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Kenai Area Office

**2003 SAMPLING WORK PLAN  
KENAI MAINTENANCE SHOP  
KENAI, ALASKA**

*PREPARED FOR*

**CITY OF KENAI**

*PREPARED BY*

**AMERICAN ENVIRONMENTAL**  
*ENVIRONMENTAL CONSULTANTS*

PROJECT No. 003-03  
JULY 24, 2003

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July 24, 2003

Mr. Jack LaShot  
Public Works Manager  
City of Kenai  
210 Fidalgo  
Kenai Alaska 99611

**Subject: Kenai Maintenance Shop 2003 Sampling Work Plan**

Mr. LaShot:

Enclosed is our work plan for field activities at the Kenai Maintenance Shop property. This work plan is presented in response to a letter from ADEC dated March 12, 2003 requesting further investigation and remediation at the site. The work plan will be submitted to the City administration. The City is required to submit a copy of the work plan to the Alaska Department of Environmental Conservation for approval.

We appreciate this opportunity to provide consulting services to the City of Kenai. If you should have any questions concerning this project, please do not hesitate to contact us.

Sincerely,

**AMERICAN ENVIRONMENTAL**

Peter C. Campbell

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**ACRONYMS AND ABBREVIATIONS**

<b>AE</b>	<b>American Environmental</b>
<b>ADEC</b>	<b>Alaska Department of Environmental Conservation</b>
<b>BTEX</b>	<b>Benzene, toluene, ethyl benzene, and total xylenes</b>
<b>CoC</b>	<b>Chain of Custody</b>
<b>CT&amp;E</b>	<b>CT&amp;E Environmental Services, Inc.</b>
<b>cy</b>	<b>cubic yards</b>
<b>DRO</b>	<b>Diesel Range Organics</b>
<b>ft/ft</b>	<b>Feet per foot</b>
<b>GRO</b>	<b>Gasoline Range Organics</b>
<b>KSI</b>	<b>Kent &amp; Sullivan, Inc.</b>
<b>mg/L</b>	<b>milligrams per liter</b>
<b>MLLW</b>	<b>Mean low low water</b>
<b>MS/MSD</b>	<b>Matrix Spike / Matrix Spike Duplicate</b>
<b>NTL</b>	<b>Northern Test Lab</b>
<b>PAHs</b>	<b>Polynuclear Aromatic Hydrocarbons</b>
<b>PCBs</b>	<b>Polychlorinated Biphenyl</b>
<b>PID</b>	<b>Photo-ionization Detector</b>
<b>ppm</b>	<b>parts per million</b>
<b>RPD</b>	<b>relative percent differences</b>
<b>RRO</b>	<b>Residual Range Organics</b>
<b>SAP</b>	<b>Sampling and Analysis Plan</b>
<b>QA/QC</b>	<b>Quality Assurance / Quality Control</b>
<b>ug/l</b>	<b>Micro grams per liter</b>
<b>VOC</b>	<b>Volatile Organic Compounds</b>

## 1.0 INTRODUCTION

This workplan has been prepared by American Environmental for the City of Kenai, Alaska (City) for investigations to be performed at the City's Maintenance Shop located near the corner of Airport Way and Willow Street in Kenai, Alaska. This document reviews the work that has been performed at the site during previous investigations, the objectives for additional investigation, and the activities that will be performed to complete the site characterization. The workplan has been prepared to address concerns expressed by the Alaska Department of Environmental Conservation (ADEC) in recent correspondence with the City.

### 1.1 SITE LOCATION

The maintenance shop includes approximately 11 acres located east of the Kenai Airport in Township 6 North, Range 11 West, Section 32 (Figure 1). The site facilities include a maintenance shop, two warm storage barns, a Quonset hut, several sheds, and a fuel pump island (Figure 2). A mixture of public and private property surrounds the maintenance shop. Parcels on the north, east, and southeast side are privately held. The Kenai airport is located west of the maintenance shop. The City owns the right-of-way along Ryan's Creek, located on the west side of the property between Homer Electric Association and the maintenance shop.

### 1.2 SITE HISTORY

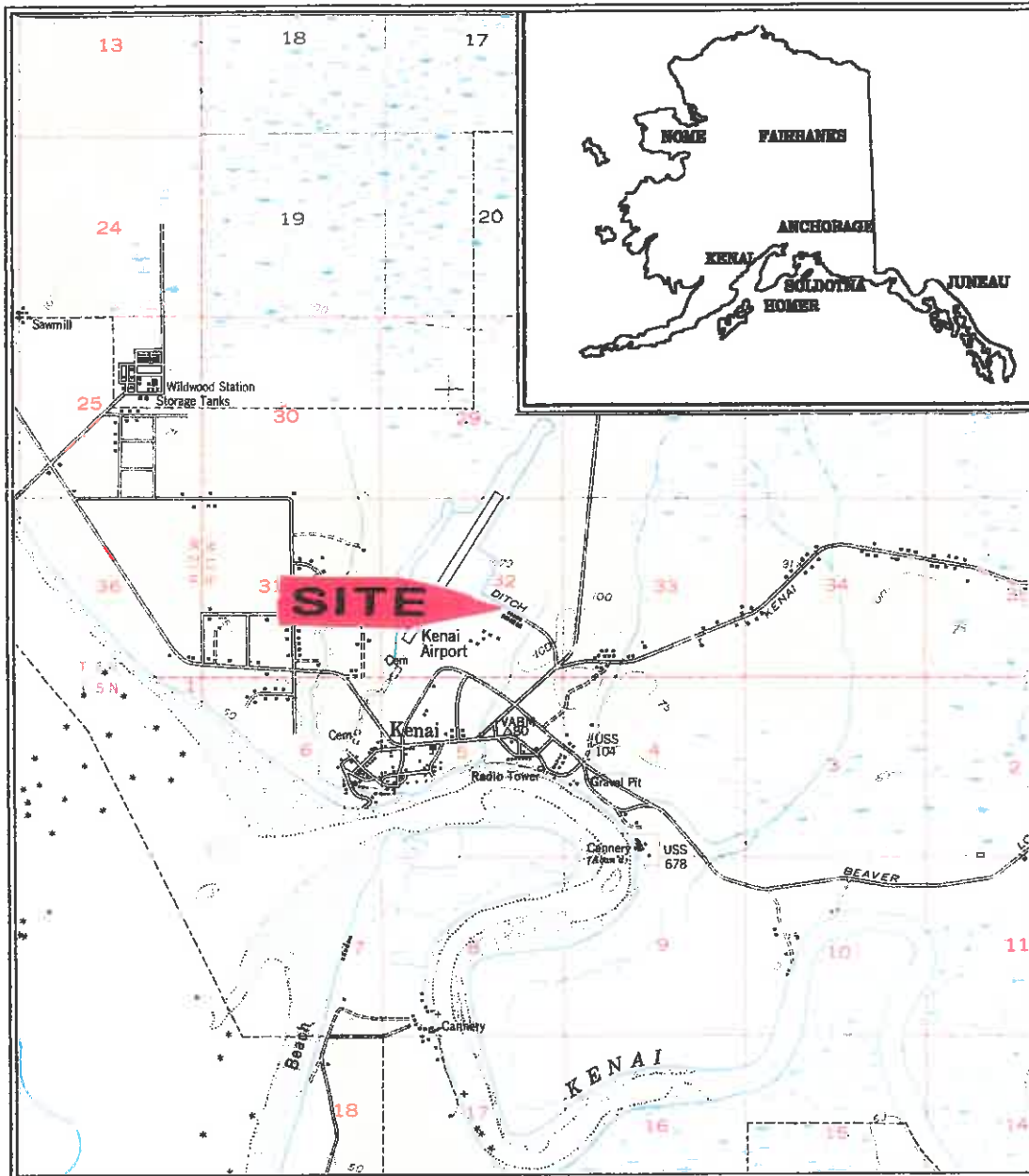
The United States military used the site in the 1940s and 1950s as a barracks and fuel storage area. In 1963, the City received the property from the U.S. Government Federal Aviation Administration under a quitclaim deed. The site has been used by the City as a maintenance facility for the Kenai Airport, Parks Department, and street and vehicle maintenance.

### 1.3 PREVIOUS INVESTIGATIONS

In 1995, Phase 1 and 2 investigations were performed at the site (Northern Test Lab, 1995). The Phase 1 work consisted of performing an aerial photograph review and conducting interviews with site personnel. The Phase 2 work involved drilling six 11-foot-deep soil borings, installing seven shallow monitoring wells, analyzing soil and groundwater samples, and measuring groundwater levels. Laboratory samples consisted of one soil sample from each borehole and groundwater samples from all of the wells. The samples were all evaluated for diesel-range organics (DRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX), and selected samples were analyzed for gasoline-range organics (GRO), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs).

In 1997, surface water and stream sediment samples were collected from unlined ditches that are present on the northwest and southeast sides of the site (KSI, 1997). These samples were analyzed for DRO, GRO, and VOCs.

The 1998 investigation involved sampling existing monitoring wells, collecting surficial soil and water samples, and surveying the site. This information was gathered to fill data gaps and determine the extent of contamination based on measurable field conditions.



Approximate Scale  
0 63,000 126,000 FEET

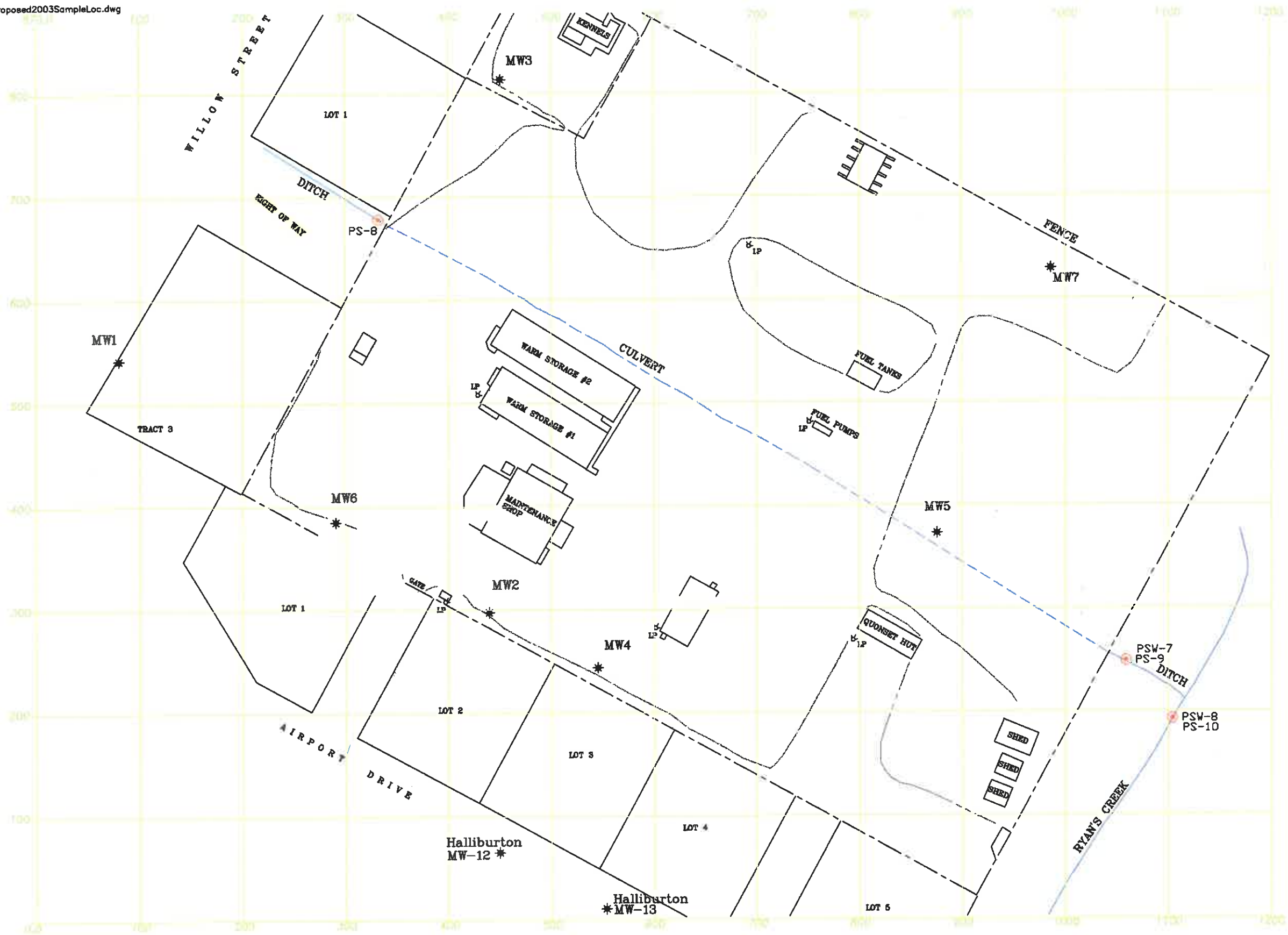
# **Topographic Site Location Map City of Kenai Maintenance Shop Kenai, Alaska**

USGS 7.5 Minute Quad Map C-4 SE, Alaska

Date: 3/3/2000 Drawn by: PC  
Proj. #: 99-5 Checked by: PCC  
File: Kena/Maintenance/Topobase  
Prepared by:  
**American Environmental**

FIGURE

1

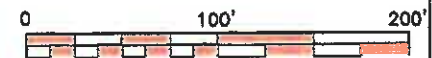


LP LIGHT POLE

GRAVEL PAD BOUNDARY

LEGEND

- PROPOSED 2003 STREAM SAMPLE LOCATION
- \* MONITORING WELL LOCATION



Proposed 2003 Sample Locations

American Environmental Consultants  
PO Box 2552  
Seldovia AK 99669  
(907) 335-5481  
FAX (907) 335-5480

CITY OF KENAI MAINTENANCE SHOP

DATE 7/22/03  
DRAWN PC  
CHECKED PC  
SCALE AS SHOWN  
PROJ NO. 03-03

FIGURE

2



The 1998 investigation narrowed down the source of contamination in the ditch that runs across the shop property, and eliminated the drums that were found along Ryan Creek as a source of contamination. Monitoring wells located on the site were resampled, and surveyed. The information gathered at the site has been compared to the new ADEC regulations adopted January 22, 1999

Halliburton has been conducting ongoing soil and groundwater investigations on a parcel located south of the maintenance shop. Wells located to the north of the Halliburton site have been tested for petroleum contaminants and shown through testing that contaminants are moving from the north to the south with the groundwater (down gradient). The source of this contamination has not been determined.

The State has requested that additional groundwater assessment be conducted at the maintenance shop, and that remediation be conducted at several source locations within the property. This work plan will address groundwater sampling, surface water and sediment sampling in Ryan's Creek. This baseline sampling will be conducted as a precursor to remediation work.

#### **1.4 SITE HYDROGEOLOGY**

The Kenai area is situated on a coastal plain underlain by fluvial, glacial outwash and shore deposits. The uppermost aquifer is unconfined, occurs in sand and gravel deposits at depths between 2 and 20 feet, and ranges between 10 and 80 feet thick.

The site is underlain by medium sand and gravel with some silt. Groundwater occurs approximately seven to ten feet below grade at elevations between approximately 70 and 76 feet MLLW. The gauging data from 1995 indicate that groundwater flows westerly at a gradient of approximately 0.012 ft/ft.

## 2.0 SUMMARY OF EXISTING DATA AND RATIONAL FOR WORKPLAN

The previous investigations identified several potential sources of soil and groundwater contamination at the site. The soil and water analytical data from the previous investigations are compiled on Tables 1 and 2, respectively. Based on this compiled data, previously-identified potential source areas (former UST, electrical shop, current fuel island, abandoned drums along Ryan's Creek and an alleged dump) appear to be of little to no concern and are not discussed further in this workplan. Previously identified potential sources are listed below.

- Road oil pit
- Buried drum disposal area
- Culvert into Ryan's Creek
- Maintenance shop
- Up gradient areas.

Each of these potential areas of concern is discussed in the following subsections. Each subsection provides historical background information for the area, a summary of the analytical data from previous investigations, gaps in the existing characterization, and a summary of investigative activities that will be performed (if necessary) to complete the characterization of the area. Figure 2 shows proposed sampling locations.

### 2.1 SUMMARY OF PROPOSED WORK

ADEC has request that the City sample the seven on site monitoring wells. In addition, they would like testing of the surface water and sediments in Ryan's Creek. We recommend that two wells from the Halliburton site be sampled for chlorinated solvents. Wells MW-12 and MW-13 are located on Airport Drive, approximately 200 feet south of the site.

### 2.2 ROAD OIL PIT

*Description.* A former road oil pit located near the northeast corner of the site (Figure 2) was first identified through the aerial photograph evaluation (NTL, 1995). It appears on photographs taken during 1975, but it is not present in photographs taken after 1981. Site personnel report that the pit was used as a storage area for road oil used in dust control. It was approximately thirty feet by sixty feet and five feet deep.

*Analytical data.* A soil boring (SB-2) drilled in the area of the pit encountered a one-foot layer of black, oil-saturated material five feet below ground level. A saturated soil sample collected at the water table (from the 9.5- to 11-foot sampling interval) contained sheens and was selected for laboratory analysis. The analytical data from this sample are summarized on Table 1 and show that DRO, GRO, and BTEX constituents were identified, although the concentrations are below ADEC's proposed criteria for inhalation as well as EPA's screening levels. Groundwater samples collected from monitoring well MW-5 (located south of the pit) contained DRO (in concentrations below ADEC's proposed groundwater criteria) and tetrachloroethylene (PCE) (in concentrations below the ADEC's proposed groundwater criteria but above the RBC).

*Data gaps.* It appears, after sampling conducted at the culvert of Ryan's Creek that contamination may be moving from the road oil pit to the east. A thick oil like compound was discovered in the soils at the soil water interface of the culvert. The available data suggest that DRO may be a potential concern but BTEX and GRO are probably not. The significance of PCE in the groundwater sample is not known, but it does not appear to be related to the road oil pit since PCE was not present in the soil sample collected below the pit.

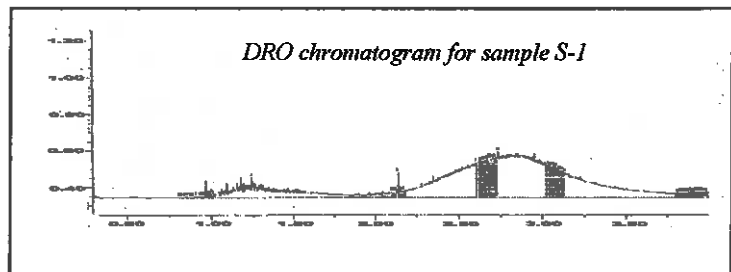
*Investigative approach.* The following activities will be performed to further characterize this area of concern:

- Groundwater flow directions will be confirmed by gauging water levels and constructing a groundwater contour map.
- Well MW-5 will be re-sampled to confirm the results from previous sampling. The samples will be analyzed for DRO, GRO, and BTEX and VOC's.

## 2.3 SITE CULVERT

*Description.* A culvert underlies the site which channels surface water flowing onto the site from an unlined ditch on the northwest to an unlined ditch on the southeast (Figure 2). The culvert underlies the site at an estimated two feet below grade. The ditch on the southeast side of the site drains westward into Ryan's Creek, which in turn drains southward toward Cook Inlet.

*Analytical data.* Sediment and surface water samples were collected to evaluate the sediments and surface water in the unlined ditches (KSI, 1997, AE 1999). A relatively dry sediment sample was collected from the ditch on the northwest side of the property and a surface water and saturated sediment sample were collected from the southeast side of the property.



All of these samples contained elevated concentrations of DRO and trace to non-detectable concentrations of GRO and BTEX. The DRO concentrations in the sediment and surface water sample from the southeast ditch exceed ADEC's maximum allowable DRO concentrations. The DRO and GRO chromatograms for both samples are similar, and the DRO chromatogram for sample S-1 is shown in the adjacent figure. This chromatogram shows that the DRO contamination contains evidence of both a light middle-distillate petroleum product (such as DF2) and heavy-end hydrocarbon (such as motor oil). Because both chromatograms are similar, both areas appear to have a similar source. The warm storage building floor drains may be a source of the contamination, however other sources cannot be ruled out, in particular the road oil pit. Runoff from the Kenai Airport may be a source of contamination in the northwest ditch.

*Data gaps.* The source and extent of the DRO contamination are not known. The impact of the contaminated sediment and surface water on Ryan's Creek is not known.

*Investigative approach.* The following activities will be performed to further assess and characterize the unlined ditches. BTEX and GRO can be eliminated from the sampling based on previous sampling results.

- The contamination in the ditch sediments will be further characterized by collecting samples from the three sediment sample (PS-8, PS-9 and PS-10) locations and analyzing them for VOCs, DRO and RRO.
- The surface water will be further characterized by collecting surface water samples from the surface water sample (PSW-7 and PSW-8) locations. The samples will be analyzed for DRO and RRO and VOC's.

## 2.4 MAINTENANCE SHOP BUILDING

*Description.* The Maintenance Shop is located in the south-central portion of the site (Figure 2). The shop is used for storage, vehicle maintenance, and office space. A floor drain inside the shop apparently drains to a log crib located in the parking lot located south of the shop. Interviews with site personnel indicate that typical shop waste may have been disposed in the floor drains in the past.

*Analytical data.* Soil samples collected from well MW-2 located approximately 30 feet south southeast of the crib and SB-2 located north of the shop did not contain detectable concentrations of hydrocarbons or volatile organic compounds (Table 1). Groundwater samples from well MW-2 contained elevated DRO concentrations below ADEC's proposed DRO criteria and non-detectable BTEX concentrations (Table 2). Trace concentrations of 1,1,1-TCA were present in the sample from MW-2, and trace levels of TCE and 1,2-DCB were identified in well MW-6.

*Data gaps.* The extent of groundwater contamination associated with the floor drains is not known because groundwater flow directions are uncertain and possibly variable.

*Investigative approach.* The following activities will be performed to further characterize this area.

- The groundwater flow directions will be confirmed by performing a water level survey.
- Groundwater samples will be collected from well MW-2 and analyzed for DRO/RRO and GRO/BTEX.
- Chromatograms from this well will be compared to chromatograms from well MW-6 to help evaluate the relationship of the groundwater contamination in these two wells.

## 2.5 UPGRADIENT AREAS

Potential sources of groundwater contamination are present upgradient from the site (NTL, 1995). Two wells were installed in 1995 to evaluate the impact of these potential sources on groundwater quality at the site.

*Analytical data.* The analytical data from wells MW-3 and MW-7 show that low levels of DRO contamination are present in the assumed upgradient direction of the site.

*Data gaps.* Chromatograms of the upgradient DRO contamination are not available to evaluate the potential for biogenic hydrocarbons to be present in the groundwater and/or to distinguish the potential hydrocarbon that is present upgradient.

*Investigative approach.* Samples will be collected from the upgradient wells and analyzed for DRO and GRO to provide a chromatographic characterization of the upgradient groundwater.

## 2.6 DOWN GRADIENT OFF SITE WELLS

Potential sources of groundwater contamination are present down gradient from the site. Two wells were installed in by Geo- Engineers (MW-12 and MW-13) to evaluate the upgradient groundwater quality for the Halliburton Site.

*Analytical data.* The analytical data from well MW-12 show that low levels of DRO, benzene, toluene and xylene contamination are present in the assumed down gradient direction of the maintenance shop. MW-13, located further east has tested clean for petroleum compounds.

*Data gaps.* The source area with the highest potential for contaminants migrating off site would be the drum disposal area, and to a lesser degree, the maintenance shop floor drain. Wells MW-12 and MW-13 are located downgradient from the Maintenance Shop building, but have not been sampled for chlorinated compounds. These wells are located too far east to monitor the groundwater quality of the drum disposal area

*Investigative approach.* Samples will be collected from MW-12 and MW-13 and analyzed for VOC's in groundwater. Arrangements will have to be made with Geo Engineers and Halliburton to gain permission and access to the wells.

### **3.0 SAMPLING AND ANALYSIS PLAN**

#### **3.1 OBJECTIVES AND APPROACH**

The overall objective for this sampling and analysis plan (SAP) is to complete the characterization of the site and to provide sufficient data for the City to make future risk management decisions. The approach for the SAP is to collect additional data to address the data gaps identified in Section 2.0. Based on the results of these activities, the scope for a second phase of field investigation will be developed.

The primary objectives for the first phase of the investigation are the following:

- Define groundwater flow directions so that downgradient flow directions and the relationship between groundwater and surface water are understood.
- Confirm the results of the 1998 groundwater sampling.
- Evaluate the adequacy of the existing monitoring well network to monitor downgradient groundwater concentrations.
- Resample Ryan's Creek sediment and water to assess the mobility of contaminants from the road oil pit.

Section 3.2 describes the activities that will be performed as part of this investigation, Section 3.3 describes the procedures for performing the fieldwork, and Section 3.4 describes the quality assurance/quality control plan.

#### **3.2 WORKPLAN TASKS**

##### **3.2.1 Water Levels**

The existing monitoring wells will be inspected and repaired if necessary. MW-1 has been lost in the regarding of the overflow parking lot. An attempt was made to abandon the well, but it was not located. We will inspect the area again to determine if the well can be located. The top of casing elevations of Halliburton wells MW-12 and MW-13 will be surveyed and water levels will be measured in all of the wells on site.

A water level contour map will be prepared based on the water levels measured in the monitoring wells.

##### **3.2.2 Groundwater Samples**

Groundwater samples will be collected from the monitoring wells MW-2 through MW-7. All of the wells will be analyzed for DRO, RRO, GRO and BTEX. Selected wells will be sampled for VOCs as shown on Table 3.

##### **3.2.3 Surface Water Samples**

Two surface water samples will be collected from unlined ditch on the southwest side of the site and from Ryan's Creek at the locations shown on Figure 2. The samples will be analyzed for DRO, RRO, GRO, BTEX and VOC's.

Table 1  
Historical Soil Analytical Data  
Maintenance Shop  
City of Kenai, Alaska

Criteria	Well/ Boring No.	Date	Depth	Benzene	Toluene	Ethyl- benzene	Total Xylenes	DRO	GRO	VOCs (8010)			SVOCs (8270)		VOCs (8240)	PCBs Aroclor-1260
										1,2-DCB	1,4-DCB	bis(2-ethylhexyl) phthalate	(8270)	(8270)		
ADEC Inhibition (1) ADEC Protection to GW (2)				9	180	89	81	12,500	1,400	110	8,000		na	na	na	10
				0.02	5	5.5	78	10,100	650	7	6.8		na	na	na	10
Area																
Drum Disposal	SS-1	1995	9.5-11.5	0.05 U	0.064	1.77	1.74	9,300	113	0.159	0.069					
	MW-6	1995	9.5-11.5	0.05 U	0.05 U	7.04	6.65	7,490	475							
Road Oil Pit	SS-2	1995	9.5-11.5	0.087	0.511	1.06	3.93	1,190	127	0.055 U	0.055 U					ND
	MW-2	1995	9.5-11.5	0.055 U	0.055 U	0.055 U	0.055 U	4 U	1 U	0.055 U	0.055 U					
Maintenance Shop	SS-5	1995	1	0.055 U	0.055 U	0.055 U	0.055 U		1.1 U							
	ESW	1998	SS													
Electrical Shop	S-1	1997	SS	0.068 U	0.068 U	0.068 U	0.068 U	11,000	1.1 U							2.73
		1998	SS													
Culvert Sediments	S-2	1997	SS	0.13 U	1.2	0.13 U	0.13 U	18,000	7.1			8.680	ND			
		1998	SS									8.490				
Drum Sediments	S-3	1998	SS	0.0297U	0.0297U	0.0297U	0.0297U	18	1.19U							
	S-4	1998	SS	0.0299U	0.0299U	0.0299U	0.0299U	78	1.20U							
Former USF	S-5	1998	SS	0.0362U	0.0362U	0.0362U	0.0362U	289	1.41U							
	S-6	1998	SS	0.0386U	0.0386U	0.0386U	0.0386U	26	1.47U							
Fuel Island	S-7	1998	SS	0.0447U	0.0447U	0.0447U	0.0447U	598	1.79U							
	CV-1	1998	8'	0.0255U	0.0255U	0.0255U	0.0255U	108	1.02U							
Alleged Dump	CV-2	1998	3'	0.0333U	0.0333U	0.0333U	0.0333U	11	1.33U							
	DS-1	1998	3.5	0.0339U	0.0339U	0.0339U	0.0339U	6.16	1.36U				ND			
Upgradient	DS-2	1998	3.5	0.0382U	0.0382U	0.0382U	0.0382U	4.22U	1.53U							
	MW-4	1995	9.5-11.5	0.05 U	0.05 U	0.05 U	0.05 U		1 U							ND
Fuel Island	SS-4	1995	9.5-11.5	0.287	0.123	0.685	2.59	8.37	142							
	SS-6	1995	9.5-11.5	0.055 U	0.055 U	0.055 U	0.055 U	4 U	1.1 U							
Alleged Dump	SS-3	1995	9.5-11.5	0.055 U	0.055 U	0.055 U	0.055 U	4 U	1 U							
	MW-3	1995	9.5-11.5	0.055 U	0.055 U	0.055 U	0.055 U	4 U	1.3 U	0.055 U	0.055 U					
Upgradient	MW-7	1995	9.5-11.5	0.055 U	0.055 U	0.055 U	0.055 U		1.1 U							

Data are reported in mg/kg.

(1) Criteria for inhalation pathway contained in 18 AAC 75 January 22, 1999.

(2) Criteria for protection of groundwater contained in 18 AAC 75 January 22, 1999.

**Bold** Concentration exceeds one or more potentially applicable criteria.

– Not analyzed.

BTEX Benzene, toluene, ethylbenzene, and xylene by EPA Method 8020.

DCB Dichlorobenzene.

DRO Diesel-range organics by EPA Method 8100M or AK102.

GRO Gasoline-range organics by EPA Method 8015M or AK101.

na Not applicable

ND Not detected.

ne Not established.

SS Surface sediment.

U Not detected. The detection level is shown in the table.

VOCs Volatile organic compounds by EPA Method 8010 or 8240.

Table 2  
**Historical Water Analytical Data**  
 Maintenance Shop  
 City of Kenai, Alaska

Area	Well No.	Date Sampled	Benzene	Toluene	Ethylbenzene	Total Xylenes	DRO	GRO	PCE	TCE	VOCs 1,2-DCB	1,1,1-TCA	Acetone	Isopropylbenzene	n-Propylbenzene	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	Naphthalene	1,2,3-Trichlorobenzene
<b>Criteria</b>																					
ADEC GW Cleanup Criteria (1)			60	42,000	7,000	100,000	15,000	43,000	60	60	6,000	2,000	34,500	ne	ne	ne	ne	ne	ne	ne	ne
<b>Area</b>																					
Drum Disposal	MW-1	1995	1.0	1.0	1.0	1.0	225	-	1.0	1.0	1.0	1.0	1.0	ne	ne	ne	ne	ne	ne	14,600	ne
	MW-6	1995	1.0	7.5	84	1,224	52,100	-	1.0	8.4	1.1	1.0	1.0	11.5	16.1	22.9	87.6	5.67	9.37	121	1.0
	1998	1.0	1.18	45.1	84.4	30,200	650	650	1.0	7.15	1.0	1.0	-	-	-	-	-	-	-	-	-
Road Oil Pit	MW-5	1995	1.0	1.0	1.0	1.0	609	-	13.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1998	1.0	1.0	1.0	1.0	1.0	1,940	400	1.0	1.17	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Maintenance Shop	MW-2	1995	1.0	1.0	1.0	1.0	1,540	-	1.0	1.0	1.0	1.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1998	1.0	1.0	1.0	1.0	1.06	4,340	65	1.0	1.0	1.0	2.4	-	1.0	1.0	1.0	1.0	1.0	2.3	1.42	1.0
Former UST	MW-4	1995	1.0	1.0	1.0	1.0	519	-	1.0	1.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1998	1.0	1.0	1.0	1.0	1.0	562	400	1.0	1.0	1.0	1.0	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	11.1
Culvert/Surface Water	SW-1	1997	1.0	10	1.0	1.0	4,800	110	1.0	1.0	1.0	1.0	45	-	-	-	-	-	-	-	-
	SW-2	1998	1.0	1.0	1.0	1.0	247	400	-	-	-	-	-	-	-	-	-	-	-	-	-
	SW-3	1998	1.0	1.0	1.0	1.0	387	400	-	-	-	-	-	-	-	-	-	-	-	-	-
	SW-4	1998	1.0	1.0	1.0	1.0	4,980	400	-	-	-	-	-	-	-	-	-	-	-	-	-
	SW-5	1998	1.0	1.0	1.0	1.0	34,700	99	-	-	-	-	-	-	-	-	-	-	-	-	-
	SW-5B Duplicate	1.0	3.47	1.0	9.7	29,400	150	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upgradient	SW-6	1998	1.0	1.0	1.0	1.0	287	400	-	-	-	-	-	-	-	-	-	-	-	-	-
	MW-3	1995	1.0	1.0	1.0	1.0	277	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1998	1.0	1.0	1.0	1.0	1.07	557	400	1.0	1.0	1.0	1.0	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	MW-7	1995	1.0	1.0	1.0	1.0	345	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	1998	1.0	1.18	1.0	1.95	128	400	400	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Data are reported in ug/L.

(1) Criteria contained in 19 AAC 75 January 22, 1999.

Based Concentration exceeds criteria for a non-drinking water source.

- Not analyzed.

1,1,1-TCA 1,1,1-Trichloroethane.

BTEX Benzene, toluene, ethylbenzene, and xylenes by EPA Method 602.

DCB Dichlorobenzene.

DRO Diesel-range organics by EPA Method 81.00M (1993) & AK 102 (1998).

GRO Gasoline-range organics by EPA Method 801.5M.

ND Not detected.

ne Not established.

PCE Tetrachloroethene.

TCE Trichloroethane.

VOCs Volatile organic compounds by EPA Method 601 or 624.



Table 3  
**Summary of Sampling and Analysis Plan**  
 Maintenance Shop  
 City of Kenai, Alaska

Area	Soil/Sediments		
	No. of Samples		
	DRO/RRO	GRO/BTEX	VOCs
Culvert - Ryan Creek Drums	3	0	3
SUBTOTAL	3	0	3
Duplicates	1	0	1
TOTAL NO. OF SAMPLES	4	0	4

Well No.	Groundwater/Surface Water		
	No. of Samples		
	DRO/RRO	GRO/BTEX	VOCs
MW-2	1	1	1
MW-3	1	1	
MW-4	1	1	1
MW-5	1	1	1
MW-6	1	1	1
MW-7	1	1	
MW-12	1	1	1
MW-13	1	1	1
Surf. Water	2	0	2
SUBTOTAL	10	8	8
Duplicates	1	1	1
MS/MSD	0	1	0
Trips	0	1	1
TOTAL	11	11	10

### 3.2.4 Sediment Samples

Three sediment samples will be collected from the unlined drainage ditches located northwest and southeast of the site and Ryan's Creek at the locations shown on Figure 2. The samples will be analyzed for DRO, RRO, GRO, BTEX and VOC's.

### 3.2.5 Data Evaluation

The data collected for this investigation will be compiled and evaluated. If data gaps in the site characterization remain after this first phase of work has been completed, a follow-up scope of work will be developed and implemented. All of the 1998 data will then be compiled with the historical data to prepare groundwater contour maps, groundwater plume maps, cross-sections, and summary analytical data tables.

### 3.2.6 Report Preparation

A report will be prepared to document the activities and findings from the field investigation(s). The report will include the tabulated and graphical compilations. The report will document the project activities, evaluate hydrogeological considerations, and assess the nature and extent of any soil or groundwater contamination. The report will serve as the basis for making future decisions concerning cleanup activities at the site.

## 3.3 FIELD PROCEDURES

### 3.3.1 Decontamination

Tools and equipment that are to be used for drilling or sampling will be decontaminated using the procedures described below. Clean, solvent-resistant gloves will be worn by persons who decontaminate tools and equipment.

*Soil samplers* will be washed in an Alconox and water solution and rinsed two times in clean water.

*Water level meters* will be washed in a clean water and Alconox solution and then rinsed with deionized water between wells.

*Disposable bailers* will be used in all wells and clean unused nylon braded rope will be used in each well.

### 3.3.2 Groundwater Sampling

Before groundwater samples are collected from a well, it will be purged until three successive pH, conductivity, and temperature readings have stabilized to within 10 percent of each other and a minimum of three well volumes have been removed. If a well is purged dry, samples will be collected after it has recharged at least 70 percent of its original water level or after 24 hours, whichever comes first.

Samples will be collected using disposable bailers fitted with a bottom-emptying device. Each well will be sampled by personnel wearing new, disposable, nitril gloves using a new bailer attached to a new length of bailer line.

The bailer will be lowered slowly to minimize disturbances of the well water, and special care will be taken to prevent the bailing line from contacting the outside of the well, equipment, clothing, and the ground surface.

The sample number designations for the groundwater samples will be the well number. Blind duplicate samples will be numbered in a manner that does not reveal the actual location of the sample.

### 3.3.3 Surface Water and Sediment Sampling

Surface water samples will be collected before the sediment samples are collected. Surface water samples will be collected from downstream to upstream locations beginning at the further downstream location. Surface water samples will be collected using a dipper. The dipper will be decontaminated between sample locations. Sediment samples will be collected from the upper six inches of sediment in the middle of the stream or ditch using a trowl.

### 3.3.4 Sample Containers, Preservation, Storage, and Holding Times

Tables 4 and 5 summarize the containers, preservation, storage, and holding times that will be used for the soil/sediment and surface/groundwater samples, respectively.

Each sample will be labeled with indelible, waterproof ink. Information that will be shown on the sample label includes the following:

**TABLE 4. ANALYTICAL AND COLLECTION PROCEDURES FOR SOIL AND SEDIMENT SAMPLES**

PARAMETER	ANALYTICAL METHOD	PRESERVATION	HOLDING TIMES
DRO	AK102	4° ± 2° C	14 days to extract, <40 days to analyze
RRO	AK103	4° ± 2° C	14 days to extract, <40 days to analyze
GRO	AK101	4° ± 2° C	14 days
Total BTEX	EPA Method 8020	4° ± 2° C	14 days
VOCs	EPA 8260	4° ± 2° C	14 days

- Unique identification number
- Date and time of collection
- Initials of person collecting the sample
- Laboratory performing the analysis
- Preservation method
- Project name.

### 3.3.5 Chain-of-Custody and Sample Shipping

Each sample will be tracked using standard Chain-of-Custody (COC) procedures. Each person who takes possession of the samples will sign the COC until the samples reach the analytical laboratory.

**TABLE 5. ANALYTICAL AND COLLECTION PROCEDURES FOR WATER SAMPLES**

PARAMETER	ANALYTICAL METHOD	SAMPLE CONTAINER	PRESERVATION	HOLDING TIMES
DRO	AK102	1-liter amber glass, TCL	4° ± 2° C	7 days to extract, <40 days to analyze
GRO	AK101	40 ml amber VOA TLS	pH < 2 (HCl) 4° ± 2° C	14 days
Total BTEX	EPA Method 602	40 ml amber VOA TLS	pH < 2 (HCl) 4° ± 2° C	14 days
VOCs	EPA Method 8260	40 ml amber VOA TLS	pH < 2 (HCl) 4° ± 2° C	14 days

Samples will be sealed in ziplock baggies and packed in foam, bubble-wrap, or other appropriate packaging materials in an ice chest. They will be stored at 4° C using ice packs or blue ice. The COC will be placed inside a plastic bag and taped to the inside lid of the shipping container. A chain-of-custody seal will be placed on the cooler so that the custody seal would be broken if the cooler were opened.

### 3.3.6 Water Level Measurements

The depth to water will be measured in each well using an electronic water level meter. Readings will be measured to an accuracy of 0.01 foot.

### 3.3.7 Investigative Wastes

Development and purge water will be containerized and labeled. The analytical results will be used to select an appropriate disposal method.

## 3.4 QUALITY ASSURANCE PLAN

Quality Assurance/Quality Control (QA/QC) for this project will be performed in accordance with the requirements of ADEC and as described in the following sections.

### 3.4.1 QC Samples

The following QC samples will be collected to evaluate the effects of field procedures on analytical precision:

- One *blind field duplicate* will be collected and analyzed for every ten field samples per matrix as shown on Table 3.
- One *trip blank* will be submitted and analyzed for BTEX with every surface water and groundwater sample shipment to the laboratory.

### 3.4.2 Laboratory QC Procedures

Laboratory QC procedures will be performed in accordance with ADEC's requirements for standard laboratory operating procedures. Standard data reports with extended QC reporting and sample chromatographs will be requested.



#### 4.0 REFERENCES

- Kent & Sullivan, Inc., 1998, *Surface Water Sampling, Results, City of Kenai Maintenance Shop*, Letter to City of Kenai, Alaska, January 1998.
- United States Geological Survey Water Resources Division, 1972, *Alaska District Water Resources of the Kenai-Soldotna Area, Alaska*. 1972.
- American Environmental, 2000, *1999 Site Investigation Report, City of Kenai Maintenance Shop*, May 11, 2000.
- Alaska Department of Environmental Conservation Division of Spill Prevention and Response Contaminated Sites Remediation Program, 2003, *1999 Investigation Report Comments, Work Plan Requested*. Letter to the City of Kenai March 3, 2003.