1999 Site Investigation Report
City of Kenai Maintenance Shop
Kenai, Alaska

Prepared for

City of Kenai

Prepared By

American Environmental
Environmental Consultants

Project No. 99-5
May 11, 2000

May 11, 2000

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

Subject: Kenai Maintenance Shop 1999 Investigation Report

ADEC Spill # 94-23-01-101-02

Mr. LaShot:

Enclosed is our report on our environmental site assessment activities at the City Maintenance Shop property located in Kenai, Alaska. This report is presented based upon further field investigation at the Maintenance Shop. The report is being submitted to the City administration. Proposed actions contained in this report are subject to the approval of the City Council and ADEC.

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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1.0 EXECUTIVE SUMMARY

The City of Kenai has conducted this investigation as part of an ongoing assessment at the Maintenance Shop. Previous investigations (NTL 1994, KSI 1997) have identified several potential source areas of subsurface soil and groundwater contamination.

This 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.

This 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.

2.0 INTRODUCTION

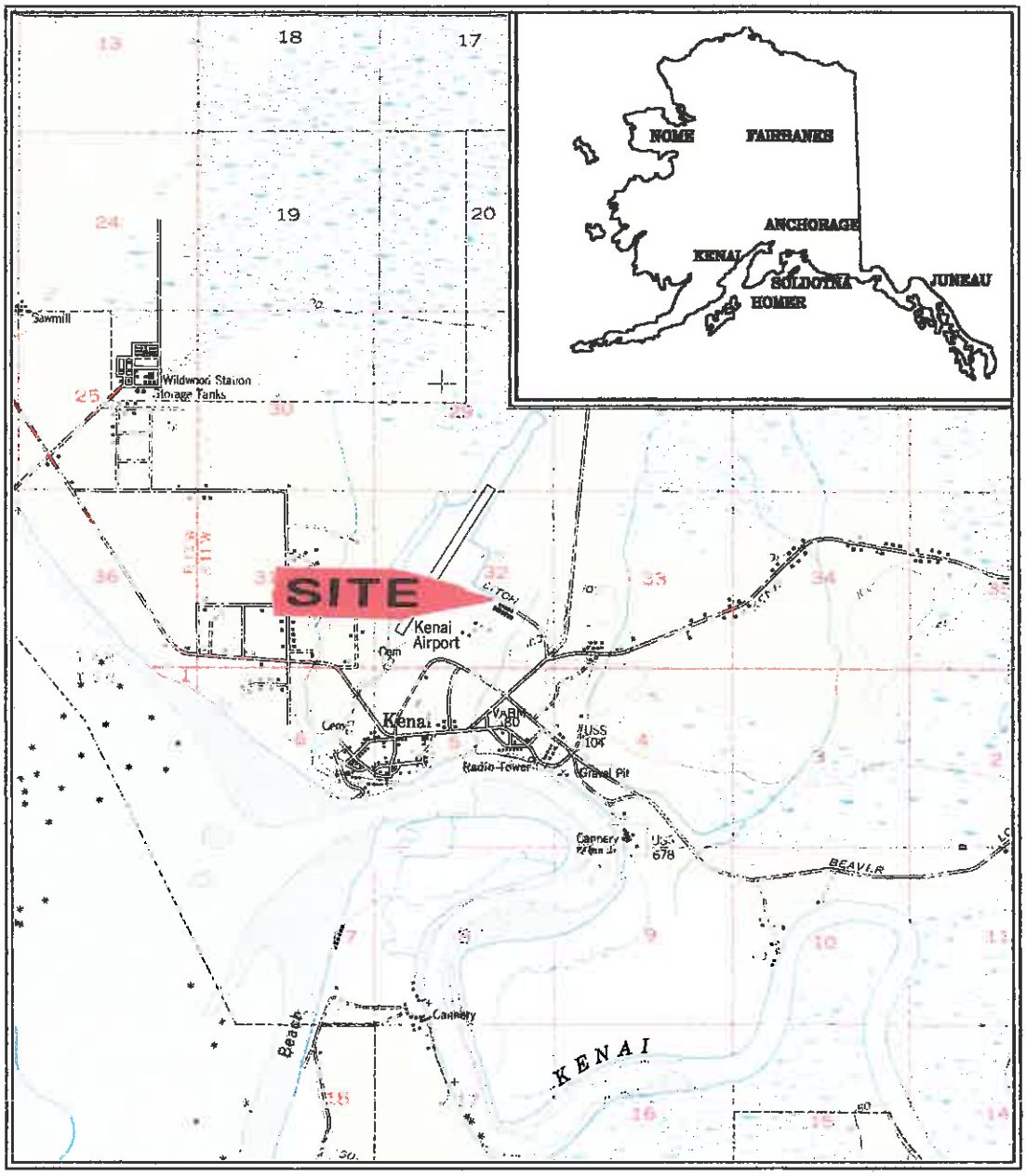
This report describes the activities and findings of the 1998 investigation at the Kenai Maintenance Shop located in Kenai, Alaska (Figure 1). The investigation work was performed by Peter Campbell for the City of Kenai. The field activities and laboratory analyses were performed in general accordance with the *1998 Environmental Investigation Workplan - Maintenance Shop Site Assessment* (Kent & Sullivan, 1998) which was submitted to the Alaska Department of Environmental Conservation (ADEC).

2.1 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.

2.2 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-feet-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 biphenols (PCBs).



Magnetic North

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: Kenai\Maintenance\Topobase

Prepared by:
American Environmental

FIGURE
1

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.

2.2.1 SITE PHYSIOGRAPHY

The Kenai Maintenance shop property covers approximately 11 acres of land. The land is relatively flat at an elevation of approximately 82 feet above mean sea level. The area is located 700 feet east of the Kenai airport terminal. Most of the area surrounding the buildings is covered with gravel, with some minor areas containing grass and trees. A drainage ditch that originates from the airport flows, at times of surface runoff, east across the property into Ryan's Creek.

According to the U.S.G.S. Professional Paper 443, Geology of the Kenai Lowlands, the area is in "the Cook Inlet Lowland physiographic region that occupies a structural trough, underlain by rocks of Tertiary age and mantled by [unconsolidated] Quaternary deposits of varying thickness." Further, deposits in the "area consist of proglacial-lake-bottom sediments underlying terraced and channeled surfaces between major morainal belts in [the] lowlands..." This area lies north of the Kasilof River and The Caribou Hills Upland. Proglacial lake deposits, windblown sands and silts, swamps and poorly integrated drainage patterns, characterize the general area.

The USDA Soil Survey of the Kenai-Kasilof Area, Alaska refers to the native soils in the area as part of the "Soldatna series of well-drained soils developed in a moderately deep to deep mantle of wind-laid silty material over a thick deposit of gravely sand or coarse sand." Soils encountered in the excavation were generally medium sand with minor gravel.

2.2.2 SITE HYDROGEOLOGY

Almost all of the groundwater near Kenai occurs in unconsolidated aquifers consisting of complexly interlayered deposits of glacial-outwash, lacustrine, fluvial, and eolian sediments (USGS 1995). The lacustrine and eolian deposits are typically fine grained and provide little water to wells. Glacial till also contains fine-grained silt and clay, but local saturated zones of sand and gravel are present that yield water to wells at sufficient rates for domestic consumption. Deposits of stratified stream-laid sand and gravel are present within the till and can be several feet thick. The maximum thickness of the unconsolidated sediments near the maintenance shop is about 150 meters. Potable water in the City of Kenai is provided by municipal wells, which are located several miles from the site.

Groundwater flows south-southwest at the maintenance shop (Figure 2). Groundwater occurs from 6.4 to 10.3 feet below ground level (BGL). It appears, after measuring the elevation of the surface water at the site that surface water is hydraulically connected to the groundwater table.

pete\kenai\mainshop\KMS99 GW Elevation Contours.dwg
1=40

CITY OF KENAI MAINTENANCE SHOP

Groundwater Contours 7/22/99

American Environmental ENVIRONMENTAL CONSULTANTS
35095 K-B DRIVE SUITE A
SOLDOTNA AK 99669
(907) 260-4744
FAX (907) 260-6613

DATE 10/21/99
DRAWN PC
CHECKED
PROJ NO. 99-5

FIGURE 2

LEGEND

MAGNETIC NORTH

0 100' 200'

WILLOW STREET
AIRPORT DRIVE
RIGHT OF WAY
DITCH
CULVERT
FENCE
GATE
LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
TRACT 3
KENNELS
WARM STORAGE #2
WARM STORAGE #1
MAINTENANCE SHOP
FUEL TANKS
FUEL PUMPS
QUONSET HUT
SHED
SHED
SHED
Manhole
Creek #3
Creek #2
DITCH
RYAN'S CREEK
KMS-S3
KMS-S1
MW1
MW2 76.81
MW3 76.89
MW4 75.61
MW5 76.16
MW6 75.84
MW7 77.17
SB1
SB2
SB3
SB4
SB5
SB6
LP
76.98
76.83

72.5	Ground Water Contour Contour Interval - 0.2 Feet
70.41	Water Elevation Date- July 21, 1999
MW6	Monitoring Well
SB5	Soil Boring
LP	Light Pole
	Gravel Pad Boundary

Note: Creek elevation #1 (72.60) is located at the intersection of Ryan Creek and Airport Way, off of the map, but used in contouring.

2.3 OVERVIEW OF PROJECT

The following activities were completed as part of this assessment:

- Additional soil samples were collected from the ditch that crosses the site.
- Soil and water samples were collected from Ryan's Creek.
- Monitoring wells were surveyed, gauged and sampled.
- PCB screening was conducted at the old electrical shop.
- Drums located along Ryan's Creek were located, inspected, soils screened and samples collected.
- Hand auger borings were drilled at several locations surrounding the maintenance shop.
- Monitoring wells were repaired from frost heave and snowplow damage.

3.0 FIELD PROCEDURES

The sampling program was performed in accordance with the protocol established in the ADEC Regulations 18 AAC 70 and 18 AAC 75 dated May 4, 1998. Samples were collected in accordance with regulations and guidelines specified by ADEC and the work plan submitted to the State (ADEC January 30, 1998).

3.1 FIELD SCREENING

An organic vapor monitor (OVM) was the primary field-screening device. The OVM uses a 10.5 electron volt lamp in a non-destructive test to measure volatile organic vapors. A standard calibration gas of approximately 100 parts per million isobutylene was used to calibrate the machine. The OVM was calibrated each time it was turned on.

The OVM was on site to screen soils and monitor vapors in the breathing zone. The OVM measures volatile organic vapors present in the atmosphere. OVM readings are not a direct measure of soil contamination, but an indicator of relative soil contamination. OVM readings along with visual observations and odors observed in the soil were used to make field decisions on where to collect laboratory samples to assess presence of contamination.

3.2 SOIL AND GROUNDWATER SAMPLING

Soils field screened for PCB's were tested with Dexsil Clor-N-Soil test kits. The test kits can be used for determining if PCB's are present at concentrations greater than 50 ppm. The soils were sampled at the Quonset hut that had been previously operated as the electrical shop. Stained soils were noted at the base of the building near the door. The field screening kit was ineffective for the test, because of the soil type. Two attempts were made, but each of the field kits clogged at the extraction stage. A soil sample was collected and sent to the laboratory for analysis.

Soil samples were collected with decontaminated trowels and were then stored in the appropriate container on blue ice for transport to the lab. Chain of custody forms traveled with the samples, and custody seals were affixed to all coolers.

Soil samples collected with the hand auger sampler were screened with an OVM. Readings recorded from the OVM were documented in field notes.

Monitoring wells were purged with disposal bailers. Development water was placed into a 55-gallon drum. The development water is stored at the Kenai Maintenance shop for disposal.

3.3 SOIL SAMPLING LOCATIONS

The area east of the Maintenance Shop was the focus of a through investigation of drums present in the wooded area surrounding Ryan's Creek. The site was screened with a metal detector to determine if the area had been used for extensive drum disposal. Several drums had been identified at the surface, and it was important to determine if other drums were present, and if the drums had leaked their contents to the environment.

The lot north of the Maintenance Shop fence was also investigated. Initially the property was walked over and visually inspected for any unusual features. The site was then inspected with a metal detector to determine if any large metal objects were present below the subsurface. This was an area of concern because of the potential for landfill type debris from the military base identified in the Phase I investigation. A further discussion of this phase of the investigation is presented in Section 4.3

Four types of soil samples were collected at the site. Drum samples were referred to as DS-#. Soil samples collected from the ditch, near the culvert, were referred to as CV-#. Soil samples collected from the ditch and Ryan's Creek were referred to as S-1, referring to "sediment" samples. A PCB sample was collected from the electrical shop. This sample was referred to as ESW, (electrical shop west).

4.0 MAINTENANCE SHOP INVESTIGATION

4.1 WATER LEVEL MEASUREMENTS

Static water levels were measured at six monitoring wells surrounding the maintenance shop site. One of the monitoring wells, MW-1, was not located during the investigation. The parking lot located across the street from the airport had been upgraded with gravel and typar, covering the well. Several attempts were made to locate the well by survey, metal detector search and digging.

An additional monitoring point was added to the contouring data by measuring the elevation of the water inside of the culvert crossing the site. The elevation was measured at a manhole located approximately sixty feet northwest of MW-5. Water flows through the culvert from the airport to Ryan's Creek. It appears that floor drains in the warm storage buildings also flow into the culvert.

Based on the elevation data compiled in Table 1, and the groundwater contour map presented on Figure 2, groundwater flow is to the south-southeast. Information was also gathered from a property located to the southeast of the maintenance shop. The Halliburton property, located on the corner of Trading Bay Road and Airport Way, has eleven monitoring wells on site. Based on information submitted to ADEC by Halliburton, groundwater flow at the site is also to the south-southeast.

The groundwater contours presented are based on measured elevational points that have included checks along Ryan's Creek. Based on the direction of groundwater flow at the Kenai Airport, Ryan's Creek is probably having an easterly influence on the direction of groundwater flow.

Monitoring well elevations were resurveyed in 1998 by Swan Surveying. Water level data are presented in Table 1. The unconfined aquifer underlies the site at depths between approximately 6.4 and 10.3 feet below ground surface. The aquifer occurs within a sequence of unconsolidated sand containing thin interbeds of gravel, silt, and clay and flows to the south southeast (Figure 2) at a slope of 0.0032 ft/ft. The flow patterns and gradients have been interpreted differently from previous gauging events (NTL, 1994), due to corrections in some top of casing elevations, the addition of the manhole water elevation and water elevations along Ryan Creek.

4.2 WELL SAMPLING

Monitoring wells were purged with disposable bailers. A minimum of three casing volumes were removed from the well prior to sampling the wells. The purge water was sampled at intervals to measure pH, temperature and conductivity. The goal was to purge water in the well until the measured parameters stabilized to a 10% variation. Purge water was drummed, labeled, and contained on site in 55-gallon drums. Representative groundwater samples were then collected from the well into the appropriate sample container.

All of the monitoring wells were sampled for diesel-range organics (DRO method AK102), gasoline-range organics (GRO method AK 101) and benzene, toluene, ethylbenzene and total xylenes (BTEX EPA method 602) and volatile organics (VOC by EPA method 8260). Table 2 contains a summary of the groundwater data, Appendix A contains the laboratory reports and Figure 3 presents the groundwater and surface water analytical results.

No GRO or BTEX compounds were detected above the cleanup criteria for the site. BTEX compounds were detected in four of the six wells sampled. Three of the wells had trace amounts of BTEX in the water sample, and two of these wells were up gradient on the site. Monitoring well MW-6 had the highest BTEX concentrations, which were well below the cleanup criteria, and significantly lower than indicated in the 1995 sampling event. Historical water sampling results are presented in Table 3.

Table 1

Water Level Data

Kenai Maintenance Shop

City of Kenai

Well No.	Gauge Date	Gauge Time	Reference Elevation (ft MLLW)	Total Depth (ft MLLW)	Depth to Water (feet)	Groundwater Elevation (ft MLLW)
MW-2	07/22/98	12:12 PM	85.73	13.74	10.31	75.42
MW-4	07/22/98	10:37 AM	84.90	13.73	10.37	74.53
MW-5	07/30/98	10:10 AM	82.08	11.62	6.38	75.70
MW-6	07/22/98	12:47 PM	88.07	17.18	12.38	75.69
MW-8	07/22/98	9:14 AM	85.53	16.73	8.92	76.61
Manhole	07/30/98	9:49 AM	81.44	NA	10.07	71.37

ft MLLW *Feet above mean lower low water*

Table 2

Summary of Groundwater Analyses

City Maintenance Shop

City of Kenai, Alaska

Well No.	Sample Date	BTEX						VOCs									
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	GRO	TCE	1,1,1,-TCA	Isopropyl-benzene	n-Propyl-benzene	1,3,5-Trimethyl-benzene	1,2,4-Trimethyl-benzene	sec-Butyl-benzene	4-Iso-propyl-toluene	Naphthalene	1,2,3-Trichloro-benzene
(1)		*50*	*10,000*	*7,000*	*10,000*	*15,000*	*13,000*	*50*	*2,000*	ne	ne	ne	ne	ne	ne	*15,000*	ne
MW-2	07/22/1998	1 U	1 U	1 U	**1.06**	**4,340**	**65**	1 U	**2.4**	1 U	1 U	1 U	1 U	1 U	**2.3**	**1.42**	1 U
MW-3	07/22/1998	1 U	1 U	1 U	**1.07**	**557**	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-4	07/22/1998	1 U	1 U	1 U	1 U	**562**	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	**11.1**
MW-5	07/22/1998	1 U	1 U	1 U	1 U	**1,940**	40 U	**1.17**	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
MW-6	07/22/1998	1 U	**1.18**	**35.9**	**70.1**	**30,200**	**650**	**7.15**	1 U	**11.5**	**16.1**	**22.9**	**87.6**	**5.67**	**9.37**	**121**	1 U
MW-7	07/22/1998	1 U	**1.18**	1 U	**1.95**	**128**	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tall C-Method 2 (mg/l)		0.005	1.0	0.7	10.0	1.5	1.3	0.005	0.2	3.65		1.85	1.85			0.7	

Data are reported in ug/L.

(1) Criteria contained in 18 AAC 75 for a non-drinking water source.

BOLD Analyte was detected.

BOLD Analyte was detected above the cleanup criteria.

-- Not analyzed.

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

DRO Diesel-range organics by Alaska method AK102.

GRO Gasoline-range organics by Alaska method AK101.

ne Not established.

TCA Trichloroethane.

TCE Trichloroethene.

U Analyte was not detected in concentrations above the detection level shown.

VOCs Volatile organic compounds by EPA Method 8260.

Table 3

Historical Water Analytical Data

Maintenance Shop

City of Kenai, Alaska

Area	Well No.	Date Sampled	Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	GRO	VOCs					Isopropyl benzene	n-Propyl benzene	1,3,5-Trimethyl benzene	1,2,4-Trimethyl benzene	sec-Butyl benzene	4-Isopropyl toluene	Naphthalene	1,2,3-Trichloro benzene
									PCE	TCE	1,2-DCB	1,1,1,-TCA	Acetone								
Criteria																					
ADEC GW Cleanup Criteria (1)			*50*	*10,000*	*7,000*	*10,000*	*15,000*	*13,000*	*50*	*50*	*6,000*	*2,000*	*36,500*	ne	ne	ne	ne	ne	ne	*14,600*	ne
Area																					
Drum Disposal	MW-1	1995	1 U	1 U	1 U	1 U	225	--	1 U	1 U	1 U	1 U	1 U								
	MW-6	1995	1 U	7.5	84	1,224	**52,100**	--	1 U	6.4	1.1	1 U	1 U								
		1998	1 U	1.18	45.1	84.4	**30,200**	650	1 U	7.15	1 U	1 U	--	11.5	16.1	22.9	87.6	5.67	9.37	121	1 U
Road Oil Pit	MW-5	1995	1 U	1 U	1 U	1 U	509	--	13.3	1 U	1 U	1 U	1 U								
		1998	1 U	1 U	1 U	1 U	1,940	40U	1 U	1.17	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Maintenance Shop	MW-2	1995	1 U	1 U	1 U	1 U	1,540	--	1 U	1 U	1 U	1.8	1 U								
		1998	1 U	1 U	1 U	1.06	4,340	65	1 U	1 U	1 U	2.4	--	1 U	1 U	1 U	1 U	1 U	2.3	1.42	1 U
Former UST	MW-4	1995	1 U	1 U	1 U	1 U	519	--	1 U	1.6	1 U	1 U	1 U								
		1998	1 U	1 U	1 U	1 U	562	40U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	11.1
Culvert/Surface Water	KMS-SW-1	1997	1 U	10	1 U	1 U	4,800	110	1 U	1 U	--	1 U	46								
	KMS-SW-2	1998	1 U	1 U	1 U	1 U	247	40U	--	--	--	--	--	--	--	--	--	--	--	--	--
	KMS-SW-3	1998	1 U	1 U	1 U	1 U	387	40U	--	--	--	--	--	--	--	--	--	--	--	--	--
	KMS-SW-4	1998	1 U	1 U	1 U	1 U	4,680	40U	--	--	--	--	--	--	--	--	--	--	--	--	--
	KMS-SW-5	1998	1 U	1 U	1 U	4.76	**34,700**	99	--	--	--	--	--	--	--	--	--	--	--	--	--
	KMS-SW-5B	Duplicate	1 U	3.47	1 U	9.7	**29,400**	150	--	--	--	--	--	--	--	--	--	--	--	--	--
	KMS-SW-6	1998	1 U	1 U	1 U	1 U	257	40U	--	--	--	--	--	--	--	--	--	--	--	--	--
Upgradient	MW-3	1995	1 U	1 U	1 U	1 U	277	--	1 U	1 U	1 U	1 U	1 U								
		1998	1 U	1 U	1 U	1.07	557	40U	1 U	1 U	1 U	1 U	--	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
	MW-7	1995	1 U	1 U	1 U	1 U	345	--	1 U	1 U	1 U	1 U	1 U								
		1998	1 U	1.18	1 U	1.95	128	40U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Data are reported in ug/L.

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

Bold 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 8100M (1995) & AK 102 (1998).

GRO Gasoline-range organics by EPA Method 8015M.

ND Not detected.

ne Not established.

PCE Tetrachloroethene.

TCE Trichloroethene.

VOCs Volatile organic compounds by EPA Method 601 or 624.

GRO compounds were detected in the two of the six well samples. Both of the wells (MW-2 & MW-6) are located directly downgradient from the site. (A magnetic anomaly that is rumored to be the location of buried drums of petroleum products from the military era.) The GRO concentrations were well below the proposed cleanup guidelines. GRO was not tested for in 1995.

DRO was present in each of the wells sampled including the upgradient wells at low levels. This distribution pattern has been consistent from the 1995 to the 1998 sampling event (Table 3). Wells measured on the downgradient side of the site exhibited DRO at concentrations increased by several orders of magnitude. Concentrations of DRO increased in monitoring wells MW-2, MW-3, MW-4 and MW-5 between 1995 and 1998. Concentrations dropped in wells MW-6 and MW-7 but concentrations in MW-6 are still significantly higher than the specified cleanup level.

The monitoring wells had been damaged by frost heave, which necessitated surveying the elevations. After the wells were surveyed, additional repairs were made, which will necessitate another survey prior to the next gauging event.

4.3 HAND AUGER BORINGS

Fifteen hand auger borings were to be drilled at various locations to the north and east of the maintenance shop property. The purpose of the borings was to explore the subsurface soils in areas outside of the fence that may have impacts on environmental conditions at the site. Areas of concern were debris piles from land clearing, areas of stressed vegetation north and east of the site, known or suspected drum disposal areas, and areas exhibiting magnetic readings on the metal detector.

The initial walkover of the area along Ryan's Creek was conducted on July 23, 1998. Drums exposed at the surface were marked with florescent paint. This visual inspection was followed up with a metal detector survey. The metal detector used was a Garrett Model Freedom Ace Plus.

Several small trails follow Ryan Creek, a mixture of footpaths and game trails. As a note several fresh bear spore were present along these trails. The initial metal detector survey involved sweeping each side of the trail. Any anomalies were marked with florescent paint. The mark was then transferred to the fence as a cross-reference. The area was then covered in a rectangular grid search pattern. The boundaries for the search were the eastern fence, 50 feet west of Ryan Creek, Airport Way and approximately 200 feet north of the northern fence on the site (See Figure 4).

Several magnetic anomalies were investigated with a hand trowel and a hand auger to determine if drums were present below the surface. Various metal objects were identified; no other drums were located in the near surface soils. Metallic anomalies included old cans, bike parts and various forms of small metal debris. Ten drums were located in four locations east of the fence. One drum is directly in Ryan Creek.

Hand auger borings were drilled in areas surrounding the drums. The surficial soils were carefully examined and stressed vegetation was noted in choosing a location to drill. Two areas were chosen as the most likely area to be contaminated by the contents of drums leaking into soils surrounding the drums. Three drums were located approximately 30 feet south of the ditch and east of the fence (Figure 4). Vegetation was stressed in the area, and the drums were approximately 2/3 buried. Borings were drilled as close as possible to the drums and advanced to 3.5 feet BGL. Soil samples were screened as the boring advanced, and samples were collected for laboratory analysis, DS-1 and DS-2. No evidence of contamination, other than the stressed vegetation, was noted. Laboratory results are presented in Table 4 and in Appendix A.

4.3.1 CULVERT SOIL SAMPLES

Two of the hand auger borings were particularly important. CV-1 and CV-2 were located on each side of the culvert where the ditch exits the fenced maintenance shop property. A stream sediment sample, KMS-S2 had been collected from this location, which was contaminated. These two borings were drilled on each side of the ditch to assess the source of the ditch contamination, which could have been the road oil pit to the northwest or the drums located to the southeast.

Four potential sources of contamination were suspected; drums located near the ditch, the road oil pit, airport runoff, and the warm storage buildings. Soils surrounding drums located approximately 30 feet from the ditch were investigated, and found to be relatively free of contamination. Contamination was apparently not moving from this area into the stream as exhibited by clean soils in CV-2.

The soils on the north side of the ditch were also relatively clean at 108 ppm DRO. We suspected that it was possible that the old road oil pit, located approximately 75 feet west of the open ditch was contributing to sediment contamination by moving through the subsurface soils at groundwater to the mouth of the culvert. CV-1 was drilled to check for this. No significant contamination was encountered approximately three feet north of the ditch. The culvert hand auger borings were drilled from approximately two feet above water level, to at least eight inches below water level. Soils were carefully examined and screened with an OVM for petroleum concentration. Laboratory results from both of the culvert soil samples indicated relatively low petroleum concentrations (Table 4).

The monitoring well MW-5 is located between the road oil pit and the ditch. Samples collected from this well have DRO and tetrachloroethene present. The diesel range chromatograms from this sample do not have the same characteristic patterns as the soil and water samples collected from the ditch and Ryan Creek. Lighter petroleum compounds (diesel or jet fuel) present in the sediment and water samples of the ditch were not present in the monitoring well, which had heavier oil and residual range petroleum along with TCE. It is also interesting to note that the TCE was not present in the soil sample collected from the road oil pit soil boring.

Another potential source was contamination moving through the ditch from the airport. A culvert sediment sample, KMS-S1, located at the beginning of the culvert on the west side of the shop did have elevated DRO concentrations of 11,000 mg/l DRO. A follow up sample, collected from further up the ditch (KMS-S3) did not have significant levels of DRO. This potentially eliminates the airport as a source of significant contamination in the ditch.

Table 4

Summary of Soil Analyses

City Maintenance Shop

City of Kenai, Alaska

Sample Location	Sample Depth	Lab No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	GRO	SVOCS bis (2-Ethylhexyl) phthalate	PCBs Aroclor 1260
Inhalation [1]			*9*	*180*	*89*	*81*	*12,500*	*1,400*	ne	*10*
Injestion [2]			*290*	*20,300*	*10,000*	*203,000*	*10,250*	*1,400*	ne	*10*
Groundwater Migration [3]			*0.02*	*5*	*6*	*78*	*250*	*300*	ne	*10*
DS-1	3.5	984033-001	0.0339 U	0.0339 U	0.0339 U	0.0339 U	**6.16**	1.36 U	0.41 U	--
DS-2	3.5	984033-002	0.0382 U	0.0382 U	0.0382 U	0.0382 U	4.22 U	1.53 U	--	--
CV-1	8 in	984033-003	0.0255 U	0.0255 U	0.0255 U	0.0255 U	**108**	1.02 U	--	--
CV-2	3 ft	984033-004	0.0333 U	0.0333 U	0.0333 U	0.0333 U	**11.2**	1.33 U	--	--
KMS-ESW	surface	983922-008	--	--	--	--	--	--	--	**2.73**

All values reported in mg/Kg

(1) Criteria for inhalation pathway contained in 18 AAC 75.

(2) Criteria for injestion contained in to 18 AAC 75.

(3) Criteria for protection of groundwater contained in to 18 AAC 75.

BOLD Analyte was detected.

-- Not analyzed.

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

DRO Diesel-range organics by Alaska method AK102.

GRO Gasoline-range organics by Alaska method AK101.

ne Not established.

PCBs Polychlorinated biphenyls by EPA Method 8082.

SVOCs Semi-volatile organic compounds by EPA Method 8270.

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

The warm storage buildings #1 and #2 have floor drains that are tied into the culverted ditch from the south. These floor drains could be a source of contamination that has entered the culvert and flowed into the ditch. A high water level could have allowed the water discharging from the floor drains east to the ditch and west toward the airport.

4.4 SURFACE WATER SAMPLES

Surface water samples were collected from both the ditch east of the maintenance shop and from Ryan Creek, both upstream and downstream of the confluence of the ditch. The ditch was dry on the west side of the maintenance shop. This sampling was conducted to determine the extent of surface water contamination in relation to contamination discovered at the culvert discharge. It was important to know if the source of contamination could have been up gradient of the ditch on Ryan Creek, and the extent of contamination down gradient of the ditch.

Water samples were collected from downstream working up stream. This was done to avoid disturbing the sediments and contaminated soils, and cross-contaminating the downgradient samples. Surface water samples were collected with two tools, the disposable bailer and a beaker. Samples were collected with the goal of minimizing the amount of organic content in the sample. The water was then transferred into the appropriate container for shipment to the laboratory.

The first water sample (KMS-SW2) was collected from the north side of the culvert where Ryan Creek crosses Airport Way. The primary contaminant of concern in the surface water samples is DRO. Each of the surface water samples collected had detectable concentrations of DRO with the concentrations ranging from 247 µ/l to 34,700 µ/l. The sample collected closest to the eastern culvert on the ditch also had low concentrations of GRO and total xylenes. See Table 5 for a summary of the surface water analyses and Figure 3 for the sample locations and results.

It appears that a portion of the 250 to 380 µ/l range of DRO contamination in SW-2, SW-3 and SW-6 could be what is known as biogenic interference. Some quantity of organic material was present in each of the samples collected, which can show up in the DRO analytical test.

It appears that diesel contamination extends downgradient from the culvert and into Ryan Creek for some distance under the conditions present at the time of sampling. This part of Ryan Creek was in a low flow condition at the time of sampling, and based on the type of vegetation in the creek bed, this is rarely a fast moving waterway. A heavy rainfall could disturb the contaminated sediments and spread contamination downgradient.

Anecdotal information gathered in the Phase I investigation did indicate that Ryan Creek may have been contaminated south of Airport Way. A worker at one of the warehouses located downstream indicated that years ago, in the early morning, strong petroleum odors were noted coming from the ditch. A source of the petroleum was not indicated.

pete\kenai\mainshop\KMS99 GW&WQuality.dwg
1=40

CITY OF KENAI MAINTENANCE SHOP

Groundwater Contours 7/22/99 & 1998 Water Analytical Results

American Environmental ENVIRONMENTAL CONSULTANTS
35095 K-B DRIVE SUITE A
SOLDOTNA AK 99669
(907) 260-4744
FAX (907) 260-6613

DATE 10/21/99
DRAWN PC
CHECKED
PROJ NO. 99-5

FIGURE 3

LEGEND

MAGNETIC NORTH

0 100' 200'

WILLOW STREET
DITCH
RIGHT OF WAY
AIRPORT DRIVE
CULVERT
FENCE
GATE
KENNELS
WARM STORAGE #2
WARM STORAGE #1
MAINTENANCE SHOP
FUEL TANKS
FUEL PUMPS
QUONSET HUT
SHED
RYAN'S CREEK
LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
TRACT 3

KMS-S3
KMS-S1
MW1
MW2
MW3
MW4
MW5
MW6
MW7
SB1
SB2
SB3
SB4
SB5
SB6
KMS-ESW
KMS-S2
KMS-SW1
KMS-SW2
KMS-SW3
KMS-SW4
KMS-SW5
KMS-SW6
KMS-S4
KMS-S5
KMS-S6
KMS-S7
CV-1
CV-2
DS-1
DS-2
PKMS-SW3
HAB-1
HAB-2
HAB-3
HAB-4

MW3: Xylenes 1.07, DRO 557
MW7: Toluene 1.18, Xylenes 1.95, DRO 128
TRACT 3: Toluene 1.18, Ethylbenzene 45.1, Xylenes 84.4, DRO 30,200, GRO 650, TCE 7.15, I 11.5, NP 16.1, 1,3,5-T 22.9, 1,2,4-T 87.6, sec-B 5.67, 4-I 9.37, N 121
MW6: Xylenes 1.33, DRO 4340, GRO 85, 1,1,1-TCA 2.4, 4-I 2.3, N 1.42
MW4: DRO 562, 1,2,3-T 11.1
MW5: DRO 1240, TCE 4.17
KMS-S2: Xylenes 4.76, DRO 34,700, GRO 99
KMS-S4: DRO 267
KMS-S5: DRO 4680
KMS-S7: DRO 387
KMS-S6: DRO 247 (Located 2 feet north of KMS-SW2 culvert at roadway.)

72.5 Ground Water Contour, Contour Interval - 0.2 Feet
70.41 Water Elevation, Date- July 21, 1999
MW6 Monitoring Well
SB5 Soil Boring
LP Light Pole
Gravel Pad Boundary
KMS-S2 1997 Soil and Water Sample Location
KMS-SW1 1998 Stream Sample Location
1998 Hand Auger Boring Location

Groundwater sample results measured in µg/L.

I Isopropylbenzene
NP n-Propylbenzene
1,3,5-T 1,3,5-Tromethylbenzene
1,2,4-T 1,2,4-Trimethylbenzene
sec-B sec-Butylbenzene
4-I 4-Isopropylbenzene
N Naphthalene
1,2,3-T 1,2,3-Trichlorobenzene
1,1,1-TCA 1,1,1-Tirchloroethane
DRO Diesel-range organics
GRO Gasoline-range organics
TCE Trichloroethene

Table 5

Summary of Surface Water Analyses

City Maintenance Shop

City of Kenai, Alaska

Sample ID	Lab No.	Sample Date	Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	GRO
(1)			*50*	*10,000*	*7,000*	*10,000*	*15,000*	*13,000*
KMS-SW-2	983922-009	07/22/1998	1 U	1 U	1 U	1 U	**247**	40 U
KMS-SW-3	983922-010	07/22/1998	1 U	1 U	1 U	1 U	**387**	40 U
KMS-SW-4	983922-011	07/22/1998	1 U	1 U	1 U	1 U	**4,680**	40 U
KMS-SW-5	983922-012	07/22/1998	1 U	1 U	1 U	**4.76**	**34,700**	**99**
KMS-SW-5B	983922-013	07/22/1998	1 U	**3.47**	1 U	**9.7**	**29,400**	**150**
KMS-SW-6	983922-014	07/22/1998	1 U	1 U	1 U	1 U	**267**	40 U

Data are reported in ug/L.

(1) Criteria contained in 18 AAC 75 for a non-drinking water source.

BOLD Analyte was detected.

BOLD Analyte was detected above the cleanup criteria.

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

DRO Diesel-range organics by Alaska method AK102.

GRO Gasoline-range organics by Alaska method AK101.

ne Not established.

U Analyte was not detected in concentrations above the detection level shown.

Table 6

Summary of Sediment Analyses

City Maintenance Shop

City of Kenai, Alaska

Sample Location	Lab No.	Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	GRO	SVOCs bis (2-Ethylhexyl) phthalate
(1)		*9*	*180*	*89*	*81*	*12,500*	*1,400*	
(2)		*290*	*20,300*	*10,000*	*203,000*	*10,250*	*1,400*	
(3)		*0.02*	*5*	*6*	*78*	*250*	*300*	
KMS-S-1	983922-001	--	--	--	--	--	--	**8.68**
KMS-S-2	983922-003	--	--	--	--	--	--	**8.49**
KMS-S-3	983922-002	0.0297 U	0.0297 U	0.0297 U	0.0297 U	**18.3**	1.19 U	--
KMS-S-4	983922-004	0.0299 U	0.0299 U	0.0299 U	0.0299 U	**76.3**	1.20 U	--
KMS-S-5	983922-005	0.0352 U	0.0352 U	0.0352 U	0.0352 U	**299**	1.41 U	--
KMS-S-6	983922-006	0.0386 U	0.0386 U	0.0386 U	0.0386 U	**25.7**	1.47 U	--
KMS-S-7	983922-007	0.0447 U	0.0447 U	0.0447 U	0.0447 U	**598**	1.79 U	--

All values reported in mg/Kg

(1) Criteria for inhalation pathway contained in 18 AAC 75.

(2) Criteria for injestion contained in to 18 AAC 75.

(3) Criteria for protection of groundwater contained in to 18 AAC 75.

BOLD Analyte was detected.

BOLD Analyte was detected above the cleanup criteria.

-- Not analyzed.

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

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

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

SVOCs Semi-volatile organic compounds by EPA Method 8270.

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

Table 7
Historical Soil Analytical Data
Maintenance Shop
City of Kenai, Alaska

	Well/ Boring No.	Date	Depth	Benzene	Toluene	Ethyl-benzene	Total Xylenes	DRO	GRO	VOCs (8010) 1,2-DCB	VOCs (8010) 1,4-DCB	SVOCs (8270) (8270)	SVOCs (8270) bis(2-ethylhexyl) phthalate	VOCs (8240)	PCBs Aroclor-1260
Criteria															
ADEC Inhalation (1)				9	180	89	81	12,500	1,400	110	8,000	na		na	10
ADEC Protection to GW (2)				0.02	5	5.5	78	10,100	650	7	0.8	na		na	10
Area															
Drum Disposal	SB-1	1995	9.5-11.5	0.05 U	0.054	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	SB-2	1995	9.5-11.5	**0.087**	0.511	1.06	3.93	1,190	127	0.055 U	0.055 U	--	--	--	ND
Maintenance Shop	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	--	--	--	--
	SB-5	1995	1	0.055 U	0.055 U	0.055 U	0.055 U	--	1.1 U	--	--	--	--	--	--
Electrical Shop	ESW	1998	SS	--	--	--	--	--	--	--	--	--	--	--	2.73
Culvert Sediments	KMS-S1	1997	SS	0.058 U	0.068 U	0.068 U	0.068 U	**11,000**	1.1 U	--	--	--	--	ND	--
		1998	SS	--	--	--	--	--	--	--	--	ND	8,680	--	--
	KMS-S2	1997	SS	0.13 U	1.2	0.13 U	0.13 U	**19,000**	7.1	--	--	--	--	ND	--
		1998	SS	--	--	--	--	--	--	--	--	ND	8,490	--	--
	KMS-S3	1998	SS	0.0297U	0.0297U	0.0297U	0.0297U	18	1.19U	--	--	--	--	--	--
	KMS-S4	1998	SS	0.0299U	0.0299U	0.0299U	0.0299U	76	1.20U	--	--	--	--	--	--
	KMS-S5	1998	SS	0.0352U	0.0352U	0.0352U	0.0352U	299	1.41U	--	--	--	--	--	--
	KMS-S6	1998	SS	0.0366U	0.0366U	0.0366U	0.0366U	26	1.47U	--	--	--	--	--	--
	KMS-S7	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	--	--	--	--	--	--
	CV-2	1998	3'	0.0333U	0.0333U	0.0333U	0.0333U	11	1.33U	--	--	--	--	--	--
Drum Sediments	DS-1	1998	3.5	0.0339U	0.0339U	0.0339U	0.0339U	6.16	1.36U	--	--	ND	--	--	--
	DS-2	1998	3.5	0.0382U	0.0382U	0.0382U	0.0382U	4.22U	1.53U	--	--	--	--	--	--
Former UST	MW-4	1995	9.5-11.5	0.05 U	0.05 U	0.05 U	0.05 U	--	1 U	--	--	--	--	--	ND
	SB-4	1995	9.5-11.5	**0.257**	0.123	0.685	2.59	8.37	142	--	--	--	--	--	--
Fuel Island	SB-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	SB-3	1995	9.5-11.5	0.055 U	0.055 U	0.055 U	0.055 U	4 U	1 U	--	--	--	--	--	--
Upgradient	MW-3	1995	9.5-11.5	0.065 U	0.065 U	0.065 U	0.065 U	4 U	1.3 U	0.065 U	0.065 U	--	--	--	--
	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 xylenes 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.

None of the sediment samples had detectable levels of GRO or BTEX compounds. Only sample locations KMS-S1 and KMS-S2, collected in 1997 had levels of DRO contamination that exceeded the inhalation and protection to groundwater standards.

4.6 PCB SAMPLING

The area around the old electrical shop was inspected, carefully looking for any sign of historical spills. The area had been graded and driven over, so it was difficult to determine if one area was more likely to be contaminated than another was. Several areas were probed with a hand auger, but no stained soils were encountered in the dense clay type soil. The borings were not advanced more than four inches because of the dense soil.

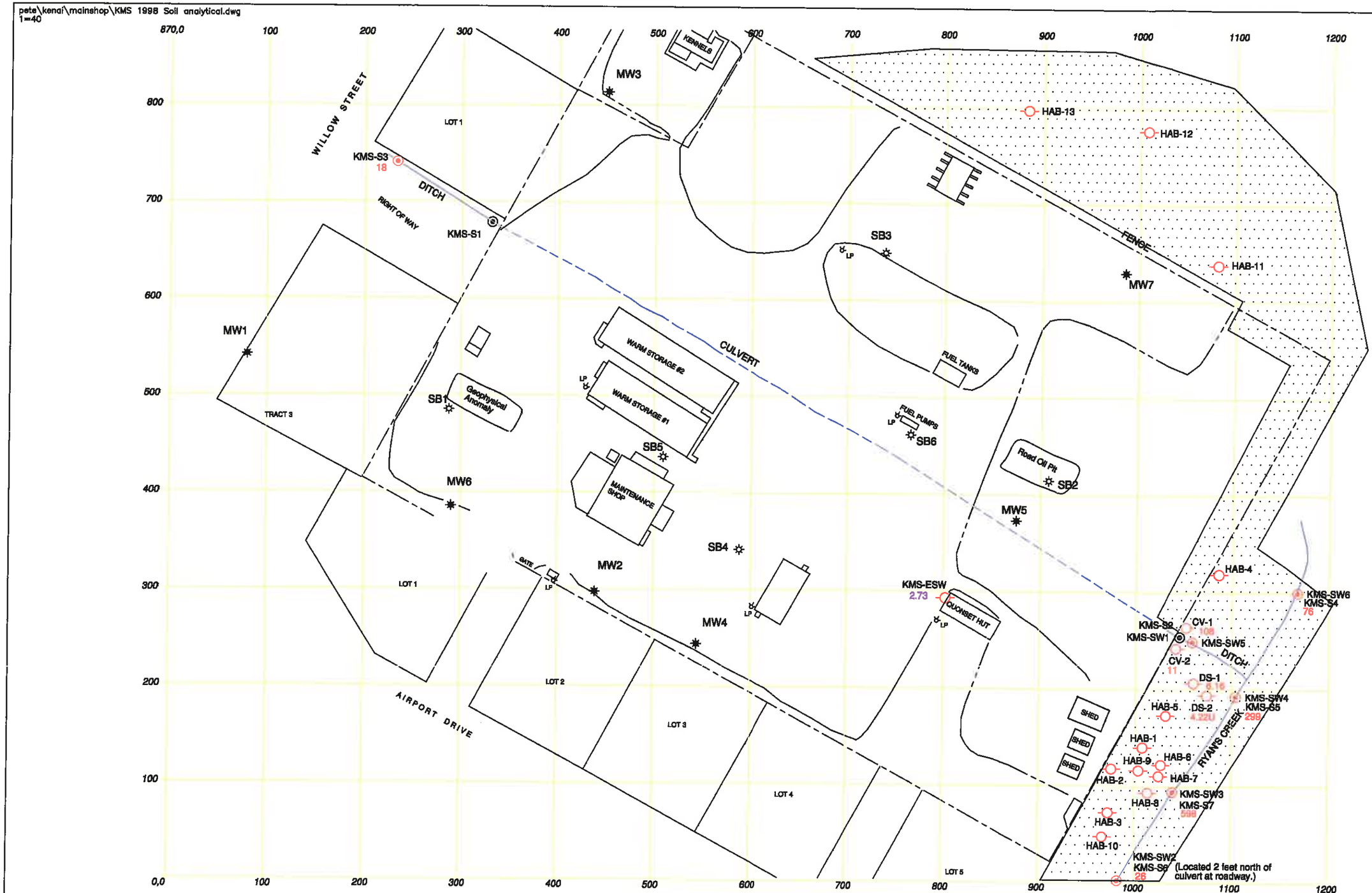
An area of soil staining was encountered outside the front of the Quonset hut. An area about six inches in diameter was noted north of the entrance door. It appeared to be a small quantity spill based on the surface area, but the depth of the soil contamination is unknown. As discussed previously the field test kits did not perform adequately, so a laboratory sample was collected. A soil sample was collected from the stained soils approximately 6 inches below ground level. The sample location is presented on Figure 4. Analytical results indicated 2.73 mg/l of Aroclor 1260 was present in the soil sample (Table 7 and Appendix A).

PCB's are regulated under 40 CFR Part 761. The procedures for cleanup of an unknown source of PCB's are defined in Part 761.125. This is based on a low concentration mineral oil spill that contains PCB's. The regulations specify two cleanup goals for different types of spills to soil, a high concentration of PCB (greater than 500 mg/l) or a low concentration less than 500 mg/l). The spill of a low concentration mineral oil require that all visible traces of oil be removed, with a buffer of one lateral foot of excavation with the ground being restored to its original configuration. Spills of higher concentrated oil in soil require the cleanup of PCB's to 25 mg/l.

Review of the regulations reveled the following conditions. The EPA has regulatory authority over PCB spills. The regulations are based on environmental risk to groundwater, food supply, surface water contact and grazing land. Because the area is in a limited contact industrial area, the exposure pathways are limited.

The regulations define the requirements for cleanup in part 125. PCB waste must be properly stored, labeled and disposed of by a certified remediation contractor. The cleanup goal is 25 ppm (761.125(c) (ii). Because the sample was collected from the surface, there is a potential for greater concentrations to be present at depth. PCB spills require immediate cleanup. Based on the low concentration of PCB's no further action is recommended on these soils.

pete\kenai\mainshop\KMS 1998 Soil analytical.dwg
1=40



SB5 ☼ Soil boring
MW6 ✱ Monitor well
LP Light pole
KMS-S2 / KMS-SW1 ◉ 1997 Soil and water sample location
KMS-S4 / KMS-SW6 ◉ 1998 Stream soil and water sample location
○ 1998 Hand auger boring location
CV = Culvert sample
DS = Drum sample
HAB = Hand auger boring
Gravel pad boundary
26 Diesel-range organics value (mg/L)
2.73 PCB value (mg/L)
Area of magnetic survey

MAGNETIC NORTH
N
0 100' 200'

REVISIONS

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1998 Soil Sample Locations
And Analytical Results

American Environmental ENVIRONMENTAL CONSULTANTS
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SOLDOTNA AK 99669
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FAX (907) 260-6613

CITY OF KENAI MAINTENANCE SHOP

DATE	4/5/00
DRAWN	PC
CHECKED	PC
SCALE	AS SHOWN
PROJ NO.	99-5

FIGURE
4

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 REGULATORY REQUIREMENTS

The cleanup levels for this site are presented in Tables 2 through Table 7. The cleanup levels are adapted from the criteria contained in 18 AAC 75 (dated January 22, 1999), including the criteria for non-drinking water. The soil cleanup criteria are based on the inhalation criteria from the same source.

An assumption made is that the aquifer underlying the site is a non-drinking water source. This is based on a regulation of the City of Kenai that prohibits drinking water wells within the City where the municipal water system is available. All of the city's water supply needs are met by wells located several miles from the site.

5.2 DRUM DISPOSAL AREA

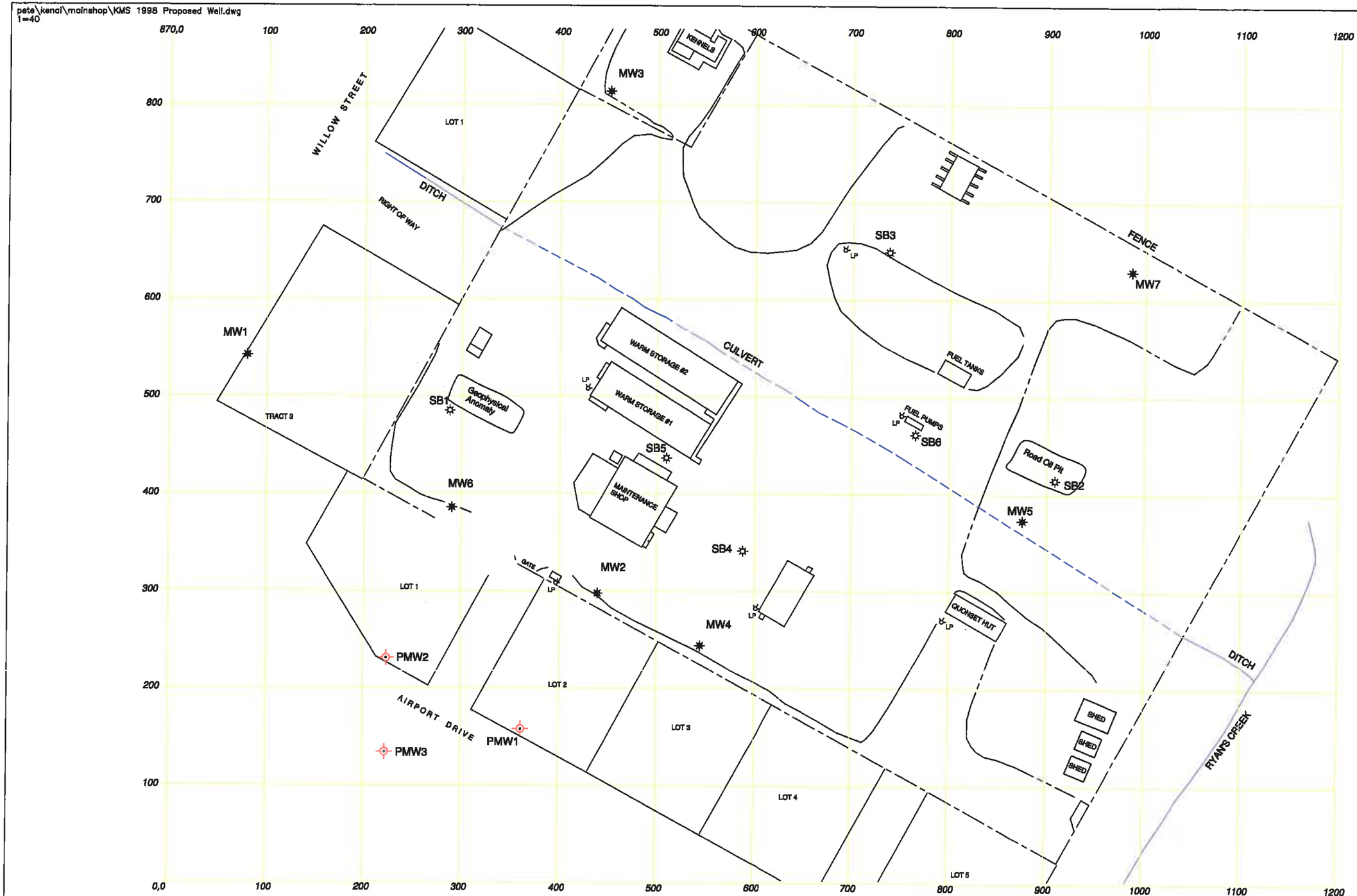
This area is near the southwest corner of the fenced property. The groundwater as measured in monitoring well MW-6 exceeds the States guidelines for DRO. The DRO concentrations have been measured at 52,100 µg/l in 1995 and 30,200 µg/l in 1998. The cleanup criteria for DRO in Groundwater is 15,000 µg/l with an exemption of ten times the specified amount if the groundwater is not used as a source for drinking water. One possible reason for the notable decrease in concentrations from 1995 to 1998 is a change in analytical methods, from EPA 8100 to AK103. Method AK 103 looks at a narrower range of hydrocarbons to quantify a value.

TCE concentrations in MW-6 have been measured at 6.4 µg/l in 1995 and 7.15 µg/l in 1998. The groundwater cleanup standard is 50 µg/l with the same ten time limit if groundwater is not a source of drinking water.

MW-6 is located at the south property line fence, with groundwater flowing to the south. Groundwater flow is transporting contaminated groundwater off site to the south for an unknown distance toward Airport Way. In order to further define the extent of groundwater contamination moving off site we recommend downgradient monitoring wells be installed. Proposed well locations are presented on Figure 5. A series of three wells downgradient from the site should delineate the groundwater plume. The wells would be sampled for parameters measured in this sampling event. There may be some problem distinguishing between contamination emanating from the old Carver property. Information gathered from the new wells will require analytical testing designed to distinguish between jet fuel and petroleum, including examination of the chromatograms

In addition to monitoring the City should pursue source removal with the military, who were the source of the drums. We also recommend that all site excavation activities be coordinated to have only one soil remediation event as a cost saving measure. An estimated 400 cubic yards of contaminated soil could be removed from the ground in the drum area. The drums will be an additional disposal cost. The drums may still contain liquids that may have to be removed, and the drums cleaned. One or more of the drums may contain a solvent that will make the development of a health and safety plan for excavation essential.

pete\kenai\mainshop\KMS 1998 Proposed Well.dwg
1=40



SB5 ☼ Soil boring
MW6 ✱ Monitor well
LP Light pole
PMW3 ⊙ Proposed Monitoring Well Location
——— Gravel pad boundary

MAGNETIC NORTH
N
0 100' 200'

REVISIONS

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Proposed Monitoring Well Locations

CITY OF KENAI MAINTENANCE SHOP

American Environmental ENVIRONMENTAL CONSULTANTS
35095 K-B DRIVE SUITE A
SOLDOTNA AK 99669
(907) 260-4744
FAX (907) 260-6619

DATE	4/5/00
DRAWN	PC
CHECKED	PC
SCALE	AS SHOWN
PROJ NO.	99-5

FIGURE
5

After soil removal, we recommend that groundwater monitoring continue for two years to determine the level of groundwater contamination prior to proceeding with any groundwater remediation. If groundwater remediation were found to be necessary, we recommend that the City examine the possibility of installing a lift station with a skimmer that would send water to the wastewater treatment plant among remedial alternatives.

5.3 MAINTENANCE SHOP DITCH AND RYAN CREEK AREA

It appears that the warm storage buildings are a potential source of some of the contamination at the ditch that crosses the site. Under conditions observed at the site, contamination does not appear to be moving far from the mouth of the culvert. However, a fence does not enclose this area, and evidence of human trespass was observed during the investigation. We would first recommend restricting access to the area by constructing a fence. This area along Ryan Creek also appeared to be a corridor for wildlife movement, so fence construction should not preclude wildlife passage.

It would be futile to excavate contaminated soil in Ryan Creek until the source of contamination is dealt with. The floor drains were inspected in the warm storage building. No evidence of ongoing contamination was evident. The City has discontinued cleaning vehicles in the warm storage buildings. There could be some volume of material in the lines that contributes to ditch contamination at periods of high flow, either from the warm storage building, precipitation or melt water.

Based on the information collected, there is a chance that the warm storage building is not the source of contamination. The culvert could be breached downgradient of the road oil pit, and groundwater could be transporting product from the old road oil pit into the ditch. There is no direct evidence, because MW-5 is appropriately located to detect product on the water table, and none is present. However, the material present at the ditch resembles the material in the road oil pit, heavy, black petroleum; despite the chromatic differences.

The City plans to connect the warm storage buildings to the City Sewer system. Other facilities within the Maintenance Shop will also be added to the City sewer at the same time. This would include the restroom within the maintenance shop and the floor drain in the maintenance shop. After these connections have been made would be the appropriate time to excavate contaminated soil from the ditch.

At the time of excavation, it may be appropriate to conduct some test pit excavation adjacent to the culvert to determine if any lateral contamination has occurred. In addition, if it is determined that the culvert is the source of contamination, it should be flushed with steam to clear the culvert of residual oil, beginning at the floor drain. The culvert would have to be lined with sorbent material and or an oil water separator.

The remediation contractor will have to develop a work plan to address cleaning the culvert, and trapping stream sediment and oil from moving downstream from the site. It should not require a great deal of excavation work to conduct remediation on the ditch. Grossly contaminated soils near the mouth of the culvert could be accomplished by removing as little as 40 cubic yards.

5.4 ROAD OIL PIT

The road oil pit located near the north east corner of the property contains at least a one foot thick layer of oil from five to six feet below ground level, based on the results of one boring. This material has not been sampled directly; laboratory samples were collected from the soil water interface approximately 9.5 feet BGL. The soils from below the product zone (SB-2) exceed the protection to groundwater criteria for benzene in a drinking water aquifer, but are well below the cleanup criteria for a non-drinking water source.

The DRO value from MW-5, which is located down gradient from the road oil pit, also exceeds the groundwater cleanup criteria for a drinking water source at 1,940 µg/l, but is well below the non-drinking water criteria of 15,000 µg/l. This well also contains TCE at 1.17 µg/l, which is below the cleanup criteria. Tetrachloroethylene (PCE), which was present in 1995 at 13.3 µg/l, and was not detected in the 1998 sampling event.

Because the road oil pit is an area of pure product that is close to the water table, the City is required to remove the material under Alaska Statute 18 AAC 325 (f). This should remove the source material that is causing contamination in MW-5. Monitoring of MW-5, along with the other site wells, should then be undertaken in the long term.

5.5 MAINTENANCE SHOP LOG CRIB

The maintenance shop log crib has not been sampled directly. The crib is connected to the floor drain of the shop. Monitoring well MW-2 was installed downgradient from the crib at the shallow water table. The DRO concentrations have risen significantly from 1,540 µg/l in 1995 to 4,340 µg/l in 1998. The DRO groundwater cleanup criteria is 15,000 µg/l. The log crib source has not been sampled directly, but an assumption can be made that because the groundwater concentrations at this well location are elevated, that the log crib source exceeds the protection to groundwater standards. It is possible, but not likely based on the evidence, that the log crib is not the source of MW-2 contamination.

As discussed earlier, the City is planning to connect the maintenance shop to the sewer system. At that time, we recommend that the City remove the log crib, piping, and contaminated soils associated with the outfall. Work planned in connecting the shop facilities to the sewer system will necessitate digging through potentially contaminated areas. Any subsurface work done in this area should have a health and safety plan in place, and be prepared to encounter contaminated soils. It is likely that some contaminated soil would be encountered if the log crib were removed.

5.6 SOIL STOCKPILE

A contaminated soil stockpile remains on site from the Kenai Airport UST removal. Approximately 200 cubic yards have been stored under plastic. This material is stored in the area of the buried drums near MW-6. In addition, purge water from the monitoring well development is also stored in drums in the same area. This area is suitable for maintaining stockpiles prior to remediation for that reason.

Additional stockpiles generated from excavation work may also be stored here, however, considering the length of storage, the material should be transferred to a more suitable liner material.

5.7 GENERAL RECOMMENDATIONS

The City could do a risk-based assessment of the property, examining the risk of leaving contamination in place. The work that has been conducted up to this point provides the basis of a risk assessment, but the risk assessment is typically a very costly procedure. The City may want to proceed with a risk assessment prior to removing identified contamination, in anticipation of leaving the material undisturbed. This could theoretically save the City some money, if contamination could be left in place. However, the regulations do stipulate that grossly contaminated materials be removed.

Prior to conducting contaminant removal, the City may wish to collect additional soil samples and test the soil for organic content. Organic material present in the soil can be factored into an equation that will allow a higher cleanup level at the site. This could be a factor in minimizing the amount of contaminated soil removed from the ground.

The elevation of the underground utilities was not examined in this investigation. It is possible that contaminants floating on the surface of the water table could make their way into the utility corridors. The utility corridors were inspected in 1995 and no sign of contaminates were observed. Diesel fuel, the primary contaminant is not particularly explosive, but vapors in the utilidor could cause problems by spreading contaminants.

The City does not allow domestic water wells within the City water system service area. Wells have been installed in the past. A business and residential water well survey should be conducted in the area, to assure that the water is not being used for potable water.

It has been demonstrated that PCBs are present on site. If any excavation work is conducted near the electrical shop, work plans should be developed to deal with unexpected subsurface contamination.

The downgradient extent of contamination is not known. The depth of contamination has not been determined at the site. All of the existing monitoring wells intersect the shallow watertable, and do not extend to the base of the surficial aquifer. Based on geologic records, it is assumed that the surficial aquifer could be up to three hundred feet thick. Because of the presence of chlorinated solvents, and their behavior in the aquifer as a heavy compound, it would be prudent to explore deeper pars of the aquifer to determine if a significant quantity of material is present.

6. CONCLUSIONS

Four areas within the Maintenance Shop property, the drum disposal area, the shop floor drain system, the road oil pit and the culvert appear to be contributing to contamination that will need to be addressed under the 1999 ADEC environmental regulations.

Groundwater contours based on new elevation data depict the groundwater flowing to the south-southeast. This correlates well with the data acquired from the Halliburton site south of the maintenance shop and the airport site west of the maintenance shop.

Two water-sampling locations had DRO concentrations that exceeded the cleanup criteria. Monitor well sampling indicated that MW-6 has diesel range contamination in the groundwater that exceeds the states cleanup criteria, in addition to a broad spectrum of other contaminants, including chlorinated solvents and gasoline range organics, that do not exceed the cleanup criteria. A water sample collected from the outfall of the culvert exiting the site (SW-5) also had elevated levels of diesel range organics that did not meet the groundwater criteria. Water samples collected downstream of the sample location met the cleanup criteria.

ADEC regulations have allowed greater concentrations of contamination in the soil and groundwater if no risk is posed to health and environment. The cleanup levels are presented on Tables 2 through 7. The regulations do require that the source of the contamination be removed, and product cannot be left in place. The areas that will require attention under this regulatory clause are 1) the drum disposal area, 2) the maintenance shop ditch and Ryan Creek, 3) Road oil pit. It appears that the maintenance shop floor drain is not a source of product. However, when the floor drain is connected to the City sewer system, the City should be prepared to encounter contaminated soils that may pose a significant health risk during excavation. Excavation work conducted in this area should be considered a hazardous waste operation.

The source of TCE in MW-5 is not known. Two or more potential sources are possible; one source may be the road oil pit, which may have had some indiscriminate waste placed into the pit, or had solvents associated with the oil. Another potential source could be effluent from the culvert. No solvents have been directly associated with the culvert or the warm storage building, but solvents were potentially used in the buildings at some point in time. No other up gradient source of chlorinated solvents has been identified, but there are potential sources.

The drums located on the surface of the ground east of the property and along Ryan Creek do not appear to pose any threat to the environment. Field screening and soils sampling were conducted in the soils adjacent to the drums located on the ground surface. No trace of contamination was detected.

It also appears that surficial concentrations of PCB contamination do not require cleanup. Other PCB deposits were not encountered. However, because PCB's were detected at the site, the City should consider advising employees of the possible presence of PCB contaminated soil. If during maintenance operations at the site, oil stained soils are encountered in the area of the old electrical shop, proper actions should be taken.

Groundwater concentrations exceeding the cleanup criteria are moving off the property, and the extent of that movement has not been determined. The City will be required by ADEC to determine the extent of contamination leaving the property. In addition, if the concentrations leaving the property exceed the cleanup criteria, the City may be required to address the groundwater contamination.

The City is prepared to begin work on removal of the road oil pit and the drums buried west of the maintenance shop as the City Council appropriates funds. Work on the warm storage floor drains, and maintenance shop log crib will be conducted as the new shop facilities are constructed.

6.1 INVESTIGATION DERIVED WASTE

Purge water from monitoring well sampling is stored in a 55-gallon drum located at the maintenance shop will require remediation. The development water can be disposed of at various locations in Anchorage.

Drill cuttings from the monitoring well installation are also stored in drums on the Maintenance Shop property. This material may be added to stockpiles on the site when the soils are treated for disposal.

7.0 LIMITATIONS

This report was prepared for the sole purpose of determining current environmental conditions at the site and is presented based on our understanding of the site history and information collected during our field investigation. The information and data supplied by others, which have been considered in this report, are from sources believed to be reliable, but no further responsibility is assumed for their accuracy.

Due to the variable nature of site soils and geology, and the lack of a complete record of previous site activities, subsurface conditions may vary from the information presented in this report. Users of this report are cautioned that any investigation is necessarily limited in extent and cannot include all possibilities. Special risks occur, and guarantees cannot be expected, whenever professional consulting services are applied to determine the composition of a site's subsurface or the existence or non-existence of hazardous substances. We cannot eliminate uncertainties altogether, but have applied good professional practice to reduce the uncertainties and believe our investigation fairly represents the site.

8.0 REFERENCES

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