

**KENAI AIRPORT FUEL SERVICE
UST REMOVAL SITE ASSESSMENT
Kenai Airport
Kenai, Alaska**

RECEIVED

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**DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
KDO**

Prepared For:

**Kenai Airport Fuel Service
Kenai Airport
403 N. Willow #1
Kenai Alaska 99611**

Prepared by:

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**Northern Test Lab
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**Project No. 91189
January 1994**

Northern Test Lab

February 3, 1994

#91189

Dan Pitts
Kenai Airport Fuel Service
403 North Willow #1
Kenai Alaska

Re: Kenai Airport fuel Service UST Removal, ADEC Spill # 90-23-01-268-01

Dan:

Enclosed are two copies of our report of the underground storage tank removal for the Kenai Airport Fuel Service facility in Kenai, Alaska. The report has been compiled in accordance with our standard procedures. Fuel contamination was encountered in the tank removal. ADEC assigned a spill number to the project, # 90-23-01-268-01.

If you have any questions regarding this project please contact our office.

Sincerely,



Peter Campbell
Environmental Scientist

c: ADEC
City of Kenai

Enclosure
Report

keniapfs\kafsust.008

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SUMMARY

In our initial site assessment (December 1991) our subsurface investigation indicated the presence of contamination extending to the water table. The tank removal project was delayed until October 1993 while the tank owners secured funding from the State of Alaska Board of Storage Tank Assistance.

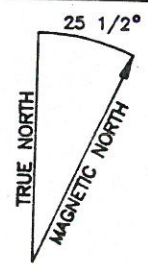
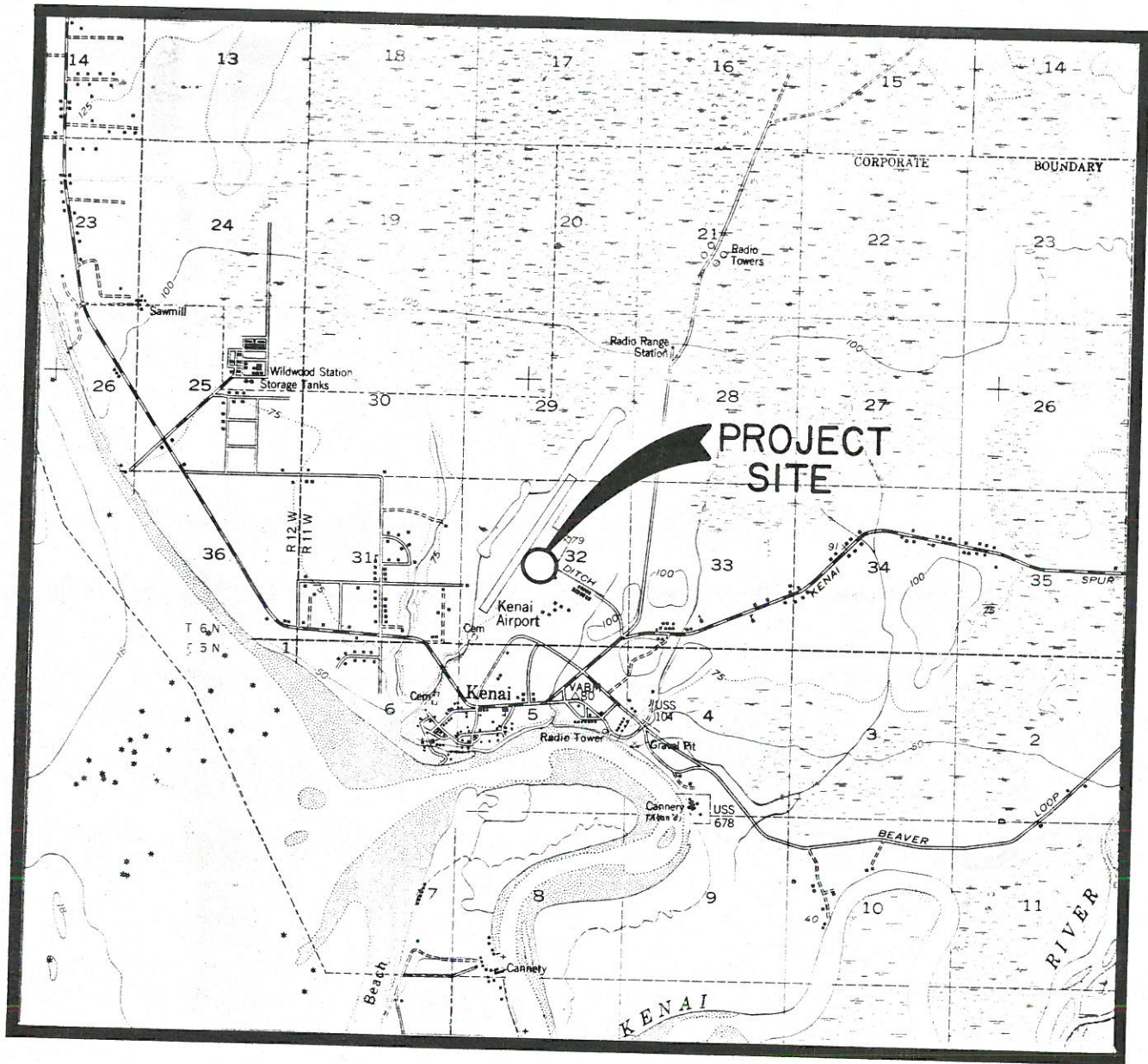
As the tanks were removed from the ground, significant soils and groundwater contamination were encountered. The source of the fuel appeared to be from surface spills and leaking pipes. Soils removed from the excavation were stockpiled on site, and product floating on the water table was skimmed off.

1. INTRODUCTION

1.1 BACKGROUND

Northern Test Lab (NTL) was retained by Kenai Airport Fuel Service to conduct a sampling program associated with the removal of four underground storage tanks (UST) at the airport facility in Kenai, Alaska. See Figure 1: Topographic Site Location Map. The USTs, three 10,000 gallon tanks and one 1,000 gallon tank are located between the Kenai Airport terminal and the air traffic control tower. The facility is used to fuel airplanes and is located next to Alaska Flying Network. The 10,000 gallon tanks contained jet aviation fuel, aviation gasoline, and 100 low lead, and the 1,000 gallon tank contained regular unleaded gasoline.

In the initial investigation (December 1991) NTL was contacted to conduct soil sampling in the area of the USTs after two fuel spills had been reported at the facility. Other releases of fuel may have occurred from overfills of the tanks in the past. Because of the nature of the various activities at the airport, with many sources of fuel, there is a potential for offsite sources of contamination. B.C. Excavating of Anchorage, Alaska was retained as the excavation contractor.



APPROXIMATE
MEAN
DECLINATION,
1951

TOPOGRAPHIC SITE LOCATION MAP
KENAI AIRPORT FUEL SERVICE
SE 1/4, NW 1/4, SEC. 32, T6N, R11W S.M.
ADAPTED FROM USGS 1951 15' TOPOGRAPHIC QUADRANGLE
KENAI (C-4), ALASKA



1.2 SCOPE OF WORK

NTL was contracted by Kenai Airport Fuel Service to develop and implement a site assessment in association with the USTs. This report covers the collection of soil and water samples with analytical tests to accomplish the following objectives:

- Supervise the removal of the USTs
- Determine if contamination is present from the USTs;
- Determine if any additional investigation of site characteristics is necessary.

2. FIELD INVESTIGATION

2.1 SITE INVESTIGATION METHODS

An organic vapor monitor (OVM) is our primary screening device for field analytic results. Our 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 isobutylane is used to program the machine. The OVM is calibrated each time it is turned on.

The OVM measures volatile organic vapors present in the atmosphere. The OVM readings are not a direct measure of soil contamination, but an indicator of relative soil contamination.

The OVM was calibrated to 99.7 ppm Isobutylane and kept on site to screen soils during excavation. The OVM along with visual observations and odors observed in the soil are combined in making decisions in the field on how far to proceed with the excavation of contaminated soil.

Samples were collected from the excavation with laboratory decontaminated trowels and stored in 250 ml amber glass bottles on blue ice for transport to the laboratory. Soils were screened with an OVM. Periodically through the day the OVM is checked against the calibration gas to determine if the accuracy of the machine is maintained. If a discrepancy is noted in the check the instrument is recalibrated.

Soil samples were collected to confirm the presence or absence of petroleum contaminants remaining in the excavation. These results are included in our report and used to make recommendations on further investigations. Table 1: Soil Testing

decision Matrix, is used to determine which analytical tests are to be used in each tank investigation.

PARAMETER / METHOD	GASOLINE		NON-REFINED / DIESEL	CRUDE OIL	UNKNOWN
	LEADED	UNLEADED			
EPH / 8100	NO	NO	YES	YES	YES
VPH / Modified 8015 ¹	YES	YES	NO	NO	YES
BTEX / 8020	YES	YES	NO	YES	YES
METALS Arsenic	NO	NO	NO	NO	YES
Chromium	NO	NO	NO	NO	YES
Lead	YES	NO	NO	NO	YES
TOTAL HALOGENS / 8010	NO	NO	NO	NO	YES

¹ As modified by Chem Lab.

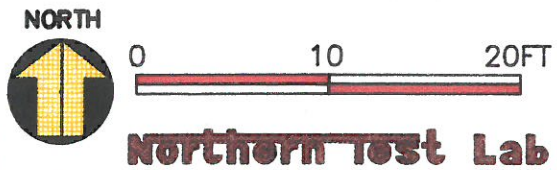
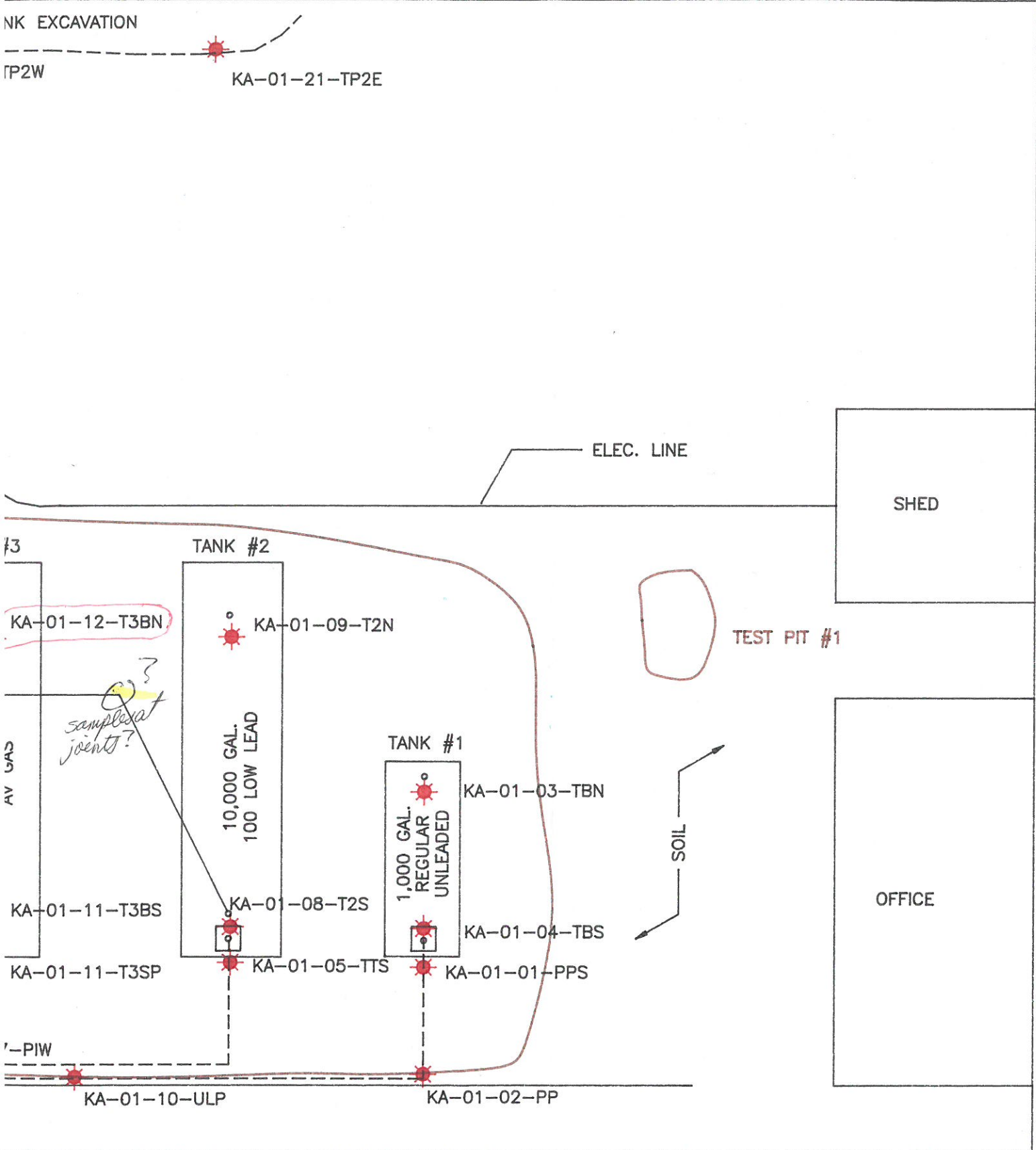
Table 1: Soil Testing Decision Matrix

2.2 SITE INVESTIGATION

2.2.1 Tank Removal

The tank removal began October 18, 1993; weather 40°F, clear skies. The first tank to be removed was the 1000 gallon unleaded fuel tank on the north side of the tank farm (see Figure #2: Site Location Map). As the tank excavation was started soils were screened with the OVM. At 2' below ground level (BGL) on the east side of the tank OVM readings from headspace soil samples indicated 231 ppm. This material was stockpiled on 20 mil Novathene. Sample KA-01-01-PPS was collected from 6" below the tank top on the south end of the tank. OVM readings from this sample location indicated 550 ppm. See Figure 2: Sample Location Map. This sample was not analyzed.

The tank top was exposed and vent lines were configured for tank purging. The excavation continued on the east side of the tank and the south end of the tank. A second soil sample was collected 9' south of the south end of the tank below



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 REVISED: 2-1-94
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 PROJECT NO.: 91189
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KENAI AIRPORT
 FUEL SERVICE
 SAMPLE LOCATION MAP
 KENAI AIRPORT
 KENAI, ALASKA

FIGURE
 #2

pipng to the pump island. Sample KA-01-02-PP was from 2.5' BGL and had an OVM reading of 254 ppm (see Figure 2). This sample was not analyzed.

As venting continued on Tank #1, we began excavating on the east side of Tank #2. See Photo #1: Tank Layout



Photo #1: Tank Layout

Tank #1 was removed at 13:30 on November 18, 1993 when the gas vapors in the tank reached less than 2% of the LEL. A soil sample KA-01-03-TBN, was collected from the north end of the tank base excavation, 4.9' BGL. Sample results are presented in Table #2: Tank #1 Soil Sample Results. Sample KA-01-04-TBS was collected from the southern end of the tank excavation. Complete sample results are presented in Appendix A: Laboratory Sample Results

Sample KF-01-05-TTS was collected from the south end of Tank #2, approximately 6" BGL, below the suction piping. OVM readings from this area were 210 ppm. This sample was not analyzed.

SAMPLE No.	LOCATION	PARAMETERS	ANALYTIC RESULTS	OVM READING
KA-01-09-T2N	NORTH TANK BASE 8' BGL	EPA 8015 EPA 8020	10,100 ppm VPH 87.6 ppm BENZENE 1630 ppm TOLUENE 161 ppm ETHYLBENZENE 441 ppm p&m XYLENE 271 ppm o-XYLENE	87 ppm
KA-02-09-T2N	NORTH TANK BASE 8' BGL	EPA 8100	52.7 ppm EPH	87 ppm

Table 3: Tank #2 Soil Sample Results

Tank #2 was inspected and no direct evidence of leaking was identified. Minor pitting was noted on the tank, but no breach was identified. The tank was in good condition. However, every joint examined in the underground piping network appeared to be a source of contamination. See Photo #3: Product Piping Sample Location. Fuel can be seen leaking from the pipe joint. Soil sample KF-01-10-ULP was collected from this area, which was the unleaded fuel tank pump piping. The soils adjoining the tanks were grossly contaminated, with strong fuel odors emanating from the excavated soils.

Sample KF-01-11-T3SP was collected from below the pump piping at the south end of Tank #3, approximately 1.5' BGL. OVM readings were 157 ppm from this sample. This sample was not analyzed.

2.2.2 Tank Removal 10/19/93

Weather at 8:30 A.M. : 30 Degrees F., winds north at 5 knots, partly cloudy. Site safety meeting held. OVM readings in the breathing zone were 4.2 ppm. Personnel on site were advised to work on the upwind side of the site whenever possible.

Surficial soils were removed from Tank #3 and the north end of the tank was raised to allow fuel to flow to the lower part of the tank. The fuel was pumped out and transferred to one of the fuel trucks. The tank was purged with compressed air. While the tank was purging the pump islands were disassembled and drained of fuel.

Tank #3 was removed from the ground at 12:30 P.M. Sample KA-01-11-T3BN was collected from the south excavation base. Sample results for this location are presented in Table #4: Tank #3 Excavation Base Soil Sample Results.



Photo #3: Product Piping Sample Location

SAMPLE No.	LOCATION	PARAMETERS	ANALYTIC RESULTS	OVN READING
KA-01-11-T3BS	TANK 3 BASE SOUTH 8' BGL	EPA 8015 EPA 8020	134 ppm VPH 2.00 ppm BENZENE 3.07 ppm TOLUENE 4.08 ppm ETHYLBENZENE 20.6 ppm p&m XYLENE 11.3 ppm o-XYLENE	641 ppm
KA-02-11-T3BS	TANK 3 BASE SOUTH 8' BGL	EPA 8100	23.4 ppm EPH	641 ppm
KA01-12-T3BN	TANK 3 BASE NORTH 8' BGL	EPA 8015 EPA 8020	28,800 ppm VPH 962 ppm BENZENE 5260 ppm TOLUENE 1060 ppm ETHYLBENZENE 3740 ppm p&m XYLENE 1600 ppm o-XYLENE	153 ppm
KA02-12-T3BN	TANK 3 BASE NORTH 8' BGL	EPA 8100	547 ppm EPH	153 ppm

Table 4: Tank #3 Excavation Base Soil Sample Results

Tank #3 also appeared to be intact and in good condition. The surficial soils above the water table had very strong petroleum odors and elevated OVM readings, while the water saturated soils had relatively low OVM readings.

Tank #4 excavation began on the south end of the tank at the pump piping.

sample not analyzed

Sample KF-01-13-T4PI was collected from the pump piping at the top of the tank, approximately 2' BGL. The pump piping (threaded galvanized pipe) appeared to be leaking at all of the joints. OVM readings from this sample were 166 ppm.

Additional samples were collected from this pump piping at each joint to the pump island. Sample KF-01-14-T4P2 at 2' BGL had an OVM reading of 216 ppm. Sample KF-01-15-T4P2 at 2' BGL was collected below the pump island and had an OVM reading of 264 ppm. Fuel odors were very strong in all of the soils removed in this area, and respirators were necessary to conduct the work.

Sample KF-01-16-PI3 was collected from Pump Island #3 at 1' BGL with an OVM reading of 364 ppm. As the soils were removed from the ground they were transferred to the soil stockpile for containment. The pump islands were dismantled, drained into drums and the fuel transferred to fuel trucks.

Samples 13,14,15,16, and 17 were not analyzed. These samples were collected to characterize stockpiled materials.

After the pump equipment was dismantled and removed from the area, surficial soils were removed from Tank #4. The tank was elevated on one end and fuel was removed from the tank and pumped into Kenai Airport Fuel Service fuel trucks. The tank was vapor purged and removed from the ground, and samples were collected from each end of the tank excavation base.

Sample KF-01-17-T4BS was collected from 8' BGL at the south end of Tank #4. OVM readings from this soil sample were 646 ppm. Sample KF-01-18-T4BN was collected from the north end of the tank excavation at 8' BGL. Sample results are presented in Table 5: Tank #4 Excavation Base Soil Sample Results.

SAMPLE No.	LOCATION	PARAMETERS	ANALYTIC RESULTS	OVM READING
KA01-18-T4BN	TANK 4 BASE NORTH 8' BGL	EPA 8015 EPA 8020	18,900 ppm VPH 255 ppm BENZENE 3,810 ppm TOLUENE 917 ppm ETHYLBENZENE 3,330 ppm p&m XYLENE 1,460 ppm o-XYLENE	606 ppm
KA02-18-T4BN	TANK 4 BASE NORTH 8' BGL	EPA 8100	1,300 ppm EPH	606 ppm

Table 5: Tank #4 Excavation Base Soil Sample Results

3. EXCAVATION CLEANUP

After the four tanks had been removed from the ground, and the associated pump equipment had been dismantled and removed, the excavation was expanded to remove grossly contaminated soils. As the soils were removed from the excavation they were screened with the OVM to characterize material being stockpiled. OVM readings on the side wall ranged from a low of 110 ppm 4' BGL to 673 at the base of the excavation. Sample KA-01-19-SP1 was collected from this material to characterize stockpiled material. This sample was not analyzed.

10/20/93

Paul Horwath and Monica English of the Kenai District office of ADEC arrived on site, and requested a corrective action plan be submitted as soon as possible which would involve a drilling and product recovery plan.

The three 10,000 gallon tanks from the site had the ends cut out and were loaded onto a flat bed truck. The tanks were taken to Redoubt Tool Rental in Nikiski for scrap recovery. The 1,000 gallon tank was removed from the site by the tank owners.

Free product was entering the excavation from the excavation sidewalls at the watertable. One of our first goals was free product recovery. The fuel contaminated soils were removed to approximately one foot below the water table. Free product was then captured using sorbent material as a boom. See Photo #4: Free Product Recovery.

Approximately 600 gallons of free product was then skimmed off the water surface into a pumper truck owned by Chumley's, and hauled to Tesoro Refinery in Nikiski for disposal. Tesoro refused to accept the material, it was kept in one of Chumley's trucks, until the truck was called to Kenai Pipe Line Company where it was pumped into a recovered oil tank so the truck could be used for other purposes. After the free product had been removed, product continued to leach into the excavation from the southwest and south sidewall and from the area under Pump Island #3. See Photo #5: Leaching fuel.

A thick oily substance was leaching into the excavation from the south side wall near the end of Tank 2. See Photo 6: Leaching product and ice on water surface. Additional attempts were made on 10/23/93 to capture petroleum on the excavation water surface. Boom material was drawn across the water surface and then wrung out into a fifty-five gallon drum. Approximately 25 gallons of product was captured. After the water surface was skimmed with the boom material, a water sample was collected to characterize water in the excavation. A sample was collected by immersing a disposable bailer into the water and transferring the sample into the appropriate container. Sample results are presented in Table 6: Excavation Base Water Sample.



Photo #4: Free Product Recovery

SAMPLE No.	LOCATION	PARAMETERS	ANALYTIC RESULTS
KA-01-22-EBW	EXCAVATION BASE WATER	EPA 602	24.4 ppm BENZENE 0,900 ppm 96.4 ppm TOLUENE 18.6 ppm ETHYLBENZENE 69.8 ppm p&m XYLENE 32.6 ppm o-XYLENE
KA-02-22-EBW	EXCAVATION BASE WATER	EPA 8100	7,910 ppm EPH

Table 6: Excavation Base Water Sample

The excavation for the new tanks, approximately forty feet north of the tank removal excavation, was sampled. The new tank excavation was approximately 8' deep which extended to the water surface, 30' wide, and 50' long. Soil samples were collected from the soil, just above the water surface. One sample was collected from each end of the southern sidewall. Sample results are presented in Table 7: New Tank Excavation Sample Results.

SAMPLE No.	LOCATION	PARAMETERS	ANALYTIC RESULTS	OVM READING
KA-01-20-TP2W	NEW TANK EXCAVATION WEST BASE SOUTH 8' BGL	EPA 8015 EPA 8020	0.66 ppm VPH 0.02 ppm BENZENE 0.028 ppm TOLUENE 0.025 ppm p&m XYLENE	0.2 ppm
KA-02-20-TP2W	NEW TANK EXCAVATION WEST BASE SOUTH 8' BGL	EPA 8100	ND EPH	0.2 ppm
KA-01-21-TP2E	NEW TANKECAVATION EAST BASE SOUTH 8' BGL	EPA 8015 EPA 8020	1.66 ppm VPH 0.036 ppm BENZENE 0.383 ppm TOLUENE 0.071 ppm ETHYLBENZENE 0.251 ppm p&m XYLENE 0.098 ppm o-XYLENE	0.2 ppm
KA-02-21-TP2E	NEW TANK EXCAVATION EAST BASE SOUTH 8' BGL	EPA 8100	ND EPH	0.2 ppm

Table 7: New Tank Excavation Sample Results



Photo #5: Leaching Fuel



Photo #6: Leaching Product and Ice on Water Surface

Twenty two samples were collected for analysis and sent to Commercial Testing and Engineering; the decision was made by others to not test twelve of these samples and they were discarded. ?

4. GEOLOGY AND HYDROGEOLOGY

4.1 GEOLOGIC SETTING

According to the USGS 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. The area is characterized by proglacial lake deposits, windblown sands and silts, swamps and poorly integrated drainage patterns.

4.2 SUBSURFACE LITHOLOGY

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 fine to medium sand, brown, with no gravel.

4.3 GROUNDWATER

We observed groundwater at approximately 6.5 to 7 feet BGL in the area of the fuel tanks. Drinking water in the area is provided by municipal wells several miles from the site. We are not aware of any water supply wells near the airport. Little is known about site specific direction of groundwater flow at this time. Based on other investigations at the airport and knowledge of the area, groundwater appears to flow to the south. Groundwater tends to be deeper south of the site. Monitor wells would be required to determine actual flow direction at the site.

5. SOIL AND GROUNDWATER CONTAMINATION

5.1 Matrix Score

The following table presents the ADEC matrix score for the Kenai Airport Fuel Service Site.

DEPTH TO SUBSURFACE WATER: 5-15 FEET	8	10
MEAN ANNUAL PRECIPITATION: 15-25 INCHES	3	
SOIL TYPE: CLEAN, COARSE GRAINED SOILS	10	
POTENTIAL RECEPTORS: NO KNOWN WELL WITHIN 1 MILE	4	
VOLUME OF CONTAMINATED SOIL: >500 CUBIC YARDS	10	
TOTAL MATRIX SCORE:	35	

Table 8: Matrix Score

With a score of 35 for soil contamination, the site would fall into the Level B category. The matrix score cleanup levels are presented in Table 9: Cleanup Levels.

MATRIX SCORE	CLEANUP LEVEL IN mg/kg (ppm)			
	DIESEL	GASOLINE/UNKNOWN		
	DIESEL RANGE PETROLEUM HYDROCARBONS	GASOLINE RANGE PETROLEUM HYDROCARBONS	BENZENE	BTEX
LEVEL A >40	100	50	0.1	10
LEVEL B 27-40	200	100	0.5	15
LEVEL C 21-26	1000	500	0.5	50
LEVEL D <20	2000	1000	0.5	100

Table 9: Cleanup Levels

At a matrix score of 35 (Level B), diesel fuel contaminated soils would have to be cleaned up to 200 ppm, gasoline contaminated soils cleaned up to 100 ppm, and benzene to 0.5 ppm.

6. CLOSURE

This report was prepared for the sole purpose of determining current environmental conditions at the sites and is presented based on our understanding of the site history and information collected in 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. Special risks occur 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 to a reasonable level and believe our investigation fairly represents the site.

7. BIBLIOGRAPHY

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Soil Survey Kenai-Kasilof Area Alaska, United States Department of Agriculture Soil Conservation Service in cooperation with Alaska Agricultural Experiment Station, Series 1958, No. 20 Issued June 1962