NEW STUYAHOK OLD AVEC TANK FARM
DIESEL CONTAMINATED SOIL

SITE INVESTIGATION REPORT

Prepared for:

STG INCORPORATED
11820 South Gambell Street
Anchorage, Alaska 99515

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ADEC Project: #11269925601

TPECI Project: #1146-04

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Acronyms and Abbreviations

ADEC	Alaska Department of Environmental Conservation
AVEC	Alaska Village Electric Cooperative
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethyl Benzene, Xylenes
COPC	Contaminants of Potential Concern
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
GRO	Gasoline Range Organics
Mg/L	Milligrams per Liter
PID	Photo-Ionization Detector
ppm	Parts per Million
QA/QC	Quality Assurance/Quality Control
RRO	Residual Range Organics
SOP	Standard Operating Procedure
STG	STG Incorporated
TPECI	Travis/Peterson Environmental Consulting, Inc.
ug/L	Micrograms per Liter
ug/mL	Micrograms per Milliliter
VOC	Volatile Organic Compounds

1.0 INTRODUCTION

Travis/Peterson Environmental Consulting, Inc. (TPECI) developed this Site Investigation Report for the Alaska Village Electric Cooperative (AVEC) to address contaminated soils discovered in the old AVEC tank farm in New Stuyahok, Alaska. On May 16, 2012, TPECI personnel traveled to New Stuyahok to screen and sample stockpiled materials and to screen and sample soil and water at two boring locations. TPECI accomplished this work in accordance with the May 7, 2012 Corrective Action Plan approved by the Alaska Department of Environmental Conservation (ADEC).

The items listed below have been completed to date for this project:

- September 15, 2011, Site Investigation Work Plan submitted to ADEC
- September 16, 2011, ADEC approved the work plan
- September 19, 2011, TPECI travels to the site to screen and sample soil
- May 4, 2012, Corrective Action Plan submitted to ADEC
- May 7, 2012, ADEC approved the Corrective Action Plan
- May 16, 2012, TPECI traveled to the site to direct drilling, establish a treatment site, and sample soil and groundwater

AVEC contracted STG, Inc. to remove the old AVEC generator house and tanks and construct a new tank farm for the City of New Stuyahok during the summer of 2011. In late August 2011, during tank farm demolition and excavation, STG reported a strong fuel smell at the old AVEC tank farm. STG removed approximately 70-cubic yards of soil from the tank farm and placed it in the stockpile area.

STG constructed the new tank farm for City of New Stuyahok in 2011. Management of the contaminated soil under the tank farm was still the responsibility of AVEC.

2.0 SITE DESCRITPTION AND BACKGROUND

The project site was located in the town of New Stuyahok on the Nushagak River, approximately 52 miles northeast of Dillingham. The old AVEC tank farm was located at the southern end of the village approximately 560-feet from the Nushagak River.

The project was situated between residential and industrial property. Residential property was located to the north and northeast of the project. Vacant forest land was located directly east across Birch Street. Two tank farms are located to the southeast and south of the project. These tank farms were owned and operated by the City of New Stuyahok. Three sewage lagoons were located directly behind the City of New Stuyahok owned tank farms, located between the tank farms and the Nushagak River. The stockpile constructed for this project was located southwest of the project. The dispenser station was installed west of the project in 2011.

The terrain surrounding the power plant slopes gradually towards the Nushagak River and was surrounded by village roads and homes. Some vegetation was present to the north and east and consisted of a closed spruce, birch, and aspen forest. Since the site was located near the

Nushagak River, TPECI assumed that drainage generally flows east towards the river. There were no streams or ponds located near the site.

3.0 CONTAMINANT OF POTENTIAL CONCERN

The contaminant of potential concern (COPC) was diesel fuel. TPECI personnel collected soil samples for diesel range organics (DRO), residual range organics (RRO), poly-aromatic hydrocarbons (PAH), gasoline range organics (GRO), and benzene, toluene, ethyl benzene, and xylenes (collectively referred to as BTEX). TPECI submitted soil samples to SGS Environmental Laboratories, Inc. in Anchorage for analysis. A TPECI qualified sampler also field screened soil with a photo-ionization detector (PID) for volatile organic compounds (VOC).

4.0 FIELD ACTIVITIES

On Wednesday May 16, 2012, TPECI staff, Wade Collins and Erik Mundahl, traveled to New Stuyahok, Alaska. Once on site, the stockpile materials was uncovered. A total of seven screenings were collected. From those screenings, three samples were sent to the laboratory for analysis. Table 1 displays the screening results.

TPECI staff inspected the Southwest Region School District (SRSD) property that was to be used as a treatment site for the 70-cubic yards of contaminated soil. After confirming the location with SRSD, STG cleared vegetation and built berms using clean soil.

TPECI staff confirmed utility locations and Discovery Drilling moved into position at bore hole #1. This bore hole was located across the street from the new City tank farm dike (Figure 2). After a safety meeting, Discovery began drilling using an auger attachment and direct push split spoon sampler. No frozen soil was encountered. Samples were collected at five foot increments to the 25-27 foot depth. Samples were collected as described in the approved Corrective Action Plan. The PVC well screen was then inserted into the bore hole.

Once complete, Discovery relocated the drill rig and set up to begin drilling bore hole #2. This bore hole was located at the southeast corner of the new City tank farm dike, approximately six feet from the dike wall. Samples were collected in the same manner as bore hole #1. No frozen soil was encountered. Samples were collected to the 20-22 foot depth.

The bore holes were covered with plastic sheeting to prevent vandalism and allowed to stabilize until the following day. On the morning of Thursday May 17, TPECI purged the wells. Measurements for dissolved oxygen, percent dissolved oxygen, temperature, pH, conductivity, and barometric pressure were collected and recorded in the field notebook. During the collection of pH and conductivity, the YSI 63 malfunctioned. Measurements for pH and conductivity were not collected for bore hole #2. Depth to water, depth to the bottom of the well, and volume purged was recorded in the field notebook. Samples were collected and labeled.

Travis/Peterson Environmental Consulting, Inc. 3305 Arctic Boulevard, Suite 102 Anchorage, AK 99503 907-522-4337	**New Stuyahok Improved Old AVEC Tank Farm** **STG Incorporated** **11820 South Gambell Street** **Anchorage, Alaska 99515**	**General Location Map** **Figure #1**

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Travis/Peterson Environmental Consulting, Inc. 3305 Arctic Boulevard, Suite 102 Anchorage, AK 99503 907-522-4337	**New Stuyahok Improved Old AVEC Tank Farm** **STG Incorporated** **11820 South Gambell Street** **Anchorage, Alaska 99515**		**Site Map** **Figure #2**
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5.0 SAMPLE RESULTS DISCUSSION

All samples which underwent laboratory analysis were submitted to SGS Environmental Laboratories, Inc. in Anchorage. Full results from the laboratory analysis are included in Appendix C. Field samples were collected and screened with a PID using the methods detailed in the Corrective Action Plan for this project. Table 2 shows soil sample results from bore hole #1 and #2. Table 3 shows water sample results for bore hole #1 and #2. The SGS Laboratory Report is available in Appendix C.

TABLE 1 –Screening Samples

Screening Sample ID	PID Reading (PPM)	Collection Depth	Location
S1	20.3	18 Inches	Stockpile
S2	238.2	18 Inches	Stockpile
S3	140.4	18 Inches	Stockpile
S4*	250.8	18 Inches	Stockpile
S5*	239.3	18 Inches	Stockpile
S6*	251.6	18 Inches	Stockpile
S7	221.5	18 Inches	Stockpile
B1 – 0-2	0.2	0-2 Feet	Bore Hole #1 (Across Street)
B1 – 5-7	0.6	5-7 Feet	Bore Hole #1
B1 – 10-12 [1]	7.2	10-12 Feet	Bore Hole #1
B1 – 15-17 [1]	3.3	15-17 Feet	Bore Hole #1
B1 – 20-22	0.5	20-22 Feet	Bore Hole #1
B1 – 25-27	0.1	27-27 Feet	Bore Hole #1
B2 – 0-2	0.6	0-2 Feet	Bore Hole #2 (SE Corner of Dike)
B2 – 5-7[1]	71.6	5-7 Feet	Bore Hole #2
B2 – 10-12[1]	559.8	10-12 Feet	Bore Hole #2
B2 – 15-17[1]	130.2	15-17 Feet	Bore Hole #2
B2 – 20-22	68.8	20-22 Feet	Bore Hole #2

TABLE 2 – Soil Sample Results

Soil Sample ID	Parameter	Results	Units	ADEC Cleanup Level (Method 2, Under 40-inch Zone, Migration to Groundwater) (mg/Kg)
Sample #S4	PID	250.8	PPM	-
	GRO	6.26	mg/Kg	300
	Benzene	0.0155U	mg/Kg	0.025
	Toluene	0.0159J	mg/Kg	6.5
	Ethylbenzene	0.0302U	mg/Kg	6.9
	o-Xylene	0.0609	mg/Kg	-
	P&M-Xylene	0.0594J	mg/Kg	-
	Total Xylene[2]	0.1203	mg/Kg	63

[1] Sample submitted for laboratory analysis
[2] o-Xylene + P&M-Xylene = Total Xylene

	DRO	8,220	mg/Kg	250
	RRO	453	Mg/Kg	11,000
Sample #S5	PID	239.3	PPM	-
	GRO	5.5	mg/Kg	300
	Benzene	0.0149U	mg/Kg	0.025
	Toluene	0.0029U	mg/Kg	6.5
	Ethylbenzene	0.0029	mg/Kg	6.9
	o-Xylene	0.0414	mg/Kg	-
	P&M-Xylene	0.0442J	mg/Kg	-
	Total Xylene	0.0856	mg/Kg	63
	DRO	12,200	mg/Kg	250
	RRO	447J	mg/Kg	11,000
Sample #S6	PID	251.6	PPM	-
	GRO	20.7	mg/Kg	300
	Benzene	0.0159U	mg/Kg	0.025
	Toluene	0.031U	mg/Kg	6.5
	Ethylbenzene	0.031U	mg/Kg	6.9
	o-Xylene	0.139	mg/Kg	-
	P&M-Xylene	0.163	mg/Kg	-
	Total Xylene	0.302	mg/Kg	63
	DRO	9,630	mg/Kg	250
	RRO	378J	mg/Kg	11,000
Sample #B1 – 10-12	PID	7.2	PPM	-
	GRO	2.94U	mg/Kg	300
	Benzene	0.0157U	mg/Kg	0.025
	Toluene	0.0306U	mg/Kg	6.5
	Ethylbenzene	0.0306U	mg/Kg	6.9
	o-Xylene	0.0306U	mg/Kg	-
	P&M-Xylene	0.0588U	mg/Kg	-
	Total Xylene	0.0894	mg/Kg	63
	DRO	500	mg/Kg	250
	RRO	46.3	mg/Kg	11,000
Sample #B1 – 15-17	PID	3.3	PPM	-
	GRO	1.16J	mg/Kg	300
	Benzene	0.00828J	mg/Kg	0.025
	Toluene	0.0161U	mg/Kg	6.5
	Ethylbenzene	0.0161U	mg/Kg	6.9
	o-Xylene	0.0145J	mg/Kg	-
	P&M-Xylene	0.031U	mg/Kg	-
	Total Xylene	0.0455	mg/Kg	63
	DRO	12.3J	mg/Kg	250
	RRO	15.8J	mg/Kg	11,000
Sample #B2 – 5-7	PID	71.6	PPM	-
	GRO	2.38J	mg/Kg	300
	Benzene	0.00912J	mg/Kg	0.025
	Toluene	0.0178U	mg/Kg	6.5
	Ethylbenzene	0.0178U	mg/Kg	6.9
	o-Xylene	0.0123J	mg/Kg	-
	P&M-Xylene	0.0342U	mg/Kg	-
	Total Xylene	0.0465	mg/Kg	63
	DRO	67.5	mg/Kg	250
	RRO	15.0J	mg/Kg	11,000
Sample #B2 – 10-12	PID	559.8	PPM	-
	GRO	21.9	mg/Kg	300

	Benzene	0.054	mg/Kg	0.025
	Toluene	0.0105U	mg/Kg	6.5
	Ethylbenzene	0.0342	mg/Kg	6.9
	o-Xylene	0.343	mg/Kg	-
	P&M-Xylene	0.343	mg/Kg	-
	Total Xylene	0.686	mg/Kg	63
	DRO	668	mg/Kg	250
	RRO	8.47J	mg/Kg	11,000
	PAH	See Page 31 of SGS Lab Report. No Analytes Above ADEC Cleanup Levels		
Sample #B2 – X (Dup. of #B2 – 10-12)	PID	-	PPM	-
	GRO	44.3	mg/Kg	300
	Benzene	0.00646U	mg/Kg	0.025
	Toluene	0.0126U	mg/Kg	6.5
	Ethylbenzene	0.0711	mg/Kg	6.9
	o-Xylene	0.0384	mg/Kg	-
	P&M-Xylene	0.0507	mg/Kg	-
	Total Xylene	0.0891	mg/Kg	63
	DRO	686	mg/Kg	250
	RRO	8.65J	mg/Kg	11,000
Sample #B2 – 15-17	PID	130.2	PPM	-
	GRO	4.22	mg/Kg	300
	Benzene	0.00622U	mg/Kg	0.025
	Toluene	0.0121U	mg/Kg	6.5
	Ethylbenzene	0.0103J	mg/Kg	6.9
	o-Xylene	0.0609	mg/Kg	-
	P&M-Xylene	0.0714	mg/Kg	-
	Total Xylene	0.1323	mg/Kg	63
	DRO	48.8	mg/Kg	250
	RRO	10.8J	mg/Kg	11,000

TABLE 3 – Water Sample Results

Soil Sample ID	Parameter	Results	Units	ADEC Cleanup Level for Groundwater (mg/Kg)
Sample #MW-1	GRO	0.522	mg/Kg	2.2
	Benzene	0.0002J	mg/Kg	0.005
	Toluene	0.00432	mg/Kg	1.0
	Ethylbenzene	0.00237	mg/Kg	0.7
	o-Xylene	0.0028	mg/Kg	-
	P&M-Xylene	0.0232	mg/Kg	-
	Total Xylene	0.0351	mg/Kg	10
	DRO	1.9	mg/Kg	1.5
Sample #MW-2	GRO	0.303	mg/Kg	2.2
	Benzene	0.0003U	mg/Kg	0.005
	Toluene	0.0006U	mg/Kg	1.0
	Ethylbenzene	0.023	mg/Kg	0.7
	o-Xylene	0.00497	mg/Kg	-
	P&M-Xylene	0.0129	mg/Kg	-
	Total Xylene	0.01787	mg/Kg	10
	DRO	0.982	mg/Kg	1.5
	PAH	See Page 43 of SGS Lab Report. No Analytes Above ADEC Cleanup Levels		

6.0 DEVIATIONS

Two deviations occurred during this project. The GRO/BTEX lid for sample #S5 was broken upon arrival to Anchorage. The septa lid was replace and sent for laboratory analysis. It appeared that a majority of the methanol had leaked out of this sample jar. The laboratory called TPECI to tell TPECI that sample #B1 – 10-12 GRO/BTEX was on its side and no methanol was present in the jar. TPECI staff told the laboratory to run the sample.

7.0 CONCLUSION

TPECI used the ADEC Method Two-Petroleum Hydrocarbon Soil Cleanup Level for the analysis of laboratory samples. Soil samples collected from the stockpile showed high levels of DRO. The highest DRO samples were collected and the results were 8,220 mg/Kg for S4, 12,200 mg/Kg for S5, and 9,360 mg/Kg for S6. The ADEC cleanup level for DRO was 250 mg/Kg. The stockpile materials will be tilled and sampled in accordance with the Landfarming Technical Memorandum (March, 2011).

Concentrations for DRO at soil sample B1 – 10-12 was 500 mg/Kg, which exceeded the ADEC cleanup levels of 250 mg/Kg. The water sample at MW#1 was 1.9 mg/Kg, which slightly exceeded the ADEC cleanup levels of 1.5 mg/Kg. Concentrations for DRO at soil sample B2 – 10-12 was 668 mg/Kg. Groundwater results did not show concentrations above ADEC cleanup levels in MW#2.

In conclusion, the area of contamination was located in an industrial area of New Stuyahok, adjacent to another fuel storage facility. The city drinking water source was located up gradient from the subject site. The exploratory bore holes found some contamination migrating off site, but the groundwater was not significantly impacted.

Bore Hole #1—East of New Tank

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Project No: 1146-04	**File: Jupiter\backup\Wade\1146 STG\04\Site Visit**	**Date: 06/27/12**	**Scale: None**

Bore Hole #2—SE Corner of New Tank Farm

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Stockpile Sampling

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Treatment Site Before Material was Brought in

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Treatment Site With Contaminated Soil

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Former Stockpile Area

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Project No: 1146-04	**File: Jupiter\backup\Wade\1146 STG\04\Site Visit**	**Date: 06/27/12**	**Scale: None**