air

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

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

If both boxes are checked, label this pathway complete: Complete

Comments:

Per ADEC Guidance Document (Note #3 to Appendix D), "DEC does not require evaluation of petroleum ranges GRO, DRO, or RRO for the indoor air inhalation (vapor intrusion) pathway."

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

Dermal Exposure to Contaminants in Groundwater and Surface Water

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

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

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

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

Comments:

The presence of impacted groundwater is unknown at this site; however, DRO and RRO contamination were identified in the soil and further investigation of the dermal exposure to the groundwater pathway is warranted if drinking water wells were installed in the future at this site or if the current land use is changed.

Inhalation of Volatile Compounds in Tap Water

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

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

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

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

Comments:

The presence of impacted groundwater is unknown at this site; however, DRO and RRO contamination were identified in the soil and further investigation of the dermal exposure to the groundwater pathway is warranted if drinking water wells were installed in the future at this site or if the current land use is changed.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

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

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

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

Comments:

Direct Contact with Sediment

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

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

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

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

Comments:

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

APPENDIX A

BIOACCUMULATIVE COMPOUNDS OF POTENTIAL CONCERN

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

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

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

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

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

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

APPENDIX B

VOLATILE COMPOUNDS OF POTENTIAL CONCERN

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

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

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

Notes:

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

APPENDIX E

IMPORTANT INFORMATION ABOUT

YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 31-1-17533

Date: December 2012
To: City of Chefornak
Re: Site Characterization, Chefornak Light Plant
Former Tank Farm and Former Chefarnmute
Corporation Tank Farm
Chefornak, Alaska

Important Information About Your Geotechnical/Environmental Report

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

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland