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TUNTUTULIAK SITE RECONNAISSANCE AND RECOMMENDATION REPORT TUNTUTULIAK, ALASKA

DRAFT

Prepared for:

ADEC Aboveground Storage Tank Program
410 Willoughby Avenue, Suite 105
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Contract No. 18-5001-10

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Project No. 21071

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APPENDICES

NOTE: A video has been submitted as part of this report. The video format is MPEG compact disk.

1.0 INTRODUCTION

This document presents the results of a site reconnaissance performed at the village of Tuntutuliak, Alaska. The site reconnaissance was performed by Bristol Environmental and Engineering Serviced, Incorporated (Bristol) at the request of the Alaska Department of Environmental Conservation (ADEC). ADEC had identified several bulk fuel facilities in this village. The potential exists for soil and groundwater contamination resulting from potential leaks or spills from these aboveground storage tank (AST's) or associated piping. Contamination may consist of diesel (heating fuel) or gasoline. Fuel leaks from piping and valves at various fuel facilities were identified in Tuntutuliak during a 1998 site assessment.

The objective of this reconnaissance was to gather preliminary information on historic fuel releases and abandoned bulk oil storage sites. The results presented in this report are based on background information provided by ADEC, interviews, and a site visit on October 24 and 25, 2000.

The information from the site reconnaissance is used to evaluate the potential for contamination at the site and to recommend any further site investigation that may be necessary. The recommendations are based on the condition of the site and the potential impact of the contamination. A site conceptual model was developed to evaluate the potential effect of the contamination on human health and the environment and to provide a basis for making recommendations for any further investigations.

2.0 PURPOSE

The purpose of the site reconnaissance at the village of Tuntutuliak was to gather preliminary information on historic fuel releases and abandoned bulk oil storage sites. The information obtained from the reconnaissance is used to develop recommendations for any further site investigation.

As part of the information-gathering process, Bristol performed the following activities:

- Conducted interviews with a local authority that would have knowledge of past spills and tank locations.
- Determined what heavy equipment, both village owned and privately owned, may be available on site should it need to be used for remediation at the village.
- Sketched, videotaped and photographed all sites in the village where a reconnaissance was performed. Sites where reconnaissance was performed were then located on aerial photographs.
- Conducted sampling at sites identified by ADEC. At each site, sub-surface soil samples were collected using a hand auger, and field-screened for the presence of petroleum contaminants. If field observation or screening indicated the presence of contamination, at least one sample from that site was collected and submitted for laboratory analysis.

3.0 SITE FINDINGS

ADEC initially identified four bulk fuel facilities, and two additional private residential sites to be evaluated during the site reconnaissance at Tuntutuliak. As identified by ADEC, the four bulk fuel facility names and operators are:

Site 1 – Tuntutuliak Community Services Association, Electric Plant

Site 2 – Tuntutuliak Community Services Association, Village Safe Water Plant

Site 3 – Qinarmiut Corporation, Retail Sales

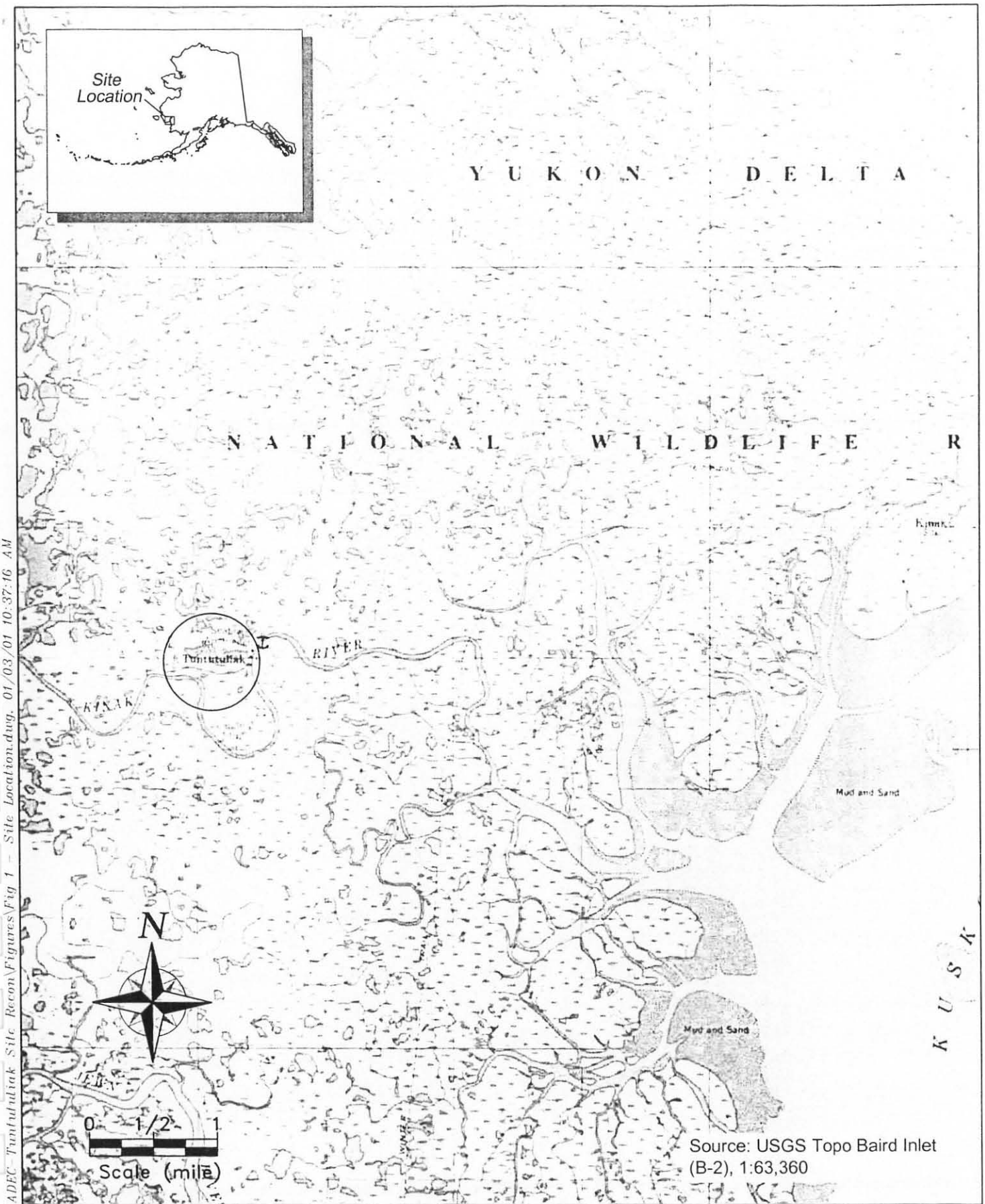
Site 4 – Lewis Angapak Memorial School, LKSD (Lower Kuskokwim School District)

The owners and locations of both private residential sites were not identified by ADEC. Only one of these sites could be located for reconnaissance. One additional site was identified in the field for reconnaissance.

The site reconnaissance was performed in Tuntutuliak (Figure 1) on October 24 and 25, 2000. At each of the Tuntutuliak sites where a site reconnaissance was performed (Figure 2), photographs (Appendix A), field notes (Appendix B) and video were taken, soil samples were collected for field screening using a photo-ionization detector (PID) and potential laboratory analysis (Appendix C), and site sketches were drawn. The video taken from each site has been placed, in MPEG format, on a compact disk (CD) and is submitted as a separate attachment to this report. On the CD, a separate file has been made for each site where video was taken.

Soil samples were collected and initially analyzed as described in the approved work plan dated October 11, 2000, and titled Final Site Reconnaissance Work Plan for the Villages of Tuntutuliak and Kwigillingok, Alaska. Soil samples, as identified in their respective tables throughout this report, were re-analyzed for diesel-range organics (DRO) following silica-gel cleanup by the laboratory. Silica-gel cleanup is a laboratory method used to remove a portion of the biogenic material (peat, for instance) from the sample. The samples collected at Tuntutuliak contained a relatively high amount of biogenic material, which could potentially cause the DRO results to be artificially high. Biogenic compounds are found in organic matter and plant oils, and can be produced as part of the natural decaying process. Conventional analysis does not differentiate between various forms of carbon. Consequently, the resulting DRO concentration estimates could include naturally occurring biogenic compounds that elute in the DRO range. While performing a silica-gel cleanup is able to remove some of the biogenic interference, it cannot remove all of the interference. Re-analyzing samples following silica-gel cleanup does, however, provide a more accurate and specific detection of petroleum contaminants in the sample.

Each of the sites identified by ADEC for reconnaissance, as well as the additional site identified in the field, is addressed below. Conclusions and recommendations for each of these sites are in Section 4.



T:\Jobs\21071 ADEC- Tuntutuliak Site Recon\Figures\Fig 1 - Site Location.dwg, 01/03/01 10:37:16 AM

BRISTOL Environmental & Engineering Services Corporation Contract No: 18-5001-10	Site Location Tuntutuliak, Alaska	Date: December 2000 Drawn By: CJL Checked By: JSR	Figure 1 Project No: 21071

3.1 Site 1 – Tuntutuliak Community Services Association, Electric Plant

One AST is located at this site. From tapping its side, the AST, marked "#10", sounded as though it contained little, if any, fuel. According to Mr. Robert Enoch, General Manager of Tuntutuliak Community Services Association, the tank had been moved to the present location from another tank farm, and was currently being used for temporary fuel storage. A wooden dike, which reportedly had been present when the tank farm was active, is absent from the site. The tank farm's liner was present, but rolled back from the edges, away from the partly-stacked sandbags that still outline the tank farm (photograph 1, Appendix A).

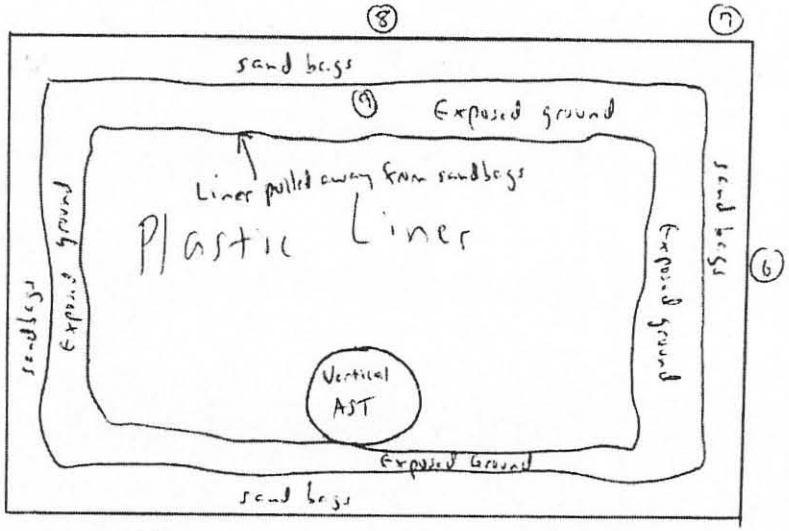
Using a hand auger, nine soil were collected for PID screening and potential submittal for laboratory analysis for DRO (method AK102), benzene, toluene, ethylbenzene and xylenes (BTEX, method AK 101) and gasoline-range organics (GRO, method AK 101). The location of the soil samples, as well as the PID results and depths of the samples are shown on Figure 3.

The following observations were made at the Electric Plant tank farm:

- *Soil staining observed*: None.
- *Sheen on water observed*: None.
- *Soil description*: Peat to 6 inches, underlain by gray silt.
- *Depth to water table observed in soil borings*: One inch to approximately 12 inches below ground surface.
- *Estimated direction of surface water and groundwater flow*: South, toward the Washeteria lagoon (photograph 2). Although the surface water and groundwater would generally be expected to flow southward, this direction may change because of the relatively flat topography and influence of seasonal flooding or rainfall.
- The nearest drinking water well is located approximately 100 feet west of the Washeteria tank farm (photograph 3). This well provides drinking water to the Washeteria and is reportedly completed at approximately 180 feet below ground surface.

The area surrounding the tank farm is marshy, with areas of standing water. The only area where firm ground was found is where the tanks had been located.

All soil samples collected from the site were screened with a PID, and readings ranged from zero to ten units. The soil sample with the PID reading of ten units, collected from location number 8 (see Figure 3), was submitted to the laboratory for analysis. An identification of TPPTF8-SL (Tuntutuliak Power Plant Tank Farm, location 8, SoiL) was assigned to this sample. PID readings, sample intervals, and their associated soil boring locations are shown on the following table:



All marshy

Location	PID	Depth (in.)
①	Ø	0-6
②	2	0-6
③	Ø	0-6
④	Ø	0-6
⑤	Ø	0-6
⑥	Ø	0-6
⑦	Ø	0-6
⑧	10	0-6
⑨	Ø	0-6

Direction of groundwater flow

Estimated surface water flow

To wastewater lagoon

Tuntutuliak Power Plant Site #1 24 Oct 00

NOT TO SCALE

Not to Scale

BRISTOL Environmental & Engineering Services Corporation	Site 1 - Tuntutuliak Community Services Association, Electric Plant - Field Drawing Tuntutuliak, Alaska	Date: January 2001	Figure 3
		Drawn By: CJL	Project No: 21071
Contract No: 18-5001-10		Checked By: JSR	

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BORING LOCATION	PID READING (units)	SOIL SAMPLE INTERVAL (inches)
1	0	0-6
2	2	0-6
3	0	0-6
4	0	0-6
5	0	0-6
6	0	0-6
7	0	0-6
8	10*	0-6
9	0	0-6

* Submitted for laboratory analysis

Analytical results for soil sample TPPTF8-SL collected from boring location 8 are shown in the following table, and are also included in Appendix D:

DRO (mg/kg)	GRO (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYLBENZENE (mg/kg)	XYLENES (mg/kg)	TOTAL BTEX (mg/kg)
182	7.54	ND (0.029)	ND (0.115)	ND (0.115)	ND (0.115)	ND

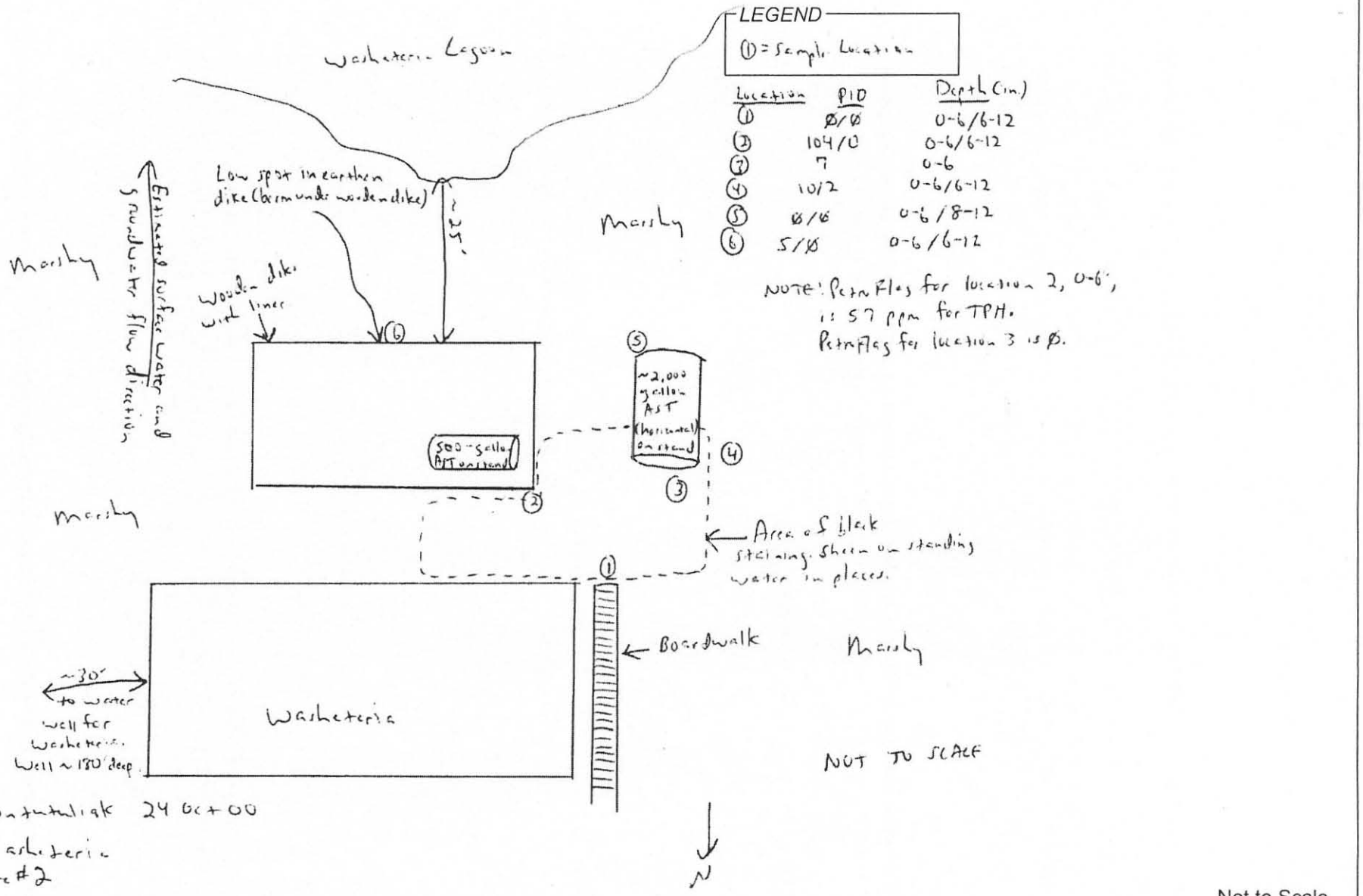
ND (0.029) = Not detected above quantification limit (quantification limit given)

3.2 Site 2 – Tuntutuliak Community Services Association, Village Safe Water Plant

The Village Safe Water Plant is commonly referred to as the Washeteria, and will be referred to as such throughout this report.

Two ASTs are located at this site (photographs 4 and 5). One horizontal AST, with a capacity of 500 gallons, is located within the diked, lined tank farm and is on a wooden, elevated stand. A new horizontal tank, with a capacity of approximately 2,000 gallons, is located outside and adjacent to the tank farm, to the west. This tank rests on a metal stand.

A hand auger was used to collected six soil samples for PID screening and potential submittal for laboratory analysis for DRO, GRO, and BTEX. The location of the soil samples, as well as the PID results and depths of the samples, are shown on Figure 4.



Not to Scale

BRISTOL Environmental & Engineering Services Corporation	Site 2 - Tuntutuliak Community Services Association, Village Safe Water Plant - Field Drawing Tuntutuliak, Alaska	Date: January 2001	Figure 4
		Drawn By: CJL	Project No: 21071
Contract No: 18-5001-10		Checked By: JSR	

The following observations were made at the Washeteria tank farm:

- *Soil staining observed*: Soil staining was seen to the north and east of the 2,000-gallon AST, as well as on the northern side of the tank farm, along the western side (Photograph 6).
- *Sheen on water observed*: A sheen was visible on the surface water near boring location no. 1, at the southern end of the boardwalk (photograph 7).
- *Soil description*: Peat to 6 inches, underlain by gray silt.
- *Depth to water table observed in soil borings*: One inch to approximately 12 inches below ground surface.
- *Estimated direction of surface water and groundwater flow*: South, toward the Washeteria lagoon. Although the surface water and groundwater would generally be expected to flow southward, this direction may change because of the relatively flat topography and influence of seasonal flooding or rainfall.
- The nearest drinking water well is located approximately 100 feet east of the Washeteria tank farm. This well provides drinking water to the Washeteria.

The area surrounding the tank farm is marshy, with areas of standing water. The only area where firm ground was found inside the diked area.

All soil samples collected from the site were screened with a PID, and readings ranged from zero to 104 units. The soil sample with the PID reading of 104 units, collected from location number 2 at the northeast corner of the tank farm (Figure 4), was submitted to the laboratory for analysis. Bristol assigned an identification of TW2-SL (Tuntutuliak Washeteria, location 2, SoiL) to this sample. Soil samples from boring locations 2 and 3 were analyzed in the field using a PetroFlag hydrocarbon test kit for soils. Results for these two samples are given in units of parts per million (ppm), and are for total petroleum hydrocarbons (TPH). It should be noted that soils with a high concentration of organics, such as the case at this site, may result in false positives or sample results that are biased high when analyzed with the PetroFlag system. The same is true for DRO results obtained from the laboratory. PID readings, sample intervals, and their associated soil boring locations are shown on the following table:

BORING LOCATION	PID READING (units)	SOIL SAMPLE INTERVAL (inches)
1	0/0	0-6/6-12
2	104*/0	0-6/6-12
3	7	0-6
4	10/2	0-6/6-12
5	0/0	0-6/6-12
6	5/0	0-6/6-12

* Submitted for laboratory analysis

Analytical results for soil sample TW2-SL collected from the 6 to 12-inch interval from boring location 2, as well as the PetroFlag results for the 0 to 6-inch intervals for boring locations 2 and 3 are shown in the following table:

Boring Location	DRO (mg/kg)	GRO (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	TOTAL BTEX (mg/kg)	PETRO-FLAG, TPH (ppm)
2	2,600	27	ND (0.049)	ND (0.196)	ND (0.196)	0.0865	0.0865	na
2	1,020*	na	na	na	na	na	na	na
3	na	na	na	na	na	na	na	0

* = Results following silica-gel cleanup of sample and re-analysis
ND (0.049)= Not detected above quantification limit (quantification limit given)
na = Not applicable

3.3 Site 3 – Qinarmiut Corporation, Retail Sales

This site was inaccessible during the October 2000, reconnaissance. The site is accessible only by boat, and the boats in the village have been removed from the river and winterized for the season. Mr. Robert Enoch stated that he believed there had been a fuel spill at this site. Is expected that a reconnaissance will be performed at this site in the spring of 2001.

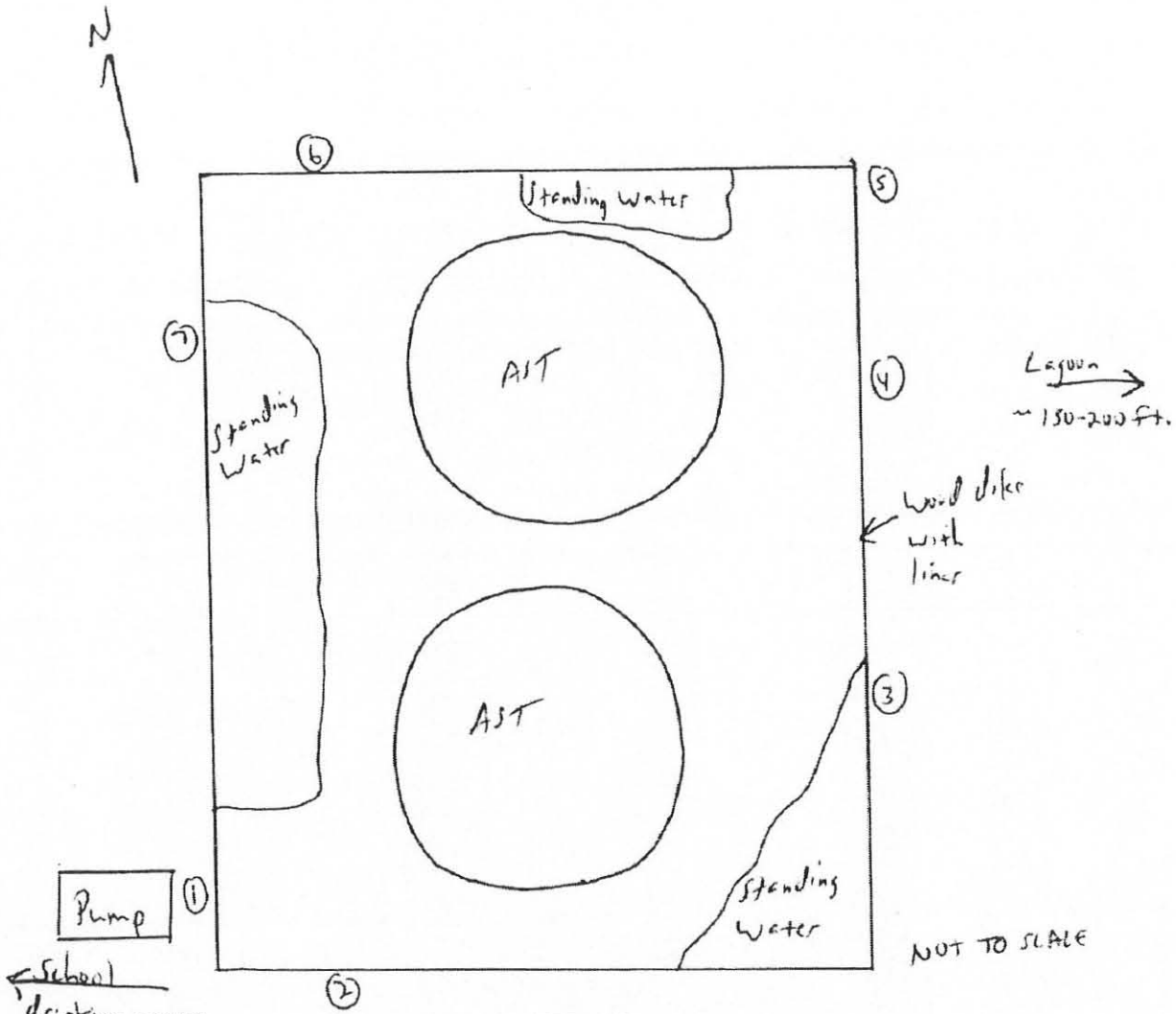
3.4 Site 4 – Lewis Angapak Memorial School, LKSD

Site 4 will be referred to as the "school" throughout this report.

Two ASTs are located at this site (photograph 8). Seven soil samples were collected using a hand auger for PID screening and potential submittal for laboratory analysis for DRO, GRO, and BTEX. All samples were collected from 0-6 inches below ground surface. The location of the soil samples, as well as the PID results and depths of the samples are shown on Figure 5.

The following observations were made at the School tank farm:

- *Soil staining observed*: None.
- *Sheen on water observed*: None.
- *Soil description*: Peat to 6 inches, underlain by gray silt.
- *Depth to water table observed in soil borings*: Approximately 6 to 12 inches below ground surface.
- *Estimated direction of surface water and groundwater flow*: East, toward a lagoon located approximately 150-200 feet from the tank farm. Although the surface water and groundwater would generally be expected to flow eastward, this direction may change because of the relatively flat topography and influence of seasonal flooding or rainfall.
- The nearest drinking water well is located approximately 200 feet west of the school tank farm. This well provides drinking water to the school, and the depth of the well is not known. According to Mr. Robert Enoch, the school well and the Washeteria wells are the only drinking water wells in the village.



LEGEND

① Sample Location

Location	PID	Depth (in.)
①	Ø	0-6
②	Ø	0-6
③	Ø	0-6
④	Ø	0-6
⑤	Ø	0-6
⑥	Ø	0-6
⑦	Ø	0-6

Tuntutuliak 25 Oct 00
School
Site #4

Not to Scale

BRISTOL Environmental & Engineering Services Corporation Contract No: 18-5001-10	Site 4 - Lewis Angapak Memorial School, LKSD - Field Drawing Tuntutuliak, Alaska	Date: January 2001 Drawn By: CJL Checked By: JSR	Figure 5 Project No: 21071

The area surrounding the tank farm is marshy, with areas of standing water. The only area where firm ground is found was the area where the tanks are located.

PID readings from all boring locations were zero. As such, no soil samples were collected and submitted for laboratory analysis.

3.5 Residential Site, Tribal Council

One of the two residential sites identified by ADEC for reconnaissance was located during the October 2000 visit. The AST at this site, identified by Mr. Robert Enoch, is owned by the tribal council. Mr. Enoch contacted Mr. Henry Lupie, tribal council administrator, for permission to access the site for purposes of conducting a reconnaissance at the tank location.

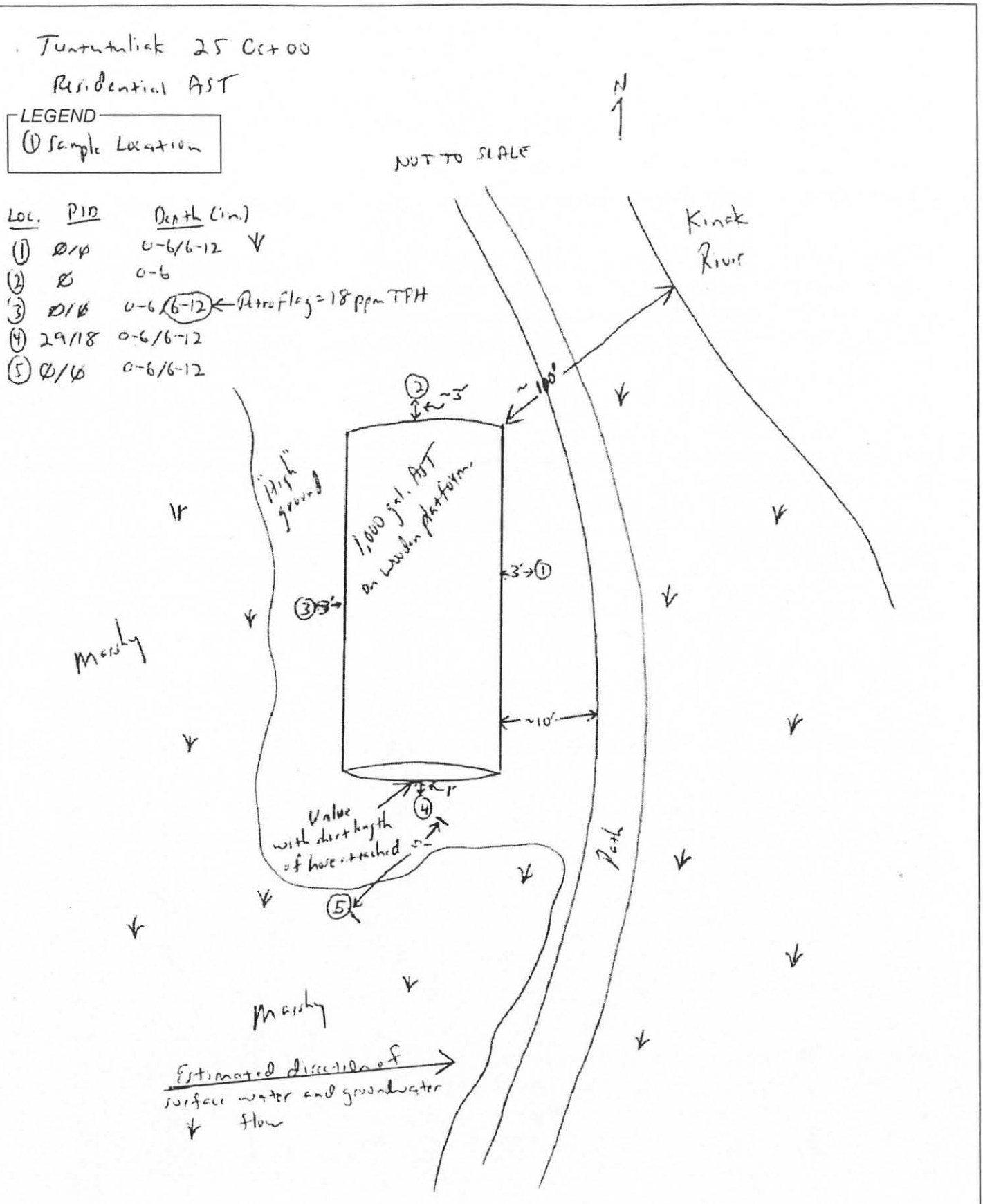
This tank (photograph 9 and 10), with a capacity of approximately 1,000 gallons, is located northeast of, and across the boardwalk from, the Electric Plant (Site 1). The tank is horizontal, rests on a wooden stand, and is not surrounded by a dike. A valve is located on the south end of the tank and a short length of hose is attached to the valve. At the time of the site visit, the tank was tapped on the side and sounded nearly empty, or empty.

Using a hand auger, five soil samples were collected for PID screening and potential submittal for laboratory analysis for DRO, GRO, and BTEX. The location of the soil samples, as well as the PID results and depths of the samples, are shown on Figure 6.

The following observations were made at the Residential Site:

- *Soil staining observed*: None.
- *Sheen on water observed*: None
- *Soil description*: Peat and silt to 12 inches.
- *Depth to water table observed in soil borings*: From ground surface to approximately 6 inches below ground surface.
- *Estimated direction of surface water and groundwater flow*: East, toward the Kinak River (photograph 9). Although the surface water and groundwater would generally be expected to flow eastward, this direction may change because of the relatively flat topography and influence of seasonal flooding or rainfall.
- The nearest drinking water well is the Washeteria well, located approximately 400 feet southwest of this residential tank.

All soil samples collected at the site were screened with a PID, and readings ranged from 0 to 29 units. The soil sample with the PID reading of 29 units, collected from boring location 4 (underneath the valve) from a depth of 0-6 inches, was submitted to the laboratory for analysis. An identification of TRES4-SL (Tuntutuliak, RESidential, location 4, SoiL) was assigned to this sample. PID readings, sample intervals, and their associated soil boring locations are shown on the following table:



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BRISTOL Environmental & Engineering Services Corporation Contract No: 18-5001-10	Residential Site, Tribal Council - Field Drawing Tuntutuliak, Alaska	Date: January 2001 Drawn By: CJL Checked By: JSR	Figure 6 Project No: 21071

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BORING LOCATION	PID READING (units)	SOIL SAMPLE INTERVAL (inches)
1	0/0	0-6/6-12
2	0	0-6
3	0/0	0-6/6-12
4	29*/18	0-6/6-12
5	0/0	0-6/6-12

* Submitted for laboratory analysis

Analytical results for soil sample TRES4-SL from boring location 4, as well as PetroFlag results for the 6 to 12-inch interval for boring location 3 are shown in the following table:

Boring Location	DRO (mg/kg)	GRO (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	TOTAL BTEX (mg/kg)	PETRO-FLAG, TPH (ppm)
3	na	na	Na	na	na	na	na	18
4	3,530	6.98	ND (0.018)	ND (0.072)	ND (0.072)	0.09	0.09	na
4	2,630*	na	Na	na	na	na	na	na

* = Results following silica-gel cleanup of sample and re-analysis
ND (0.018)= Not detected above the quantification limit (quantification limit given)
na = Not applicable

3.6 Additional Reconnaissance Area (Electric Plant)

A reconnaissance was performed at one additional area, in the vicinity of the Electric Plant. This tank, while located at the Electric Plant, was not specifically identified by ADEC for reconnaissance. It is located on the western side of the western-most generator at the Electric Plant site.

Based on discussions with Mr. Robert Enoch, an overfill of an approximately 300-gallon AST occurred at this site in the spring during the mid-1980's, and several thousand gallons of fuel were spilled. The ground was reportedly frozen at the time and the village cleaned up the spill as much as possible.

The AST located at this site (photograph 11) is horizontal and rests on a wooden, elevated stand. The tank has no secondary containment.

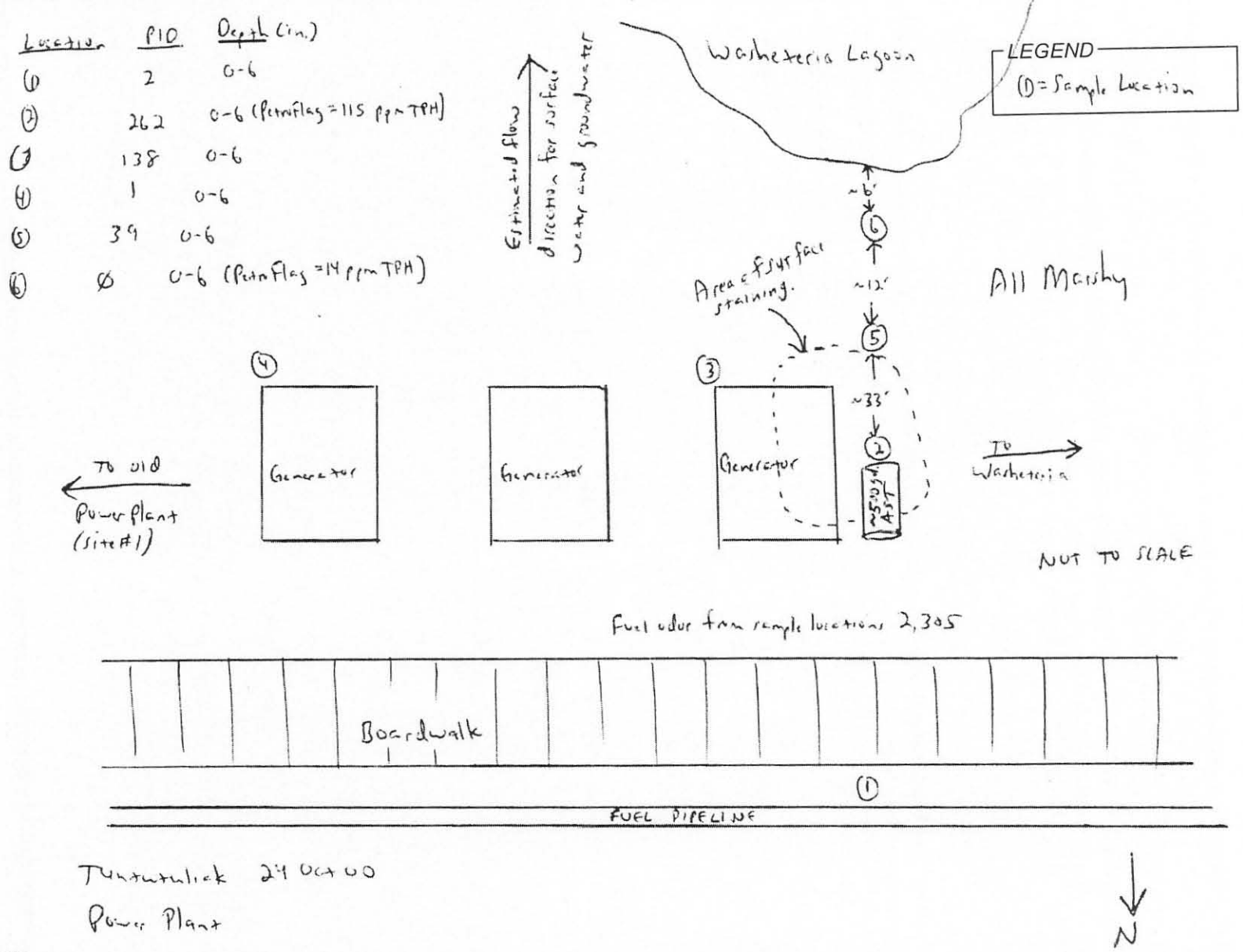
Using a hand auger, six soil samples were collected for PID screening and potential submittal for laboratory analysis for DRO, GRO, and BTEX. The location of the soil samples, as well as the PID results and depths of the samples are shown on Figure 7.

The following observations were made at the 300-gallon AST at the Electric Plant:

- *Soil staining observed*: Soil staining was seen underneath, and south of the tank (photograph 11). Soil staining was also visible underneath, and south of the western-most generator (Photographs 12, 13). It could not be determined whether the staining underneath the generator was from the tank spill, or from the generator itself. A hose is routed through the floor of the generator building into a 5-gallon bucket. Possible spillage of the fluid (appears to be oil) from this bucket may have contributed to the staining.
- *Sheen on water observed*: None.
- *Soil description*: Peat to 6 inches, underlain by gray silt.
- *Depth to water table observed in soil borings*: Approximately 1 to 6 inches below ground surface.
- *Estimated direction of surface water and groundwater flow*: South, toward the Washeteria lagoon (photograph 11). Although the surface water and groundwater would generally be expected to flow southward, this direction may change because of the relatively flat topography and influence of seasonal flooding or rainfall.
- The nearest drinking water well is the Washeteria well, located approximately 30 feet west of this 300-gallon tank.

The area surrounding the tank is marshy, with areas of standing water. The only area where firm ground was found is underneath the generators.

All soil samples collected at the site were screened with a PID, and readings ranged from 0 to 262 units. The soil sample with the PID reading of 262 units, collected from location number 2 at the southern end of the tank, was submitted to the laboratory for analysis. This sample was assigned an identification of TPPAST2-SL (Tuntutuliak Power Plant AST, location 2, SoiL) to this sample. A duplicate sample, collected for quality control purposes, was collected from this same location and identified as sample TPPAST10-SL. Soil samples from boring locations 2 and 6 were analyzed in the field using a PetroFlag hydrocarbon test kit for soils. Soil boring locations, PID readings, and sample intervals are shown on the following table:



Not to Scale

BRISTOL Environmental & Engineering Services Corporation	Additional Reconnaissance Area (Electric Plant) - Field Drawing Tuntutuliak, Alaska	Date: January 2001	Figure 7
		Drawn By: CJL	Project No: 21071
Contract No: 18-5001-10		Checked By: JSR	

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BORING LOCATION	PID READING (units)	SOIL SAMPLE INTERVAL (inches)
1	2	0-6
2	262*	0-6
3	138	0-6
4	1	0-6
5	39	0-6
6	0	0-6

* Submitted for laboratory analysis

Analytical results for soil sample TPPAST2-SL collected from boring location 2, its duplicate, and the PetroFlag results for soil samples collected from boring locations 2 and 6 are shown in the following table:

Boring Location	DRO (mg/kg)	GRO (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	TOTAL BTEX (mg/kg)	PETRO-FLAG, TPH (ppm)
2	53,500	694	0.171	0.846	2.25	16.95	20.22	115
2*	105,000	839	0.232	1.04	3.01	25.3	29.58	na
6	na	na	na	na	na	na	na	14

* = Duplicate sample
na = Not applicable

4.0 CONCLUSIONS AND RECOMMENDATIONS

For each site in this report where additional investigation is recommended, a preliminary site conceptual model is presented. The intent of this model is to show potential contaminant sources (soil, surface soil, surface water, groundwater, e.g.) and receptors, such as vegetation or humans, for example. These models are used to guide future investigative activities. For example, if contamination is suspected to be migrating from the source area (soil beneath leaking ASTs, for example) into surface water where aquatic organisms such as fish may be affected, collection of surface water samples downgradient from the source area may be warranted. Based on the models presented in this report, general recommendations and rationale for future sample locations and media types are presented. Should ADEC determine that future investigative activities are warranted for a site, a detailed work plan showing proposed sample locations, media types, analytical methods and rationale will be developed.

Cleanup levels for the following sites are based on Method Two, Tables B1 and B2, from 18 AAC 75, as amended through October 28, 2000. Based on the fact that groundwater at Tuntutuliak, as evidenced by the two existing drinking water wells, is potable, the Method Two cleanup levels presented below are recommended. These levels are based on the Method Two, Under 40-Inch Zone migration to groundwater pathway. The Method Two cleanup levels are:

- **GRO** – 300 mg/kg
- **DRO** – 250 mg/kg
- **Benzene** – 0.02 mg/kg
- **Toluene** – 5.4 mg/kg
- **Ethylbenzene** – 5.5 mg/kg
- **Xylenes** – 78 mg/kg

4.1 Site 1 – Tuntutuliak Community Services Association, Electric Plant

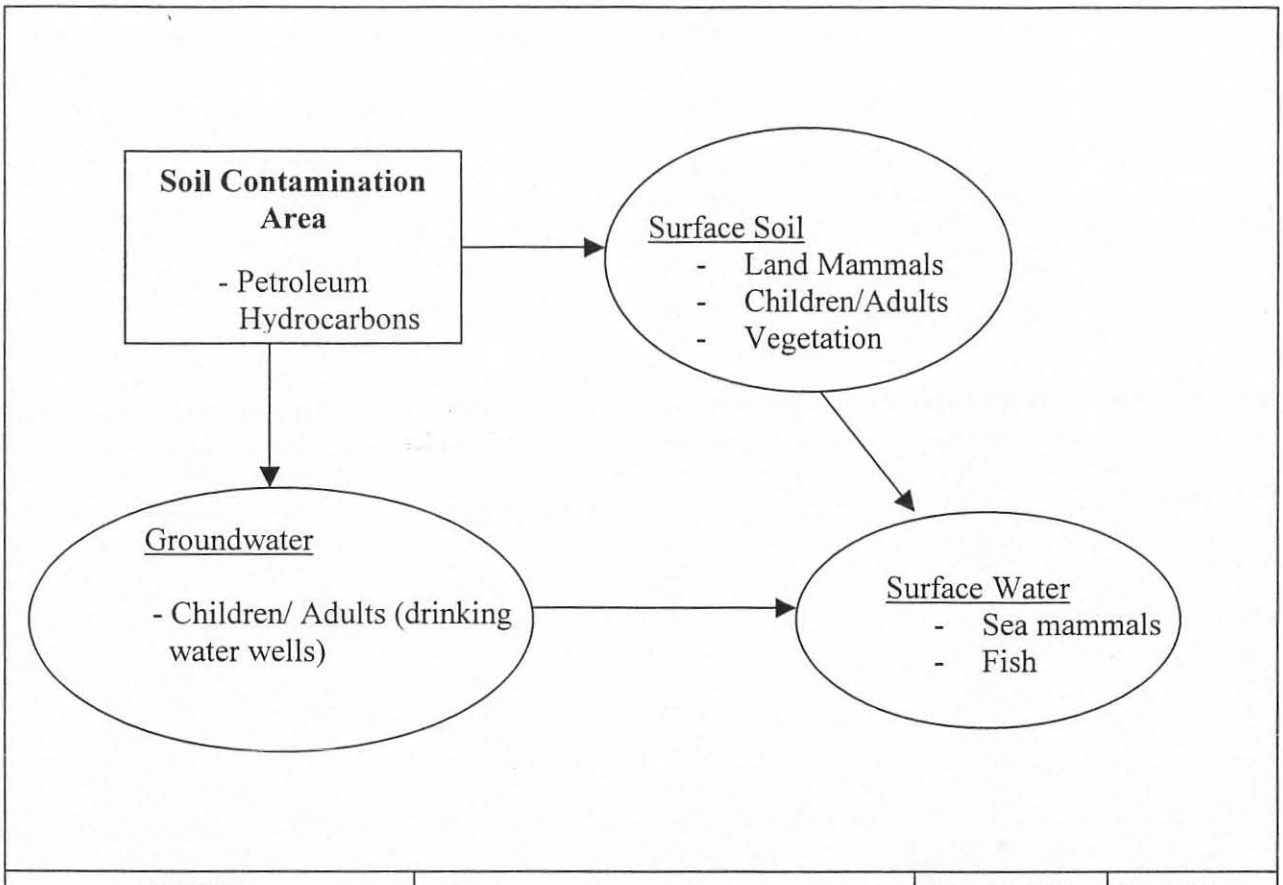
The highest PID reading of the nine soil samples collected at this site was 10 units. Laboratory analysis of this sample indicates that only DRO and GRO were detected, and at relatively low concentrations. No visible signs of contamination at the site were noted. No additional investigative activities are recommended at this site.

4.2 Site 2 – Tuntutuliak Community Services Association, Village Safe Water Plant

The highest PID reading of the six soil samples collected at this site was 104 units. Laboratory analysis of this sample indicates the presence of DRO, GRO, and xylenes. While concentrations of GRO and xylenes are relatively low, DRO was detected at a concentration of 1,020 mg/kg following silica-gel cleanup and re-analysis. The site was visibly stained with petroleum, and a sheen was visible on the surface water.

Given the concentration of DRO detected in the soil sample, the presence of soil staining and surface water sheen, the proximity of the site to the Washeteria drinking water well, and the possible variability of the direction of groundwater and surface water flow, additional investigative activities are recommended at this site.

Based on data collected during the site reconnaissance, the conceptual model (Figure 4-1) showing potential contaminant sources and receptors has been developed.



BRISTOL Environmental & Engineering Services Corporation	**Site Conceptual Model** Site 2-Tuntutulick Community Services Association, Village Safe Water Plant	Date: Jan. 2001	Figure: 4-1
		Drawn By: mft	
			Project No: 21071
Contract No: 18-5001-10		Checked By: sr	

Based on the site conceptual model shown above, the following types of samples, general sample locations and rationale, are presented:

Table 4-1

Sample Media	Location	Rationale
Groundwater	• Downgradient from suspected source area.	• Groundwater possibly migrating to surface water in Washeteria lagoon.
	• Between suspected source area and Washeteria drinking water well	• Groundwater possibly migrating to well.
Surface Soil	• Downgradient from suspected source area.	• Contaminants possibly leaching from soil into groundwater and surface water.
	• Area surrounding tank farm.	• Determine contaminant concentrations that potential receptors may be exposed to. • Define lateral extent of contamination for purpose of potential remedial activities.
Surface Water	• Downgradient from suspected source area.	• Determine if contaminants are migrating into Washeteria lagoon.
	• Area surrounding tank farm. • Washeteria lagoon.	• Determine contaminant concentrations that potential receptors may be exposed to.

4.3 Site 3 – Qinarmiut Corporation, Retail Sales

Because this site was inaccessible during the October 2000 reconnaissance, no conclusions or recommendations can be made at this time. It is anticipated that this site will be visited in the spring of 2001, followed by a reconnaissance report that will include findings and recommendations.

4.4 Site 4 – Lewis Angapak Memorial School, LKSD

No signs of spills were visible at this site, and PID readings indicated no detectable fuel contamination in the soil surrounding the tank farm. No additional investigative activities are recommended at this site.

4.5 Additional Reconnaissance Area (Electric Plant)

The highest PID reading of the six soil samples collected at this site was 262 units. Laboratory analysis of this sample indicates the presence of DRO, GRO, and BTEX. DRO, GRO and benzene were detected at concentrations of 105,000 mg/kg, 839 mg/kg and 0.232 mg/kg, respectively. The site was visibly stained with petroleum, although a sheen was not visible on the surface water.

Given the concentrations of DRO, GRO and benzene detected in the soil sample, the presence of soil staining, the proximity of the Washeteria drinking water well to the site, and the possible variability of the direction of groundwater and surface water flow, additional investigative activities are recommended at this site.

The site conceptual model (Figure 4-1) for Site 2 also applies to this site. Also applying to this site is the information in Table 4-1 for Site 2 showing the types of samples, general sample locations and rationale for recommended future sampling.

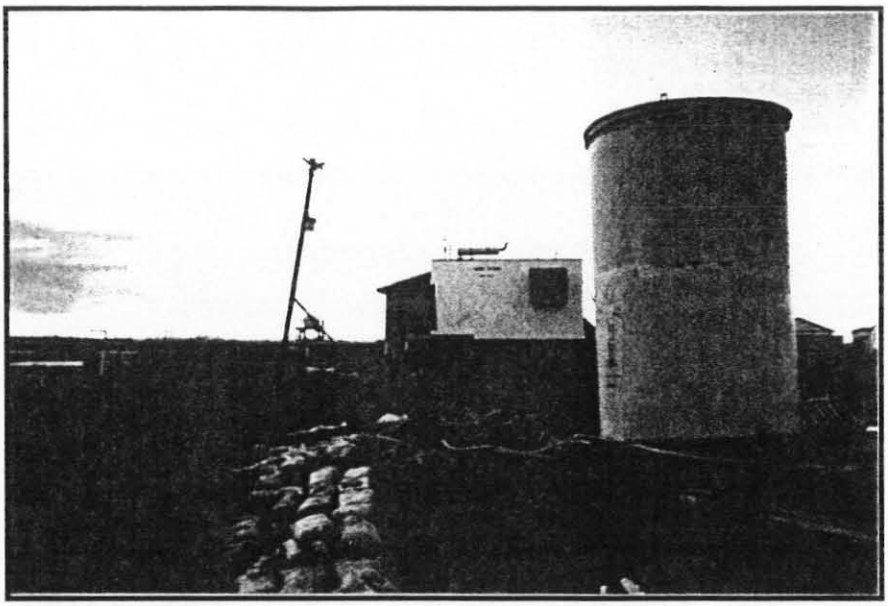
4.6 Residential Site (Tribal Council)

The highest PID reading of the six soil samples collected at this site was 29 units. Laboratory analysis of this sample indicates the presence of DRO, GRO, and xylenes. While concentrations of GRO and xylenes are relatively low, DRO was detected at an elevated concentration. No surface staining or surface water sheen was visible at this site.

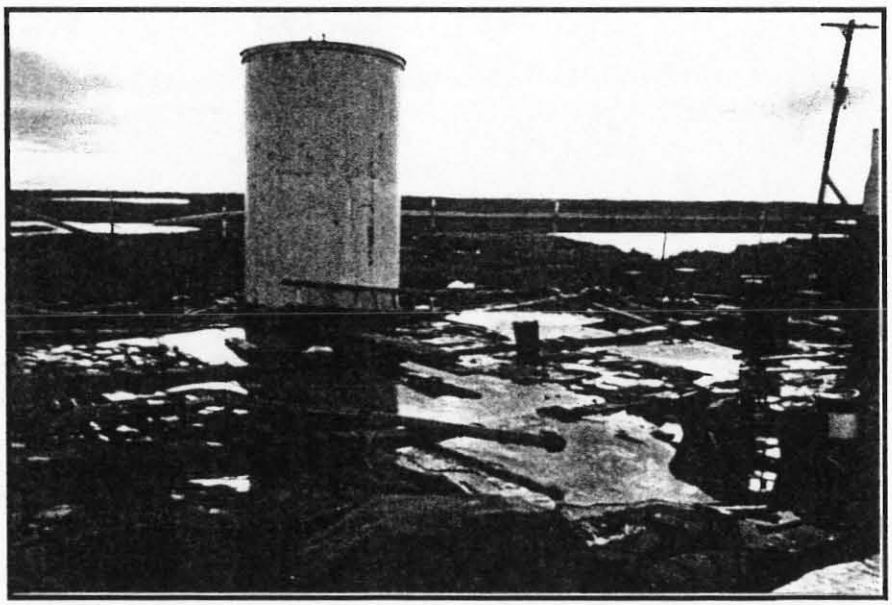
Although contamination was detected at this site, the contamination appears to be isolated as evidenced by the PID readings from soil samples collected from the area surrounding the AST. Based upon this observation, and that the nearest groundwater drinking well (Washeteria) is located approximately 400 away in what appears to be an upgradient direction, no additional investigative activities are recommended at this site.

APPENDIX A

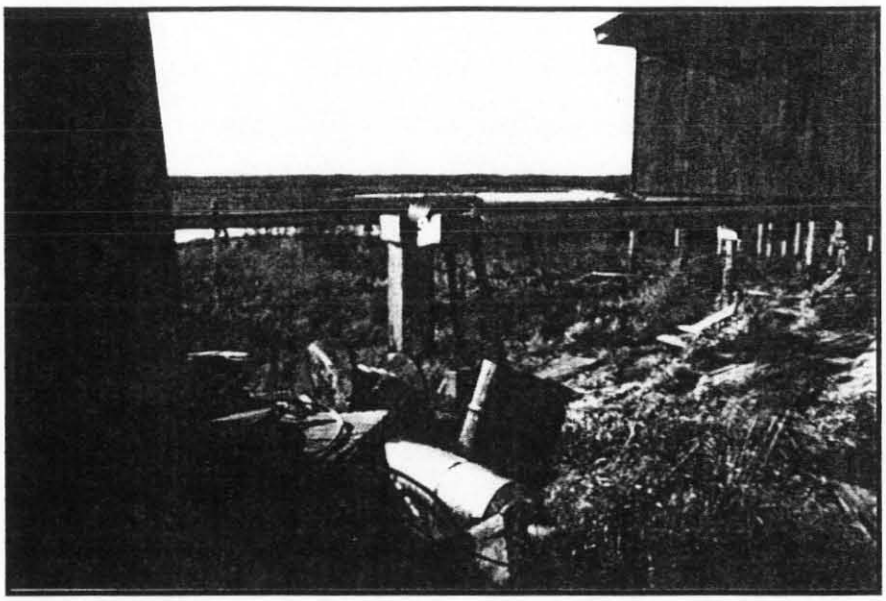
SITE PHOTOGRAPHS



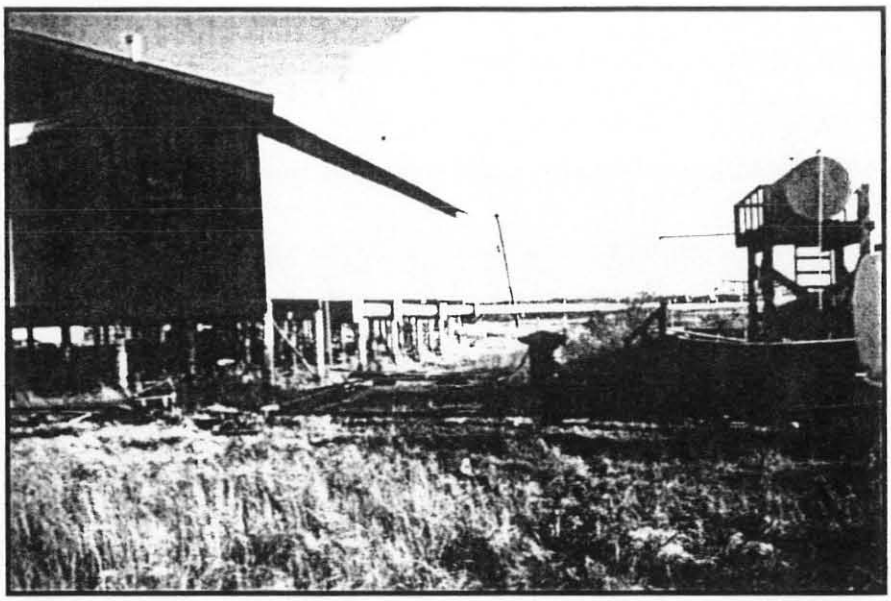
Village: Tuntutuliak Photo 1
ADEC Site Number: 1
Site Name: Tuntutuliak Community Services Association, Electric Plant
Direction: W
Description: Foreground to background is sand bag berm, #10 AST, generators (yellow), Washeteria (red), one of two ASTs (elevated, behind pole) at Washeteria.



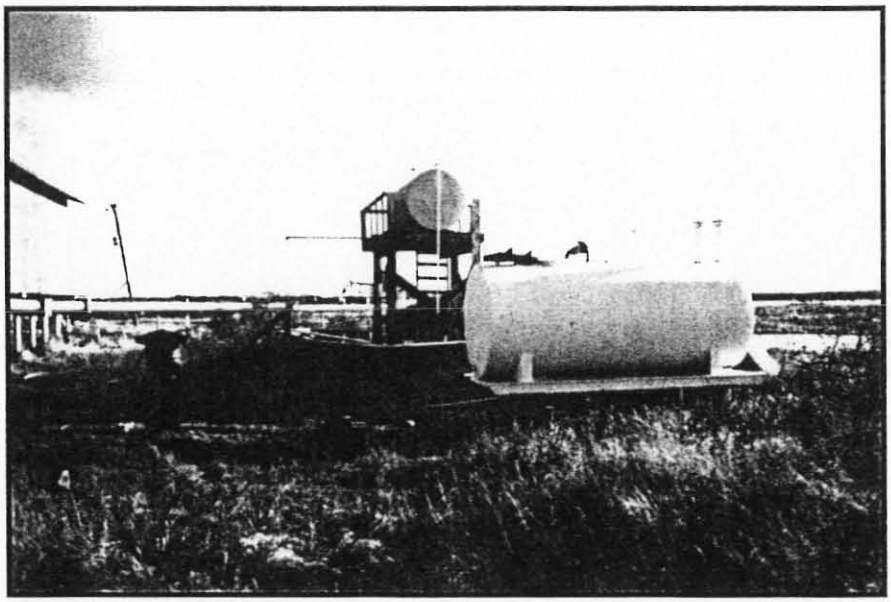
Village: Tuntutuliak Photo 2
ADEC Site Number: 1
Site Name: Tuntutuliak Community Services Association, Electric Plant
Direction: SW
Description: Number 10 AST with Washeteria (Site No. 2, Village Safe Water Plant) Lagoon in background.



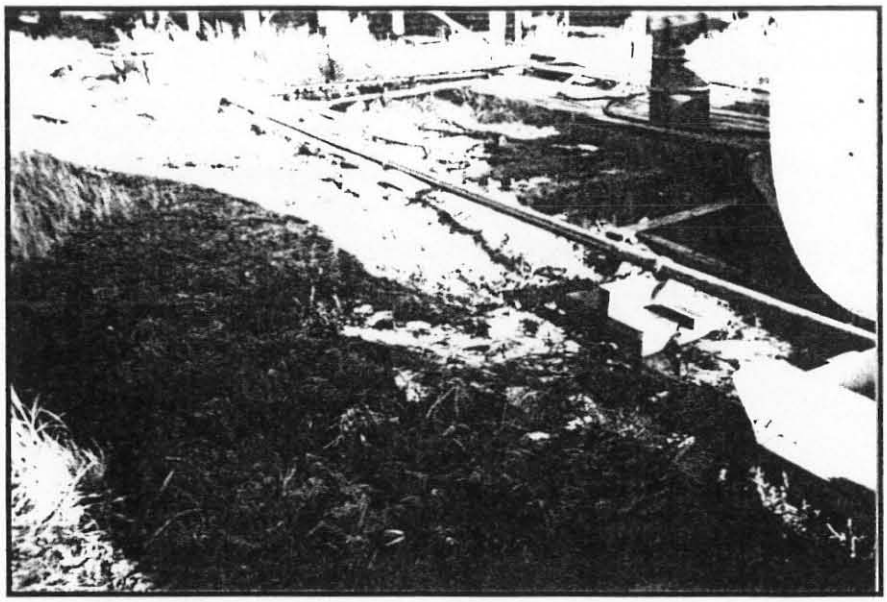
Village: Tuntutuliak Photo 3
ADEC Site Number: 1
Site Name: Tuntutuliak Community Services Association, Electric Plant
Direction: SW
Description: Water-supply well for Washeteria is in the center of the photo. This well is approximately 90 feet from the Washeteria tank farm.



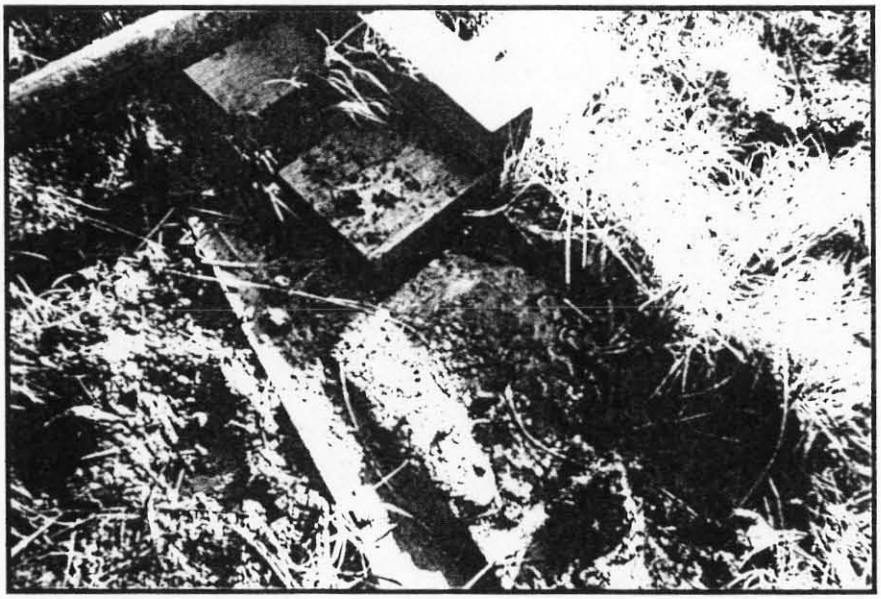
Village: Tuntutuliak Photo 4
ADEC Site Number: 2
Site Name: Tuntutuliak Community Services Association, Village Safe Water Plant
Direction: NE
Description: Along the south side of the Washeteria. 2,000-gallon AST is seen on the right, and 500-gallon AST is seen to its left.



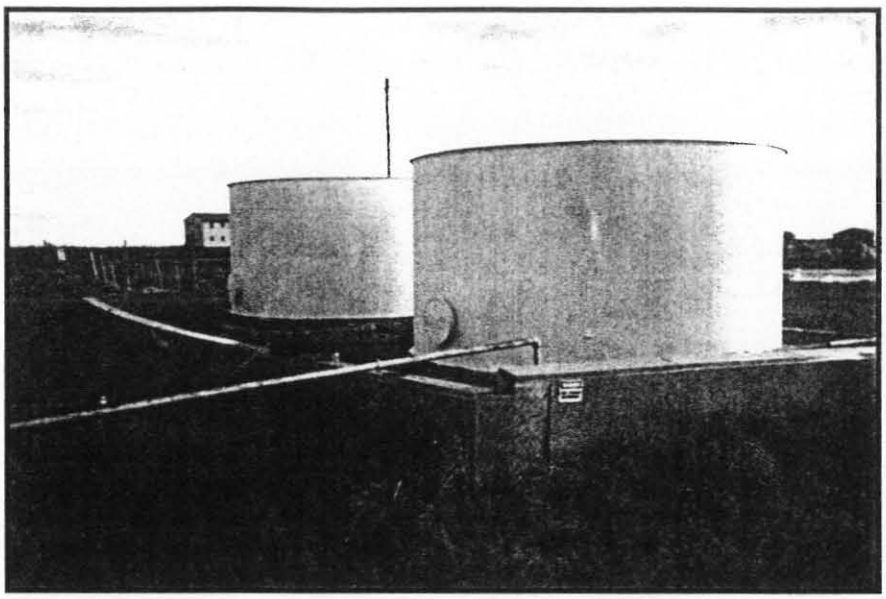
Village: Tuntutuliak Photo 5
ADEC Site Number: 2
Site Name: Tuntutuliak Community Services Association, Village Safe Water Plant
Direction: E
Description: Same as Photo 4.



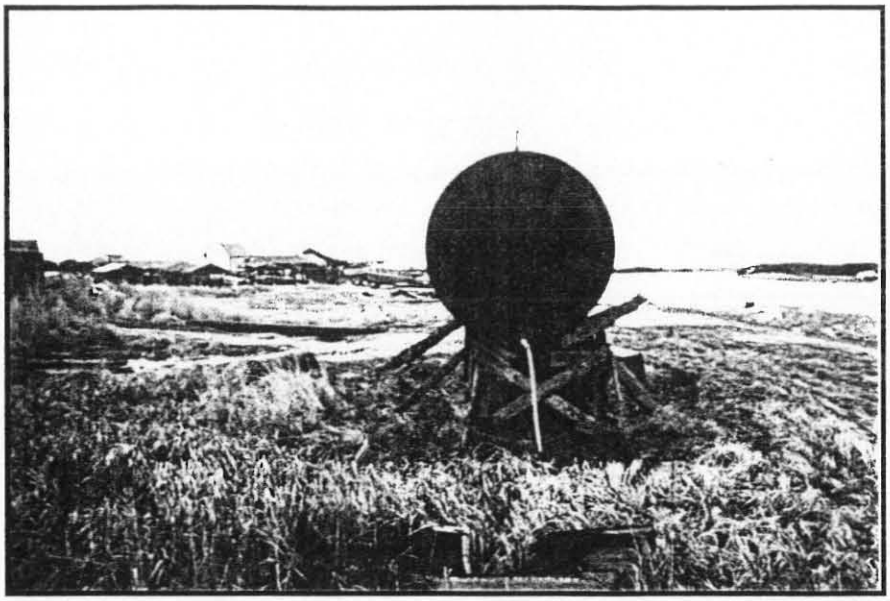
Village: Tuntutuliak Photo 6
ADEC Site Number: 2
Site Name: Tuntutuliak Community Services Association, Village Safe Water Plant
Direction: N-NE
Description: Stained areas are in the right foreground and background. Shadows are not to be confused with stains.



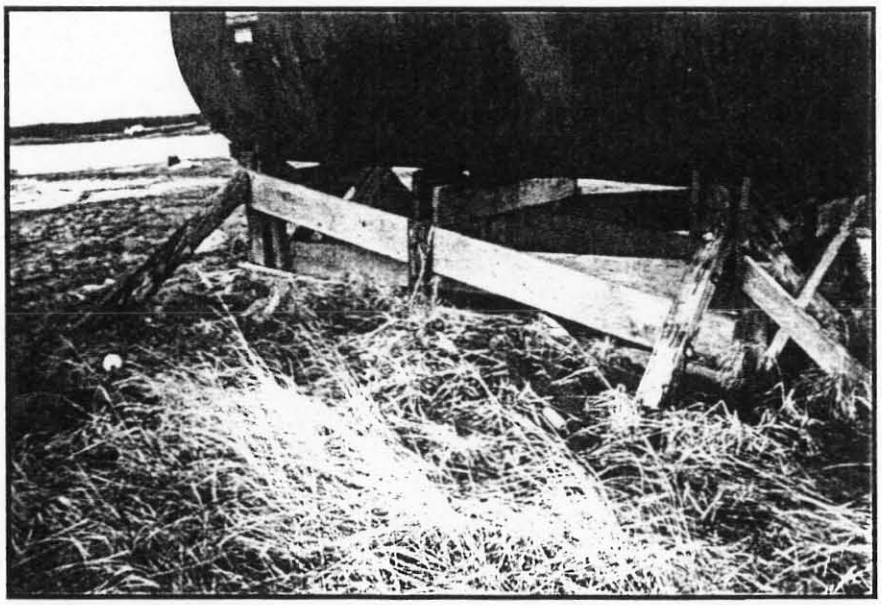
Village: Tuntutuliak Photo 7
ADEC Site Number: 2
Site Name: Tuntutuliak Community Services Association, Village Safe Water Plant
Direction: SE
Description: Sheen on water near boring location no. 4. This location is near the green tote seen in the upper left-hand corner of Photo 6.



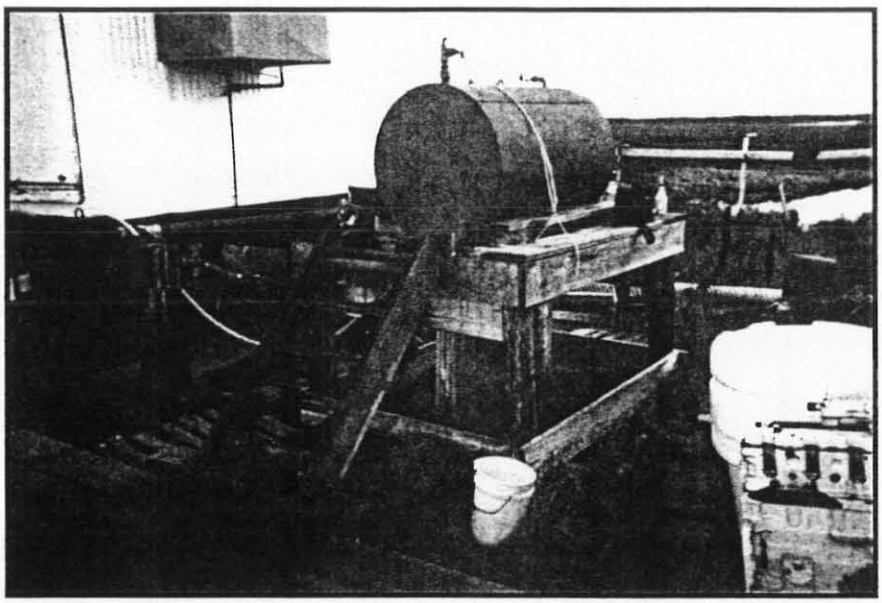
Village: Tuntutuliak Photo 8
ADEC Site Number: 4
Site Name: Lewis Angapak Memorial School, LKSD
Direction: NE
Description: Two ASTs surrounded by dike and underlain by liner.



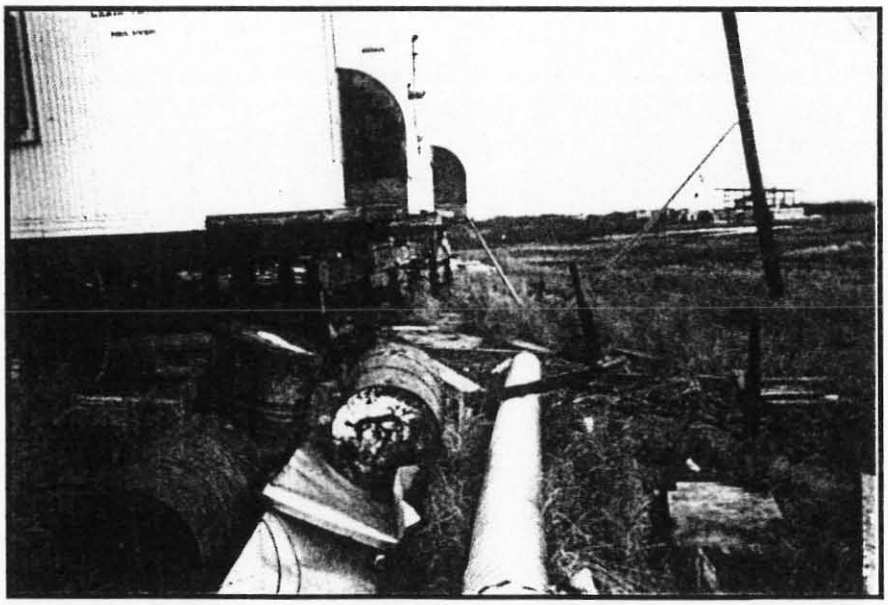
Village: Tuntutuliak Photo 9
Site Name: Residential Site, Tribal Council
Direction: N
Description: South end of tank. Short length of hose attached to valve. Kinak River on the right.



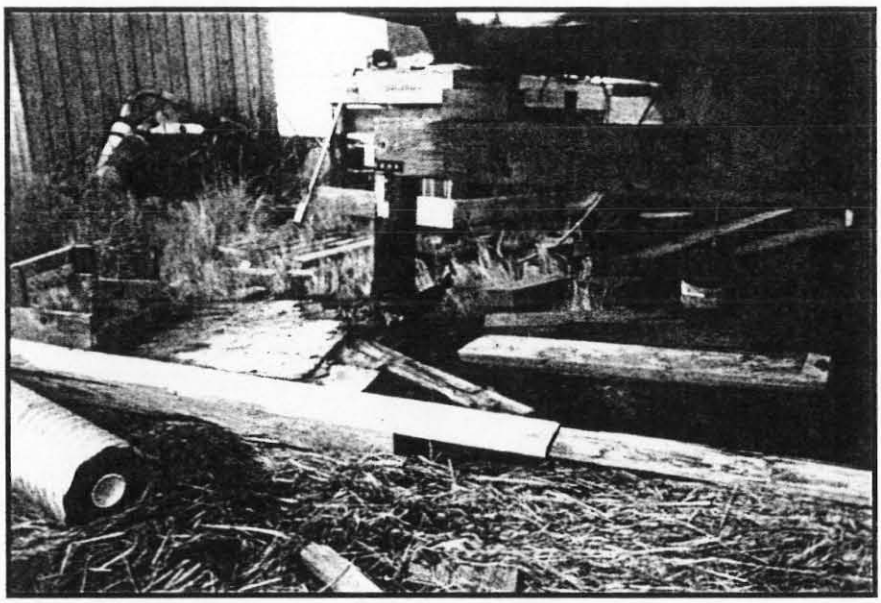
Village: Tuntutuliak Photo 10
Site Name: Residential Site, Tribal Council
Direction: NE
Description: West side of the tank. Kinak River in the upper left-hand corner of the photo.



Village: Tuntutuliak Photo 11
Site Name: Addition Reconnaissance Area (Electric Plant)
Direction: SE
Description: 300-gallon AST on the west side of the western-most generator.



Village: Tuntutuliak Photo 12
Site Name: Addition Reconnaissance Area (Electric Plant)
Direction: E
Description: On the south side of the three generators and tank, looking east.



Village: Tuntutuliak Photo 13
Site Name: Addition Reconnaissance Area (Electric Plant)
Direction: NW
Description: Staining on the ground south of the tank (red, center top of photo), and underneath the western-most generator. Five-gallon bucket with hose running from floor of generator building is visible. This bucket may contain oil.

APPENDIX B

FIELD NOTES

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

LEVEL

All-Weather Notebook

No. 311

Tuntutuliak Site Recon
24 & 25 Oct 00
ADEC

4 5/8" x 7" - 48 Numbered Pages

"Rite in the Rain®"
ALL-WEATHER WRITING PAPER

Name _____

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Yellow Polyethylene Protective Slipcovers (Item #31) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

CONTENTS

PAGE	REFERENCE	DATE
	Dan Benfield ph. 465-5207	
	fax. 465-5218	
	cell 723-8737	
	Robert Enoch 256-2529	

24 Oct 00

0445 Arrive at Anch. airport for 0605 flight to Bethel & on to Tunt.

0740 Arrive Bethel. 0900 flight to Tunt. on weather hold due to high winds.

1100 Leave Bethel for Tunt.

1140 Arrive Tunt. Walk from airstrip to Tunt. to try to find Robert Enoch. Found Mr. Enoch and discuss lodging, storage of my equipment, etc. Mr. Enoch says he doesn't think I'll be able to do site visit at Site #3 (Winarmint Corp, Retail Sales) that's accessible only by boat. Says all boats have already been pulled from the river for the season.

Mr. Enoch loans my Gator to use to go to airstrip & get my gear.

1230 - 1245 Eat lunch.

1245 Review aerial photos of Tunt I brought from Anch.

JR

24 Oct 00

Washeteria

See figure.

2 ASTs present south of bldg. One tank inside dike on stand, one outside dike to west, on metal stand (off ground). Extensive black fuel staining on grass, and sheen in places on standing water.

Auger Locations / Depths / PID

1	0-6" / 6-12"	0/0
2	0-6" / 6-12"	104 / 0 Petrolflex
3	0-6"	7 =57
4	0-6" / 6-12"	10/2
5	0-6" / 8-12"	0/0
6	0-6" / 6-12"	5/0

Water table encountered from ground surface to approx. 12".

Peat to approx. 6", then silt (gray).

Photos	Direction Facing	Subject	Time (CAMERA #1)
1	S	Wind Wash., AST	1515
2	E	S. of Wash.	1517
3	NE	" "	1517
4	N-NE	Stained Area	1518
5	E	Scarp of wood dike at Wash, lagoon on rt., new form in background	1518

24 OCT 00

6 Down Sheen on water behind Washeteria, near sample #1 location — 1520

7 SE old Wash. tank farm dike — 1521

8 S " " — 1521

9 SW Public water supply well ~30 ft E. of Washeteria — 1526

10 SE AST. Site of overfill — 1527

Washeteria sample to lab

Sample ID TW2-SL
(T = Tunt., W = Washeteria, 2 = Loc., SL = soil)

Sample Time is 1500

DRO, GRO, BTEX

PetroFlag run on this sample (TW2-SL), too.
PetroFlag result is 57 ppm.

PetroFlag also run on Washeteria sample from location #3. Result is Ø ppm.

JR

24 OCT 00

1535 At power plant previous tank farm location. One AST (marked #10) here. Sounds empty. Vertical tank. Liner still in place, but rolled up near edges. Some sand bags (berm) still here & intact.
Walked perimeter and surrounding area and see no signs of staining, spills, or sheen on standing water.

(Camera #1 (Tunt.) Site #1

Photo#	Direction	Subject	Time
11	SE	PwrPlant tank farm	1800
12	E-SE	"	1800
13	S-SE	"	1800
14	SW	" w/washeteria lagoon in background, to right.	1802
15	SW	Condition of pad	1803
16	E	Temp fuel storage	1804
17	W	Foreground to background is fmr. tank farm for pwr. (w) generators, Washeteria, wash. tank farm.	1806
18	SE	AST on W. side of generators.	1810
19	E	N. side of AST.	1812

JR

24 Oct 00

#20 South From S. side of small AST, looking toward Washateria lagoon. 1815

21 E. S. side of generators 1816

22 NW Staining under S. end of W. generator, between gen. & AST. 1820

6 in
1830 (collect soil (hand auger) samples for PID readings, ~~Petroflag~~ IR, Lab.

Location # (see figure)	PID Reading
1	Ø
2	2
3	Ø
4	Ø
5	Ø
6	Ø
7	Ø
8	(10) ← TO LAB ID TPPTF8-SL
9	Ø

As shown in figure, sample locations 1 through 5 & 9 are collected inside the berm, between the sandbags (berm) and the edge of the liner.

IR

24 Oct 00 IR

Sample locations 6, 7 & 8 are collected located just outside the berm.
Sample depths are 0-6". Water table varies from just below ground surface (~1" or so) to approx. 6-12".
Soil consists of peat in upper 6" or so, then silt below that (gray). Similar to Washateria area.
As with Washateria area, drainage direction appears to be toward lagoon to the south.
Submit sample from location # 8 to lab for BTEX, Gro & BTEX.
Sample ID is TPPTF8-SL
Sample time 1600

At 300 gal. AST on west side of westernmost generator. See Figure.
Collect soil samples from 6 locations.

Location (see fig.)	PID	Depth
1	2	0-6"
2 ← TO LAB. ID is TPPAST2-SL	(263)	0-6"
3 Dup of T is	138	0-6"
4 TPPAST10-SL	1	0-6"
5	39	0-6"
6	Ø	0-6"

IR

24 Oct 00

According to Robert Enoch, an overfill at this AST occurred in the mid 1980s and several thousand gallons were spilled. Occurred in early spring, ground was frozen, and the spill was cleaned up best they could, & booms used.

Currently, see staining near AST and especially under south end of westernmost generator. Unable to tell if staining from previous spill, or from generator (enclosed).

Pull auger from location 2, 3 & 5 samples. Lithology is approx. 0-6" peat near surface underlain by gray silt. Surface water, and likely groundwater, would appear to flow to south toward lagoon. Lagoon is approx. 50-55' south of AST / spill site.

Petroflag run on sample location 2 (PID of 262, Petroflag = 115 ppm) and location 6 (PID = 0, petroflag = 14).

No sheen observed on any water.

2100 Dinner / end of day.

JR

25 Oct 00

0900 Ready equipment. Too dark to do recon.

1000 Talk to Robert Enoch. Mr. Enoch says there are ~~only~~ only 2 water wells in Village. One at Washateria, one at school on nw corner. Mr. Enoch only knows of 1 residential AST. Is 1,000 gal. & owned by Tribal council. Mr. Enoch calls Henry Lupie, Tribal Council Administrator. Mr. Lupie oks my performing investigation.

JR

1050 At school. See figure.

No signs of spills or leaks.

No stains or sheen seen either inside berm or outside. Standing water in bermed area in places, & many places surrounding berm.

Collect samples for GID just outside berm.

Auger to groundwater for samples. Peat to ~6", then silt (gray). Groundwater from ~6" to 12" in auger borings.

JR

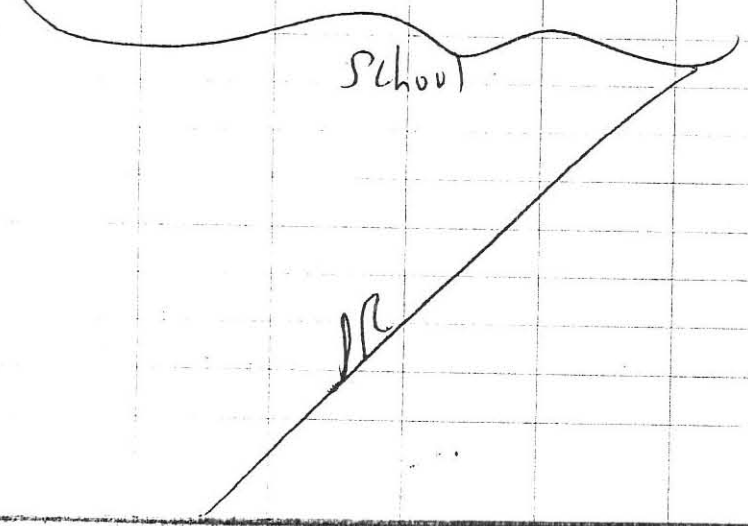
10

25 Oct 00

Auger Locations	PID
1	Ø
2	Ø
3	Ø
4	Ø
5	Ø
6	Ø
7	Ø

no PID hits, so no sample to lab.

Photo #	Direction	Subject	Time
23	NE	school AST.	1145
24	N	Along W. end of farm	1146
25	E	" S. " " "	1147
26	S	" E	1148
27	W	" N	1150



11

25 Oct 00

1230 At 1,000 gal AST owned by tribal council, Henry Lupiesis tribal council administrator.

5 boring locations. See figure

Location		PID	
1	*TO LAB	Ø	0-6", 6-12"
2	ID	Ø	0-6"
3	TRES4-SL	Ø	0-6", 6-12"
4		29	(0-6"), 18 (6-12")
5		Ø	0-6", 6-12"

Soils to ground water silt + peat.

Photos	Direct	Camera #2	Tuesday pick
1	SW	AST. Power plant tank in background.	
2	N	S. end of AST. Valve with hose attached.	
3	E	Boring #1 location	
4	NE	W. side of tank, river in background	

↖ kinak

Location #4 was collected from underneath the tank valve. Standing water throughout area. Location #4 is above water, loc. #5

12

25 Oct 00

is adjacent to Loc. #4 & is under water. No sheen on any water and no staining on ground. Appears area of AST floods, as there is silt washed onto grassy areas. AST sounds empty, or nearly so.

1600 Spoke to Robert Enoch ~~of Kwig~~ AK before I went to airstrip to catch Kwig. flight. Mr. Enoch expresses concern about possibly having State money for AST cleanup run out before cleanup of sites completed. Then would village be responsible for remaining cleanup? Also, concerned that if contaminated soil is dug up & burned, since mostly peat, would burn up and then leave ponds (standing water) where the area was dug up.
I told Mr. Enoch I'd pass on his concerns to ADEC, Dan Benfield.

1630 Catch Kwig. flight. Pilot couldn't take all of my gear. Will try to

AR

13

25 Oct 00

bring rest tomorrow on ~1000 flight.
Notes continue in Kwigillingok fieldbook.

PR

APPENDIX C

LABORATORY RESULTS

CT&E Environmental Services Inc.
Laboratory Division

Laboratory Analysis Report

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.cteesi.com

Scott Ruth
Bristol Environmental
2000 W Intl Airport Rd, Ste C1
Anchorage, AK 995021117

Work Order:	1006763
	Tunt & Kwig Recon.
Client:	Bristol Environmental
Report Date:	January 03, 2001

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintaned by CT&E. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your CT&E Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

U	Indicates the analyte was analyzed for but not detected.
J	Indicates an estimated value that falls below PQL, but is greater than the MDL.
B	Indicates the analyte is found in the blank associated with the sample.
*	The analyte has exceeded allowable limits.
GT	Greater Than
D	Secondary Dilution
LT	Less Than
!	Surrogate out of range

CT&E Environmental Services Inc.

CT&E Ref.#	1006763003	**Client PO#**	
Client Name	Bristol Environmental	**Printed Date/Time**	01/03/2001 13:32
Project Name/#	Tunt & Kwig Recon.	**Collected Date/Time**	10/24/2000 16:00
Client Sample ID	TPPTF8-SL	**Received Date/Time**	10/30/2000 12:45
Matrix	Soil/Solid	**Technical Director**	Stephen C. Ede
Ordered By		**Released By**	Michael Riley

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	57.0		%	SM20 2540G			10/31/00	JCO
Volatile Fuels Department								
Gasoline Range Organics	7.54	5.76	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Benzene	0.0288 U	0.0288	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Toluene	0.115 U	0.115	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Ethylbenzene	0.115 U	0.115	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
P & M -Xylene	0.115 U	0.115	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
o-Xylene	0.115 U	0.115	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	82.7		%	AK101/8021B	60-120	10/24/00	11/07/00	MAH
4-Bromofluorobenzene <Surr>	50.4		%	AK101/8021B	50-150	10/24/00	11/07/00	MAH
Semivolatile Organic Fuels Department								
Diesel Range Organics	182	34.5	mg/Kg	AK102 DRO		10/31/00	11/01/00	MCM
Surrogates								
5a Androstane <surr>	81.8		%	AK102 DRO	50-150	10/31/00	11/01/00	MCM

CT&E Ref.#	1006763002	Client PO#	
Client Name	Bristol Environmental	Printed Date/Time	12/19/2000 11:16
Project Name/#	Tunt & Kwig Recon.	Collected Date/Time	10/24/2000 15:00
Client Sample ID	TW2-SL	Received Date/Time	10/30/2000 12:45
Matrix	Soil/Solid	Technical Director	Stephen C. Ede
Ordered By		Released By	Michael Reidy

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
DRO/RRO - Surrogate recoveries outside controls due to matrix interference.
Corrected Report: DRO Silica Gel added.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	28.3		%	SM20 2540G			10/31/00	JCO
Volatile Fuels Department								
Gasoline Range Organics	27.0	9.79	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Benzene	0.0490 U	0.0490	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Toluene	0.196 U	0.196	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Ethylbenzene	0.196 U	0.196	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
P & M -Xylene	0.465	0.196	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
o-Xylene	0.400	0.196	mg/Kg	AK101/8021B		10/24/00	11/07/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	79.1		%	AK101/8021B	60-120	10/24/00	11/07/00	MAH
4-Bromofluorobenzene <Surr>	90.2		%	AK101/8021B	50-150	10/24/00	11/07/00	MAH
Semivolatile Organic Fuels Department								
Diesel Range Organics	2600	686	mg/Kg	AK102 DRO		10/31/00	11/01/00	MCM
DRO Silica Gel	1020	513	mg/Kg	AK102 SILICA GEL		11/22/00	11/27/00	MCM
Surrogates								
5a Androstane <surr>	238 !		%	AK102 DRO	50-150	10/31/00	11/01/00	MCM
5a Androstane <surr>	118		%	AK102 SILICA GEL	50-150	11/22/00	11/27/00	MCM

F-714

CT&E Environmental Services Inc.

CT&E Ref.#	1006763001	**Client PO#**	
Client Name	Bristol Environmental	**Printed Date/Time**	01/03/2001 13:32
Project Name/#	Tunt & Kwig Recon.	**Collected Date/Time**	10/24/2000 17:30
Client Sample ID	TPPAST2-SL	**Received Date/Time**	10/30/2000 12:45
Matrix	Soil/Solid	**Technical Director**	Stephen C. Ede
Ordered By		**Released By**	Michael Riley

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.

Parameter	Results		PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids									
Total Solids	36.7			%	SM20 2540G			10/31/00	JCO
Volatile Fuels Department									
Gasoline Range Organics	694		27.0	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Benzene	0.171		0.135	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Toluene	0.846		0.540	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Ethylbenzene	2.25		0.540	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
P & M -Xylene	9.10		0.540	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
o-Xylene	7.85		0.540	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Surrogates									
1,4-Difluorobenzene <Surr>	102			%	AK101/8021B	60-120	10/24/00	11/08/00	MAH
4-Bromofluorobenzene <Surr>	1150	!		%	AK101/8021B	50-150	10/24/00	11/08/00	MAH
Semivolatile Organic Fuels Department									
Diesel Range Organics	53500		524	mg/Kg	AK102 DRO		10/31/00	11/02/00	MCM
Surrogates									
5a Androstane <surr>	92.3			%	AK102 DRO	50-150	10/31/00	11/02/00	MCM

CT&E Environmental Services Inc.

CT&E Ref.#	1006763004	**Client PO#**	
Client Name	Bristol Environmental	**Printed Date/Time**	01/03/2001 13:32
Project Name/#	Tunt & Kwig Recon.	**Collected Date/Time**	10/24/2000 18:00
Client Sample ID	TPPAST10-SL	**Received Date/Time**	10/30/2000 12:45
Matrix	Soil/Solid	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	Michael Riley

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
DRO/RRO - Surrogate recoveries outside controls due to matrix interference and/or sample dilution.
GRO/BTEX - Surrogate recovery is biased high due to matrix interference. Results not affected.

Parameter	Results		PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids									
Total Solids	21.3			%	SM20 2540G			10/31/00	JCO
Volatile Fuels Department									
Gasoline Range Organics	839		30.4	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Benzene	0.232		0.152	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Toluene	1.04		0.609	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Ethylbenzene	3.01		0.609	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
P & M -Xylene	12.5		0.609	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
o-Xylene	12.8		0.609	mg/Kg	AK101/8021B		10/24/00	11/08/00	MAH
Surrogates									
1,4-Difluorobenzene <Surr>	92.6			%	AK101/8021B	60-120	10/24/00	11/08/00	MAH
4-Bromofluorobenzene <Surr>	1220	!		%	AK101/8021B	50-150	10/24/00	11/08/00	MAH
Semivolatile Organic Fuels Department									
Diesel Range Organics	105000		934	mg/Kg	AK102 DRO		10/31/00	11/02/00	MCM
Surrogates									
5a Androstane <surr>	368	!		%	AK102 DRO	50-150	10/31/00	11/02/00	MCM

CT&E Ref.#	1006763005	Client PO#	
Client Name	Bristol Environmental	Printed Date/Time	12/19/2000 11:16
Project Name/#	Tunt & Kwig Recon.	Collected Date/Time	10/25/2000 14:30
Client Sample ID	TRES4-SL	Received Date/Time	10/30/2000 12:45
Matrix	Soil/Solid	Technical Director	Stephen C. Ede
Ordered By		Released By	Michael Riley

Sample Remarks:

DRO/RRO - Pattern consistent with weathered middle distillate.
DRO/RRO - Surrogate recoveries outside controls due to matrix interference.
Corrected Report: DRO Silica Gel added.

Parameter	Results		PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids									
Total Solids	62.7			%	SM20 2540G			10/31/00	JCO
Volatile Fuels Department									
Gasoline Range Organics	6.98		3.59	mg/Kg	AK101/8021B		10/25/00	11/08/00	MAH
Benzene	0.0180 U		0.0180	mg/Kg	AK101/8021B		10/25/00	11/08/00	MAH
Toluene	0.0718 U		0.0718	mg/Kg	AK101/8021B		10/25/00	11/08/00	MAH
Ethylbenzene	0.0718 U		0.0718	mg/Kg	AK101/8021B		10/25/00	11/08/00	MAH
P & M -Xylene	0.0902		0.0718	mg/Kg	AK101/8021B		10/25/00	11/08/00	MAH
o-Xylene	0.0718 U		0.0718	mg/Kg	AK101/8021B		10/25/00	11/08/00	MAH
Surrogates									
1,4-Difluorobenzene <Surr>	84			%	AK101/8021B	60-120	10/25/00	11/08/00	MAH
4-Bromofluorobenzene <Surr>	74.6			%	AK101/8021B	50-150	10/25/00	11/08/00	MAH
Semivolatile Organic Fuels Department									
Diesel Range Organics	3530		30.3	mg/Kg	AK102 DRO		10/31/00	11/01/00	MCM
DRO Silica Gel	2630		219	mg/Kg	AK102 SILICA GEL		11/22/00	11/27/00	MCM
Surrogates									
5a Androstane <surr>	253	!		%	AK102 DRO	50-150	10/31/00	11/01/00	MCM
5a Androstane <surr>	133			%	AK102 SILICA GEL	50-150	11/22/00	11/27/00	MCM

CT&E Environmental Services Inc.

CT&E Ref.#	1006763010	**Client PO#**	
Client Name	Bristol Environmental	**Printed Date/Time**	01/03/2001 13:32
Project Name/#	Tunt & Kwig Recon.	**Collected Date/Time**	
Client Sample ID	TB	**Received Date/Time**	10/30/2000 12:45
Matrix	Soil/Solid	**Technical Director**	**Stephen C. Ede**
Ordered By		**Released By**	Michael Riley

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Solids								
Total Solids	100		%	SM20 2540G			10/31/00	JCO
Volatile Fuels Department								
Gasoline Range Organics	2.56 U	2.56	mg/Kg	AK101/8021B			11/07/00	MAH
Benzene	0.0128 U	0.0128	mg/Kg	AK101/8021B			11/07/00	MAH
Toluene	0.0511 U	0.0511	mg/Kg	AK101/8021B			11/07/00	MAH
Ethylbenzene	0.0511 U	0.0511	mg/Kg	AK101/8021B			11/07/00	MAH
P & M -Xylene	0.0511 U	0.0511	mg/Kg	AK101/8021B			11/07/00	MAH
o-Xylene	0.0511 U	0.0511	mg/Kg	AK101/8021B			11/07/00	MAH
Surrogates								
1,4-Difluorobenzene <Surr>	83.1		%	AK101/8021B	60-120		11/07/00	MAH
4-Bromofluorobenzene <Surr>	66.9		%	AK101/8021B	50-150		11/07/00	MAH

1006763

CT&E Environmental Services Inc.

SAMPLE RECEIPT FORM

CT&E WO#:

Yes	No	
	✓	Are samples **RUSH**, priority, or *within 72 hrs* of **hold time**?
		If yes, have you done *e-mail notification*?
	✓	Are samples *within 24 hrs* of **hold time** or **due date**?
		If yes, have you *spoken with* Supervisor?
	✓	Are there any **problems** (e.g., ids, analyses)?
✓		Were samples preserved correctly and pH verified?
		Has Project Manager been notified of problems?
	✓	Is this an ACOE/AFCEE/ADEC project?
	✓	Will a **data package** be required?
		If this is for PWS, provide **PWSID**.
		Is there a **quote** for this project?
	✓	Will **courier** charges apply?

Completed by (sign): CM (print): CMeeson

Due Date: 11/6/00

Received Date/Time: 10/30 - 12:45

Cooler Temperature: 1.8 °C

Sample Condition: (Good) / Poor

Matrix of each Sample:

2	" "	1-9
	" "	
	" "	
	" "	
2	Trip Blank	10
	MS/MSD	

Additional Sample Remarks:

✓	AK101s/_______ 8260s field pres'd?
	Field-filtered for dissolved_______?
	Lab-filter for dissolved_______?
	Ref Lab required?

Notes:

*** The following *must* be completed for *all* ACOE & AFCEE projects: ***

Yes	No		Notes:
		Is cooler temperature 4 ± C?	
		thermometer used:	
		Was there an airbill, etc? note #:	
		Was cooler sealed with custody seals?	
		#/where?	
		Were seals intact upon arrival?	
		Was there a COC with cooler?	
		Was the COC filled out properly?	
		Did the COC indicate ACOE/AFCEE project?	
		Did the COC and samples correspond?	
		Were samples screened with Geiger counter?	
		Were all samples packed to prevent breakage?	
		packing material:	
		Were all samples unbroken and clearly labelled?	
		Were all samples sealed in separate plastic bags?	
		Were all bottles for volatiles free of headspace?	
		Were correct container/sample sizes submitted?	
		Was client notified of problems?	(specify below)

Individual contacted:

Date & Time: Phone/Fax #:

# of each Container Received:

#	Container	Preservation
	950 ml amber	unpres'd
	950 ml amber	w/ HCl
	500 ml amber	w/ H2SO4
	1L cubies	unpres'd
	1L cubies	w/ HNO3
	1L cubies	w/ H2SO4
	1L cubies	w/ NaOH + ZnAc
	120 ml coli	bottles
	60 ml	Nalg
9	8 oz amber	unpres'd
	4 oz amber	unpres'd
10	4 oz w/ septa	w/ MeOH
	40 ml vials	w/ HCl
	Other (specify)	
	Other (specify)	

#/Log In Proofed by: ARC 10/30/00

Form Number: F004r2
Printed: 10/03/2000

APPENDIX D

CHAIN-OF-CUSTODY SHEET

CHAIN OF CUSTODY RECORD

1006763

CT&E Environmental Services Inc.
Laboratory Division

(1)

CLIENT: Bristol Environmental

CONTACT: Scott Ruth PHONE NO: (907) 563-0013

PROJECT: Tunt & Kwig Recon. SITE:

REPORTS TO: Scott Ruth FAX NO: (907) 563-6713

INVOICE TO: Scott Ruth P.O. NUMBER: Scott

CT&E Reference:

PAGE 1 OF 1

(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX	No. CONTAINERS	SAMPLE TYPE C = COMP G = GRAB	Preservatives Used: None / Methanol; Analysis Required (3): DRO (AK102) / GRO + BTEX (AK101)	REMARKS
(1)	TPPAST2-SL	10-24-00	1730	soil	2	G	1 / 1	2 methanol vials
(2)	TW2-SL	10-24-00	1500	soil	2	G	1 / 1	
(3)	TPPTF8-SL	10-24-00	1600	soil	2	G	1 / 1	
(4)	TPPAST10-SL	10-24-00	1800	soil	2	G	1 / 1	2 methanol vials
(5)	TRES4-SL	10-25-00	1430	soil	2	G	1 / 1	
(6)	KSITE6-SL	10-26-00	1300	soil	2	G	1 / 1	
(7)	KSITE3-SL	10-26-00	1430	soil	2	G	1 / 1	2 methanol vials
(8)	KSITE2-SL	10-26-00	1700	soil	3	G	1 / 1	
(9)	KSPILL-SL	10-27-00	1345	soil	2	G	1 / 1	2 methanol vials
(10)	TB (Trip Blank)	NA	NA	NA	1		/ 1	

(5)

Collected/Relinquished By: (1)	Date	Time	Received By:
Scott Ruth	10/31/00 SR	1230	
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date 10/30/00	Time 1245	Received For Laboratory By:

(4)

Shipping Carrier:	Samples Received Cold? (Circle) YES NO
Shipping Ticket No:	Temperature °C: 1.8 °C
Data Deliverables Required: Level I Level II Level III	Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT
Requested Turnaround Time and Special Instructions:	

200 W. Potter Drive **Anchorage, AK 99518** Tel: (907) 562-2343 Fax: (907) 561-5301
3180 Peger Road **Fairbanks, AK 99701** Tel: (907) 474-8656 Fax: (907) 474-9685

White - Retained by Lab (Project File) Yellow - Returned with Report Pink - Retained by Sampler

APPENDIX E

LIST OF LOCAL RESOURCES AND AUTHORITIES

LOCAL EQUIPMENT RESOURCES

According to Mr. Robert Enoch of the Tuntutuliak Community Services Association (TCSA), the following equipment, owned by TCSA, is currently located at Tuntutuliak and is in working order:

1) Takeuchi Skid Steer, with front loader and forks
2) Bobcat 870, with front loader, backhoe, snow blower, and drill
3) John Deer 310D, with front loader and backhoe

LOCAL AUTHORITIES

1) Robert Enoch, TCSA General Manager (907-256-2529)
2) Nick Frank, Tuntutuliak Traditional Council President (907-256-2128), Tuntutuliak Land Limited (formerly Quinarmiut Corporation) Chairman (907-256-2315)

APPENDIX F

SUMMARY OF BILLABLE HOURS FOR PERSONNEL AND EQUIPMENT, EMPLOYEE TRAVEL

The following is a summary of billable field hours (includes travel time) for personnel and equipment rental:

Field hours for Bristol geologist: 26.5
Photoionization Detector: 2 days
Camcorder: 2 days
Hand Auger: 2 days
Global Positioning Satellite (GPS) Unit: 2 days

APPENDIX G

TRANSCRIPTS OF MEETINGS WITH VILLAGE AUTHORITIES

24 Oct 00

0445 Arrive at Anch. airport for 0605 flight to Bethel & on to Tunt.

0740 Arrive Bethel. 0900 flight to Tunt. on weather hold due to high winds.

1100 Leave Bethel for Tunt.

1140 Arrive Tunt. Walk from airstrip to Tunt. to try to find Robert Enoch. Found Mr. Enoch and discuss lodging, storage of my equipment, etc. Mr Enoch says he doesn't think I'll be able to do site visit at Site #3 (Winarmint Corp, Retail Sales) that's accessible only by boat. Says all boats have already been pulled from the river for the season.

Mr. Enoch loans my Gator to use to go to airstrip & get my gear.

1230 - 1245 Eat lunch.

1245 Review aerial photos of Tunt I brought from Anch.

JR

24 Oct 00

Washeteria

See figure.

2 ASTs present south of bldg. One tank inside dike on stand, one outside dike to west, on metal stand (off ground). Extensive black fuel staining on grass, and sheen in places on standing water.

Auger Locations / Depth / PID

1	0-6" / 6-12"	0/0
2	0-6" / 6-12"	104/0 Refilled
3	0-6"	7 =57
4	0-6" / 6-12"	10/2
5	0-6" / 8-12"	0/0
6	0-6" / 6-12"	5/0

Water table encountered from ground surface to approx. 12".

Peat to approx. 6", then silt (gray).

Photos	Direction Facing	Subject	Time (CAMERA #1)
1	S	Wind Wash, AST	1515
2	E	S. of Wash	1517
3	NE	" "	1517
4	N-NE	Stained Area	1518
5	E	Site of wood dike at Wash, lagoon on rt., new farm in background	1518

24 Oct 00

According to Robert Enoch, an overfill at this AST occurred in the mid 1980s and several thousand gallons were spilled. Occurred in early spring, ground was frozen, and the spill was cleaned up best they could, a boom was used.

Currently, see staining near AST and especially under south end of westernmost generator. Unable to tell if staining from previous spill, or from generator (enclosed). Rpt under from location 2, 3 & 5 samples. Lithology is approx. 0-6" peat near surface underlain by gray silt. Surface water, and likely groundwater, would appear to flow to south toward lagoon. Lagoon is approx. 50-55' south of AST/spill site.

Petroflag run on sample location 2 (PID of 262, Petroflag = 115 ppm) and location 6 (PID = 0, petroflag = 14).

No sheen observed on any water.

2100 Dinner/end of day.

25 Oct 00

0900 Ready equipment. Too dark to do recon.

1000 Talk to Robert Enoch. Mr. Enoch says there are ~~only~~ only 2 water wells in Village. One at Washateria, one at school on nw corner. Mr. Enoch only knows of 1 residential AST. Is 1,000 gal. & owned by Tribal council. Mr. Enoch calls Henry Lupie, Tribal Council Administrator. Mr. Lupie oks my performing investigation.

1050 At school. See figure.

No signs of spills or leaks.

No stains or sheen seen either inside berm or outside. Standing water in bermed area in places, & many places surrounding berm.

Collect samples for GRO just outside berm.

Auger to groundwater for samples. Peat to ~6", then silt (gray). Groundwater from ~6" to 12" in auger borings.

25 Oct 00

is adjacent to Loc. #4 & is under water. No sheen on any water and no staining on ground. Appears area of AST floods, as there is silt washed onto grassy areas. AST sounds empty, or nearly so.

1600 Spoke to Robert Enoch ~~of Kwig~~ before I went to airstrip to catch Kwig. flight. Mr. Enoch expresses concern about possibly having State money for AST cleanup run out before cleanup of silter completed. Then would village be responsible for remaining cleanup? Also, concerned that if contaminated soil is dug up & burned, since mostly peat, would burn up and then leave ponds (standing water) where the area was dug up.
I told Mr. Enoch I'd pass on his concerns to ADEC, Dan Benfield.

1630 Catch Kwig. flight. Pilot couldn't take all of my gear. Will try to

JR

25 Oct 00

bring rest tomorrow on ~1000 flight.
Notes continue in Kwigillingok fieldbook.

JR

APPENDIX H

SUMMARY OF INJURIES, ACCIDENTS AND INCIDENTS

Number of Injuries Sustained: 0
Number of Accidents: 0
Number of Incidents: 0
Number of Lost Time Accidents: 0