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Elmendorf AFB, Alaska

Final

Remedial Investigation Report
Galena Airport and Campion Air Station

Volume 1—Text

March 1996

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13. ABSTRACT (Maximum 200 words)

The U.S. Air Force has conducted a remedial investigation (RI) at Galena Airport and Campion AS, Alaska. This report summarizes the activities and findings of the investigation and recommends future activities at these installations. The information gained from the RI has been used to support a baseline risk assessment, under separate cover.

The RI has included several sites at Galena Airport: the Fire Protection Training Area (FT001); the POL Tank Farm (ST005); the Waste Accumulation Area (SS006); the West Unit (ST009) (composed of several source areas); the Control Tower Drum Storage Area South (SS013); the Drums, Perimeter Dike (SS007); the Southeast Runway Fuel Spill (ST010); the Alternate Landfill (LF011); and the Southwest Dump (LF012). One site—the POL Area (ST007)—has been investigated at Campion AS as part of the RI. Three other sites at Campion AS—the Barge Landing Area (SS008), Waste Accumulation Area No. 2 (SS003), and White Alice Site (OT006)—were investigated in support of proposed NFRAP status.

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DISCLAIMER

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This report has been prepared for the United States Air Force by Radian Corporation for the purpose of aiding implementation of a final remedial action plan under the Air Force Installation Restoration Program (IRP). Since the report relates to actual or possible releases of potentially hazardous substances, its release before an Air Force final decision on remedial action may be in the public's interest. The limited objectives of this report and the ongoing nature of the IRP, along with the evolving knowledge of site conditions and the chemical effects on the environment and health, must be considered when evaluating the report, since subsequent facts may become known that may make this report premature or inaccurate.

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NOTICE OF DOCUMENT UPDATE

22 March 1996

This final Remedial Investigation report has been updated to include information gathered during 1995.

- Volume 1, which contains the main body of the report, has been completely updated and finalized and should replace any draft versions of Volume 1.

- Volumes 2 through 6, which include Appendices A through G, have not changed.

- Volume 7 is new and includes the 1995 analytical data (Appendix A.1), the 1995 QA/QC report (Appendix B.1), and the 1995 field documents (Appendix E.1). All of these addenda to earlier appendices may be left in Volume 7, or, in the case of Appendix A.1 and Appendix E.1, inserted in the appropriate locations of Volumes 2 and 6. Appendix B.1 is too large to be added to Appendix B, and should therefore be left in Volume 7.

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LIST OF ACRONYMS

ABAL	areas below action levels
AFB	Air Force Base
AFS	Air Force Station
AH	aromatic hydrocarbons
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
AS	Air Station
bgl	below ground level
BLM	Bureau of Land Management
BTEX	benzene, toluene, ethylbenzene, xylene
BTX	benzene, toluene, xylene
CAT	hydrocarbon analyzer with catalytic detector
CEOS	Civil Engineering Operations Squadron
CES	Civil Engineer Squadron
cm/sec	centimeters per second
DDT	dichlorodiphenyl trichloroethane
DERA	Defense Environmental Restoration Account
DoD	Department of Defense
DOT	Department of Transportation
DPT	Direct-Push Technology
DRO	diesel range organics
DSA	drum storage area
EPA	Environmental Protection Agency
FID	flame ionization detector
ft	foot or feet
GRO	gasoline range organics
in.	inch or inches
IR	infrared
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
µg/L	micrograms per liter
mg/L	milligrams per liter
MSL	mean sea level
NFAD	No Further Action Decision
NFRA	No Further Response Action

LIST OF ACRONYMS

NFRAP	No Further Response Action Planned
OVM	organic vapor monitor
PA	preliminary assessment
PCBs	polychlorinated biphenyls
PID	photoionization detector
PNAs	polynuclear aromatic hydrocarbons
POL	petroleum, oils, and lubricants
ppb	parts per billion
ppm	parts per million
ppmV	parts per million by volume
RBC	risk-based criteria
RI	Remedial Investigation
RRS	radio relay station
SI	site inspection
SQL	sample quantitation limit
SVOC	semivolatile organic compound
TPH	total petroleum hydrocarbons
USACE	United States Army Corps of Engineers
USAF	United States Air Force
UST	underground storage tank
UTL	upper tolerance limit
VOC	volatile organic compound
°F	degrees Fahrenheit

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EXECUTIVE SUMMARY

The U.S. Air Force (USAF) has conducted a Remedial Investigation (RI) at the Galena Airport (formerly Galena Air Force Station) and Campion Air Station (AS), Alaska. The objectives of this study were to evaluate potential environmental contamination at these two facilities and to develop remedial actions consistent with the National Contingency Plan (NCP) for all sites that pose a threat to human health and welfare or to the environment.

The purpose of this report is to summarize the activities and findings of the investigation and, on the basis of this information, make recommendations on future activities at the Galena Airport and Campion AS sites. Information from the RI at these sites was also used to support a baseline risk assessment. The results of this risk assessment are reported in the *Baseline Risk Assessment Report, Galena Airport, Alaska* (USAF, 1996).

Background

The RI results presented in this report are from investigation activities conducted at the Galena Airport and Campion AS during 1992, 1993, 1994, and 1995. Additional information was gathered from previous investigations at these sites (USAF, 1989a, 1991). Nine sites, shown in Figure ES-1, were investigated at the Galena Airport:

- Fire Protection Training Area (FT001);
- POL Tank Farm (ST005);
- West Unit (ST009), composed of seven source areas:
  - Waste Accumulation Area (SS006—previously defined site);
  - Million Gallon Hill;
  - Power Plant UST #49;
  - JP-4 Fillstands;
  - Building 1845 (Vehicle Maintenance Building);
  - Building 1700 (Refueling Vehicle Maintenance Building); and
  - Building 1850.
- Control Tower Drum Storage Area South (SS013);
- Drums, Perimeter Dike (SS007);
- Southeast Runway Fuel Spill (ST010);
- Alternate Landfill (LF011); and
- Southwest Dump (LF012).

In addition to these sites, the Galena Airport and community water supply wells have been sampled during the RI, and the results to date are presented in this report. Pesticides, which occur throughout the Galena area, are discussed for the entire airport facility rather than site by site.

Several sites have been investigated during previous RI activities at Campion AS. However, only one site—POL Area (ST007)—was investigated as part of the RI during 1992 and 1993. Three other Campion AS sites received limited investigation to support proposed No Further Response Action Planned (NFRAP) status. These sites are the following:

- Barge Loading Area (SS008);
- White Alice Site (SS006); and
- Waste Accumulation Area No. 2 (SS003).

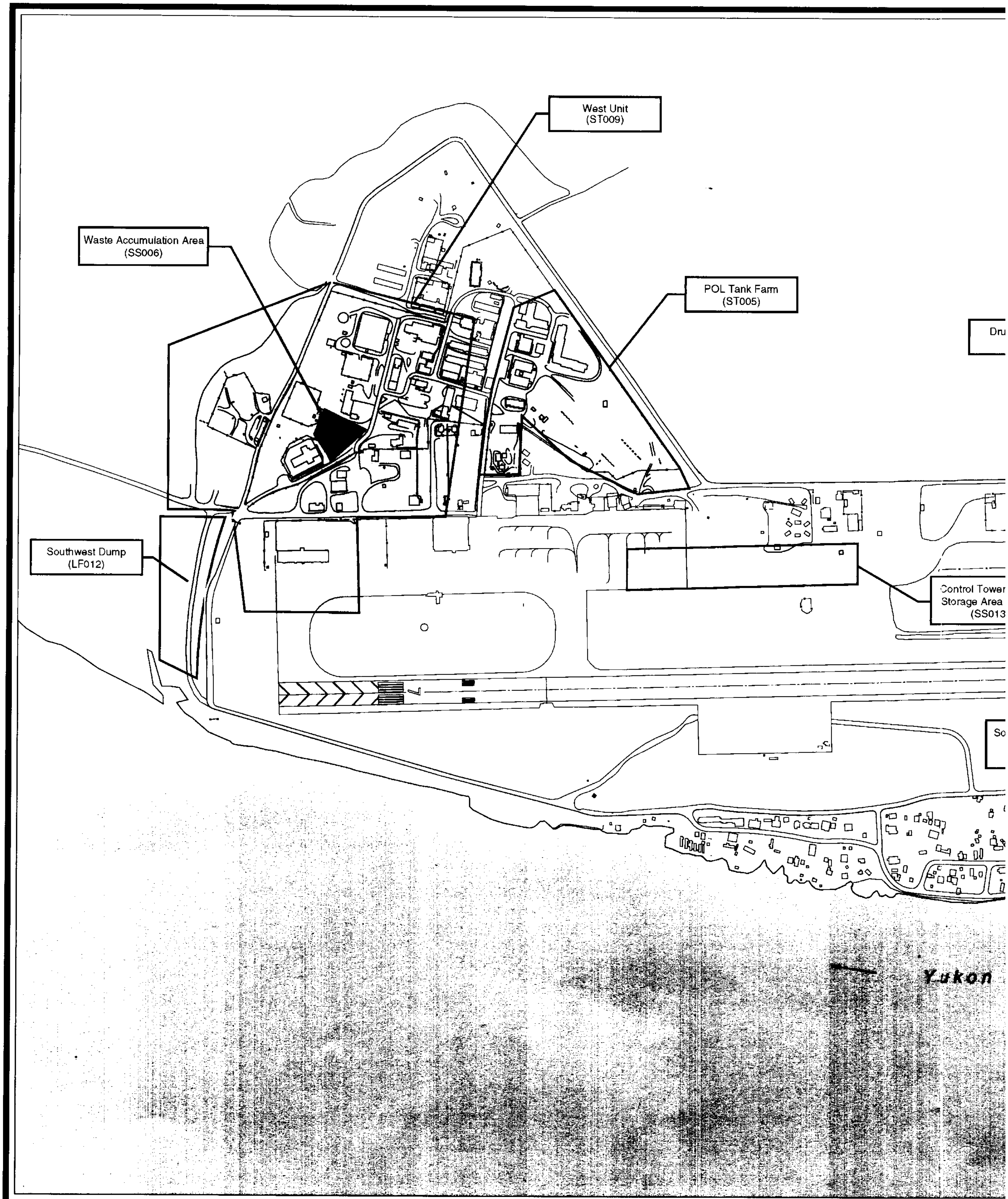
NFRAP status has been recommended for all Campion AS sites other than the POL Area. The locations of the Campion AS sites are shown in Figure ES-2.

Investigations were conducted at many of the Galena Airport and Campion AS sites prior to the RI conducted from 1992 to 1995. Tables ES-1 and ES-2 summarize these activities and their findings.

Table ES-1
Previous Investigation Activities and Findings at Galena Airport

Site	Investigation	Activities/Findings
Fire Protection Training Area (FT001)	Phase I Records Search (USAF, 1985) Stage 1 Confirmation and Quantification (USAF, 1989a)	Identified the type of potential contaminants and history of area. Conducted groundwater and soil sampling. Identified BTEX and TPH contamination in burn pit area.
POL Tank Farm (ST005)	Phase I Records Search (USAF, 1985) Stage 1 Confirmation and Quantification (USAF, 1989a) Stage 2 RI/FS (USAF, 1992)	Conducted records search and site assessment. Identified contaminant sources and recommended RI. Conducted groundwater and soil sampling and a soil gas survey. Identified BTEX and TPH contamination in soil and water. Identified the presence of free-phase hydrocarbons on water table. Evaluated contaminant volumes and remedial technologies.
Waste Accumulation Area (SS006)—West Unit	Phase I Records Search (USAF, 1985) Stage 2 RI/FS (USAF, 1992)	Identified types of wastes stored and documented leakage during site assessment. Conducted groundwater and soil sampling. Identified BTEX, TPH, and chlorinated hydrocarbon contamination in water and soil.
Million Gallon Hill—West Unit	Phase I Records Search (USAF, 1985) Non-RI Study (USAF, 1992)	Verified tank capacities and years of operation. Conducted groundwater and soil sampling. Identified BTEX and TPH contamination in water and soil.
Power Plant UST No. 49—West Unit	Non-RI Study (USAF, 1992)	Conducted groundwater and soil sampling. Identified BTEX and TPH contamination in soil and TPH contamination in water.
JP-4 Fillstands—West Unit	Non-RI Study (USACE, 1993)	Conducted subsurface soil sampling. Identified pesticide, jet fuel, BTEX, and volatile and semivolatile organic contamination in soil.
Building 1845—West Unit	Phase I Records Search (USAF, 1985)	Identified waste handling practices and quantities.
Buildings 1700 and 1850—West Unit	No Previous Investigations	NA
Drums, Perimeter Dike (SS007)	No Previous Investigations	NA
Southeast Runway Fuel Spill (SS010)	No Previous Investigations	NA
Alternate Landfill (LF011)	No Previous Investigations	NA
Southwest Dump (LF012)	Phase I Records Search (USAF, 1985)	Identified the types of wastes disposed.
Control Tower Drum Storage Area South (SS013)	No Previous Investigations	Note: A related site (SS002) was investigated during Stage 1 Confirmation and Quantification (USAF, 1989a)

Note: BTEX = benzene, toluene, ethyl benzene, and xylene.
TPH = total petroleum hydrocarbons.
NA = not applicable.


West Unit
(ST009)
Waste Accumulation Area
(SS006)
POL Tank Farm
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Southwest Dump
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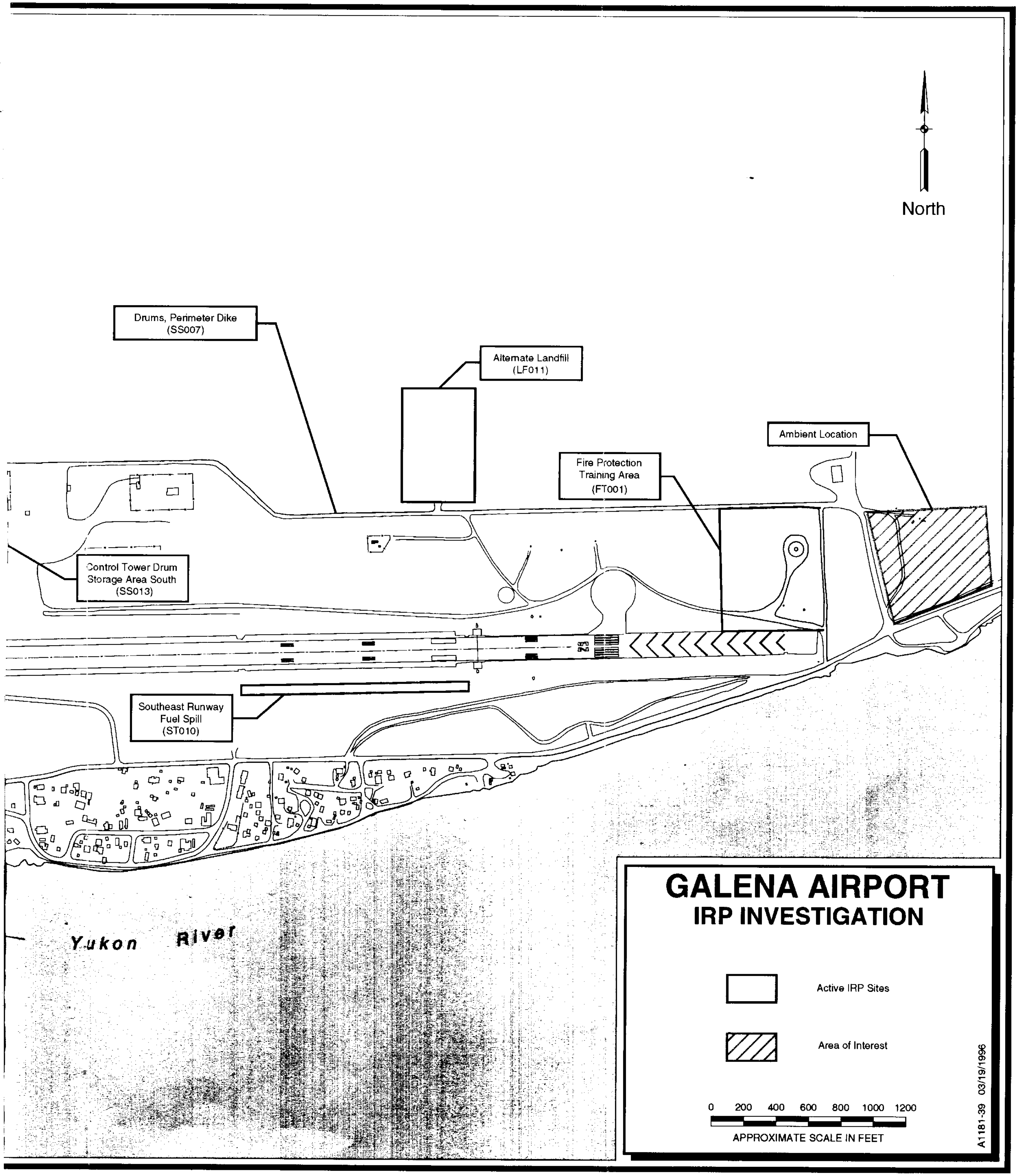

Figure ES-1. IRP Sites and Area of Interest, Galena Airport, Alaska

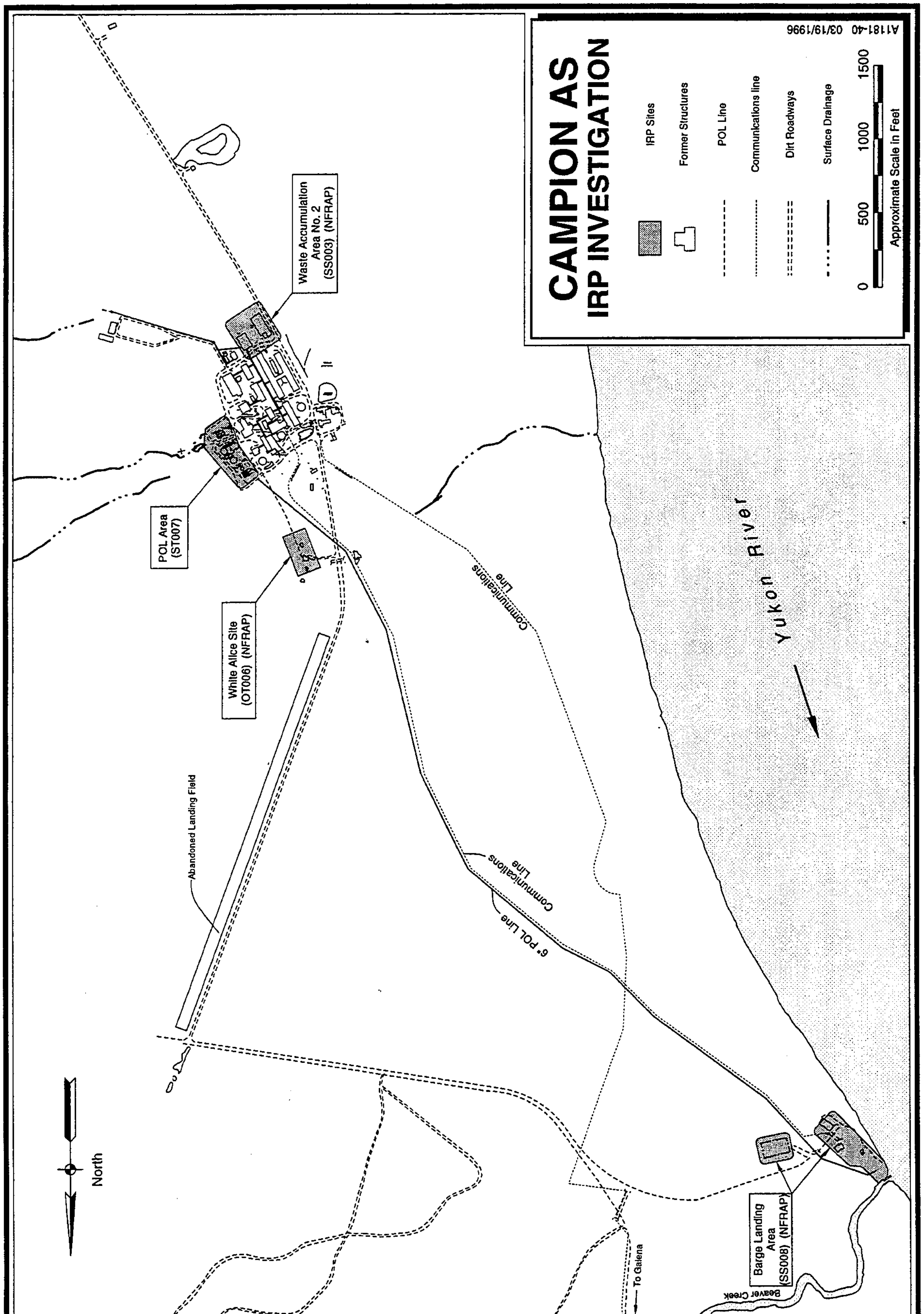

Figure ES-2. Campion Air Station, Alaska

Table ES-2
Previous Investigation Activities and Findings at Campion AS

Site	Investigation	Activities/Findings
Campion POL Area (ST007)	Phase I Records Search (USAF, 1985)	Documented fuel transport and storage.
	Stage I Confirmation and Quantification (USAF, 1989a)	Conducted groundwater and soil sampling and a soil gas survey.
	Stage 2 RI/FS (USAF, 1992)	Detected BTEX and TPH in soil and water.
Campion Barge Loading Area (SS008)	Phase I Records Search (USAF, 1985)	Reported several spills/leaks at site.
	Stage I Confirmation and Quantification (USAF, 1989a)	Identified areas of petroleum contamination through surface and subsurface soil sampling.
White Alice Site (SS006)	No Previous Investigations	NA
Waste Accumulation Area No. 2 (SS003)	Phase I Records Search (USAF, 1985)	Identified types of wastes stored at site and documented spillage.
	Stage I Confirmation and Quantification (USAF, 1989a)	Conducted soil and soil gas sampling. Detected low concentrations of fuels and solvents.

RI Activities and Findings

The field activities conducted from 1992 to 1995 as part of the RI at the Galena Airport and Campion AS are summarized in Tables ES-3 and ES-3A. The findings and recommendations for each area investigated are summarized in the following paragraphs and in Table ES-4.

Airport and Community Water Supply

With the exception of low concentrations of chloroform in one of the non-potable airport supply wells, detection of analytes in the airport and community water supply wells has been very inconsistent. Two pesticides, aldrin and dieldrin, have been detected in these wells above the U.S. Environmental Protection Agency (EPA) Region III risk-based concentration (RBC). However, most of the concentrations were less than the sample quantitation limit (SQL), were indistinguishable from those in method blanks, or were not confirmed by second-column analysis. Since the airport supply wells are near to several known source areas at the Galena Airport, these wells will be regularly monitored for potential contaminants. In addition to monitoring, an air stripper has been added to the current water treatment system to remove any volatile organic compounds (VOCs) that may eventually affect the deep aquifer where the supply wells are screened.

Analytes detected in the privately owned wells in the community of Galena are limited to pesticides. Although some of the pesticide detections in these wells exceed the screening criteria, no pesticide was detected in the same well in two successive years. The presence of pesticides may be the result of controlled application; the extent of pesticide use around the private residences of Galena is unknown. There is no evidence that pesticide detections are related to accidental releases from the Galena Airport.

Fire Protection Training Area (FPTA)

The RI results suggest that soil and groundwater contamination has occurred as a result of training exercises at the FPTA; the primary soil contaminants are the fuels that were used as flammables during these exercises. In addition to the fuels, surface soils contain polynuclear aromatic hydrocarbons (PNAs), which are probably by-products of fuel combustion. Two areas where groundwater is contaminated by benzene were identified through field screening: 1) the area in the vicinity of the burn pit; and 2) the area south of the burn pit, where a stand pipe was used to pump combustible liquids to the aircraft mockup. However, data from several years of groundwater monitoring indicate that the groundwater plume is not advancing.

The following activities are planned for the FPTA:

- Remove the stand pipe and associated underground fuel line to eliminate the possibility of future releases;
- Abandon all monitoring wells at the site;
- Fill and/or grade surface to promote site drainage; and
- Revegetate site.

Following these activities, an NFRAP decision document will be prepared for the FPTA.

POL Tank Farm

The results of RI activities at the POL Tank Farm indicate that fuel transport and storage have contaminated soil and groundwater at this site. Free-phase hydrocarbons are floating on the groundwater surface in the southern part of the site. The exact thickness and areal extent of the free product are not known and appear to change seasonally; the estimated volume is between 30,000 and 75,000 gal. Much of the soil contamination in this area is related to a "smear zone" caused by the seasonal fluctuation of the water table, but "hot spots" of surface soil contamination also exist here.

Table ES-3
Summary of RI Field Activities for 1992, 1993, and 1994

Site/Source Area	1992 Activities	1993 Activities	1994 Activities
Fire Protection Training Area (FT001)	• Collected surface soil, water, and sediment samples; • Completed and sampled two soil borings; • Sampled existing monitoring wells; • Installed and sampled two monitoring wells; • Surveyed monitoring wells and conducted water level surveys; and • Completed in situ hydraulic conductivity tests to determine aquifer characteristics.	• Collected groundwater samples from wells installed in 1992; • Completed and sampled two soil borings; • Installed and sampled two monitoring wells; • Performed soil gas survey and hydropunch water sampling; and • Conducted geophysical surveys.	• Sampled surface and subsurface soils within the burnpit for dioxins and furans; and • Sampled six monitoring wells.
POL Tank Farm (ST005)	• Sampled surface soil, water, and sediment samples; • Completed and sampled three soil borings; • Sampled existing monitoring wells; • Installed and sampled six monitoring wells; • Surveyed monitoring wells and conducted water level surveys; and • Completed in situ hydraulic conductivity tests to determine aquifer characteristics.	• Collected groundwater samples from wells installed in 1992; • Conducted soil gas screening and collected groundwater confirmation samples; • Collected surface soils for arsenic and lead analysis to compare the means of these metals with background values; • Completed and sampled three soil borings; • Installed and sampled three downgradient monitoring wells; • Conducted baildown testing of hydrocarbon product on three wells to determine recovery rates; and • Conducted pumping/flowmeter test to determine aquifer hydraulic conductivity, storativity, and pumping cone of influence.	• Sampled ten monitoring wells; • Collected surface soil samples for characterization of pesticides; and • Conducted additional baildown and product recovery testing.
Waste Accumulation Area (SS006)—West Unit	• Collected surface soil, water, and sediment samples; • Completed and sampled two soil borings; • Sampled existing monitoring wells; • Installed and sampled a monitoring well; and • Surveyed monitor wells and conducted water level surveys.	• Collected groundwater samples from wells installed in 1992; and • Collected surface soil samples for arsenic and lead analysis to compare the means of these metals with background values.	• Sampled two monitoring wells; and • Collected surface soil samples for characterization of pesticides.
Million Gallon Hill—West Unit	• Sampled existing monitoring wells; • Collected surface soil, water, and sediment samples; • Installed and sampled seven monitoring wells; and • Surveyed all monitoring wells and conducted water level surveys.	• Collected groundwater samples from wells installed in 1992; • Conducted soil gas screening and collected groundwater confirmation samples; • Installed and sampled a downgradient monitor well; and • Conducted hydrocarbon baildown test on one well to determine recovery rate.	• Sampled ten monitoring wells; and • Conducted additional baildown testing.
Power Plant UST #49--West Unit	• Sampled all existing monitoring wells; • Collected a surface soil sample; • Completed and sampled one soil boring; and • Surveyed wells and conducted water level surveys.	• Collected surface soil samples for arsenic and lead analysis to compare the means of these metals with background values.	NA

Table ES-3
(Continued)

Site/Source Area	1992 Activities	1993 Activities	1994 Activities
JP-4 Fillstands--West Unit	• Collected surface soil samples; • Completed and sampled three soil borings; • Installed and sampled three monitoring wells; and • Surveyed wells and conducted water level surveys.	• Collected groundwater samples from wells installed in 1992; • Collected surface soil samples for arsenic and lead analysis to compare the means of these metals with background values; • Conducted soil gas screening and collected groundwater confirmation samples; • Installed and sampled one downgradient monitoring well; and • Abandoned one monitoring well.	• Sampled two monitoring wells.
Building 1845--West Unit	• Installed and sampled two monitoring wells.	• Conducted soil gas screening and collected groundwater confirmation samples; and • Installed and sampled one upgradient monitoring wells.	• Sampled three monitoring wells.
Building 1700--West Unit	NA	• Conducted soil gas screening; • Collected one surface soil sample for arsenic and lead analysis; and • Completed and sampled one soil boring.	NA
Building 1850--West Unit	NA	• Conducted soil gas screening and collected soil confirmation samples.	NA
Control Tower Drum Storage Area South (SS013)	NA	• Conducted soil gas screening and collected soil confirmation samples.	• Sampled two monitoring wells.
Drums, Perimeter Dike (SS007)	NA	• Conducted soil gas screening and collected soil confirmation samples.	NA
Southeast Runway Fuel Spill (ST010)	NA	• Conducted soil gas screening and collected soil confirmation samples.	NA
Alternate Landfill (LF011) and Southwest Dump (LF012)	NA	• Conducted geophysical surveys; and • Conducted soil gas screening and collected soil confirmation samples.	NA
Campion POL Area (ST007)	• Collected surface soil, water, and sediment samples; • Completed and sampled three soil borings; • Installed four monitoring wells and collected two rounds of groundwater samples; and • Surveyed wells and conducted water level surveys.	• Collected surface water and sediment samples down-drainage from the site; • Collected surface soil samples for arsenic and lead analysis to compare the means of these metals with background values; and • Conducted soil gas screening and collected soil confirmation samples.	NA
Barge Landing Area (SS008)	NA	• Collected surface water and sediment samples; • Conducted soil gas screening and collected soil confirmation samples; and • Collected DPT[a] groundwater samples.	NA

Table ES-3
(Continued)

Site/Source Area	1992 Activities	1993 Activities	1994 Activities
Campion White Alice Site (SS006)	NA	• Collected surface soil samples for PCB[b] field screening.	NA
Campion Waste Accumulation Area No. 2 (SS003)	NA	• Conducted soil gas survey; • Collected DPT groundwater samples; and • Screened shallow subsurface soils for PCBs.	NA

[a] DPT = Direct push technology.
[b] PCB = polychlorinated biphenyl.

Table ES-3A
Summary of RI Field Activities for 1995

Site/Source Area	1995 Activities
POL Tank Farm	• Conducted an additional soil gas survey in the northwestern portion of the site.
Control Tower Drum Storage Area (SS013)	• Collected surface soil samples to confirm field screening data and support a baseline risk assessment.
Southeast Runway Fuel Spill (ST010)	• Conducted an additional soil gas survey; • Collected DPT[a] water samples to aid in the placement of monitoring wells; • Collected surface and subsurface soil samples; and • Installed and sampled four monitoring wells.

[a] DPT = Direct push technology.

Table ES-4
Summary of Results and Recommendations for Galena Airport and Campion AS Sites Investigated Under This RI

Site	Contaminants Exceeding Screening Criteria	Recommendations
Fire Protection Training Area (FT001)	Water: benzene, pesticides Soil: DRO[a], GRO[b], BTEX[c] benzo(a)pyrene	• Remove underground piping that carried fuels to pit; • Abandon all monitoring wells; • Grade and/or fill site to promote drainage; and • Revegetate the site.
POL Tank Farm (ST005)	Water: 1,2-DCA[d], trans-1,3-dichloropropene, 1,1,2,2-TCA[e], acetone, BTEX, methylene chloride, BEHP[f], cadmium, chloromethane, 4-methylphenol (p-cresol), MIBK[g], pesticides Soil: DRO, GRO, BTEX, benzo(a)pyrene, arsenic, beryllium, lead, manganese	• Install free product and soil vapor extraction system at the site; • Collect baseline groundwater sample at startup of soil vapor extraction system; and • Conduct point-of-compliance groundwater monitoring during intrinsic remediation of the site.
West Unit (ST009) Million Gallon Hill	Water: BTEX, BEHP, 1,2-DCA, MIBK, naphthalene, 1,1,2,2-TCA, chloromethane, methylene chloride, TCE[h], chlorobenzene, arsenic, lead, pesticides Soil: DRO, lead	• Install free product removal and bioventing systems. • Collect baseline groundwater sample at startup of bioventing system; and • Conduct point-of-compliance groundwater monitoring during intrinsic remediation of the site
West Unit (ST009) Waste Accumulation Area (SS006)	Water: pesticides Soil: DRO, benzo(a)pyrene, lead	• NFRAP.
West Unit (ST009) Power Plant UST#49	Water: lead, pesticides Soil: DRO, GRO	• NFRAP.
West Unit (ST009) JP-4 Fillstands	Water: BEHP, benzene, arsenic, lead, pesticides Soil: DRO, GRO, BTEX, benzo(a)pyrene	• NFRAP.
West Unit (ST009) Building 1845	Water: 1,2-dichloroethene, TCE, BEHP, cadmium, pesticides Soil: No exceedances	• NFRAP. Note: The water treatment system has been upgraded to protect the potable water supply from potential contamination from this site.
West Unit (ST009) Building 1700	Water: NA Soil: DRO, GRO, BTEX	• Abandon dry well and floor drain in place.
West Unit (ST009) Building 1850	Water: NA Soil: NA	• NFRAP.
Control Tower Drum Storage Area South	Water: TCE, pesticides Soil: DRO	• NFRAP.
Drums, Perimeter Dike (SS007)	Water: NA Soil: NA	• Remove the perimeter dike as a potential source area at SS007.

Table ES-4
(Continued)

Site	Contaminants Exceeding Screening Criteria	Recommendations
Southeast Runway Fuel Spill (ST013)	Water: Benzene, cadmium, selenium, thallium Soil: DRO, GRO, BTEX, PNAs	• Conduct a limited bioventing effort in the area of the fuel line leak; • Confirm that the pipeline was properly abandoned and does not represent a continuing source of contamination at the site; and • Properly clean and abandon the pipeline if it has not been done.
Alternate Landfill (LF011)	Water: NA Soil: NA	• Move from IRP to compliance program.
Southwest Runway Dump (LF012)	Water: NA Soil: NA	• Move from IRP to compliance program.
Campion POL Area (ST007)	Water: lead, pesticides Soil: DRO, GRO, BTEX, PNAs, arsenic	• Excavate contaminated soils to eliminate source area (completed); and • Allow site to recover naturally.
Campion Barge Landing Area (SS008)	Water: No exceedances Soil: NA	• NFRAP.
Campion White Alice Site (OT006)	Water: NA Soil: NA	• NFRAP.
Campion Waste Accumulation Area #2 (SS003)	Water: NA Soil: NA	• NFRAP.

[a] DRO = diesel range organics.
[b] GRO = gasoline range organics.
[c] BTEX = benzene, toluene, ethylbenzene, and xylene.
[d] 1,2-DCA = 1,2-dichloroethane.
[e] 1,1,2,2-TCA = 1,1,2,2 tetrachloroethane.
[f] BEHP = bis(2-ethylhexyl)phthalate.
[g] MIBK = methyl-isobutyl-ketone.
[h] TCE = trichloroethene.
[i] PNAs = polynuclear aromatic hydrocarbons (benzo(a)pyrene, benzo(b)flouranthene, and dibenz(a,h)anthracene).
NA = not available; only field screening data collected.
NFRAP = no further response action planned.
USTs = underground storage tanks.
ASTs = aboveground storage tanks.

Another area of soil and groundwater contamination has been identified in the northern part of the site. This area corresponds to the former location of an extension of the POL Tank Farm. A vacant dormitory now stands in this area.

The following recommendations are made for the POL Tank Farm:

- Install free product extraction wells in the southeast area of fuel-contaminated groundwater (completed);
- Design and install a soil vapor extraction (SVE) system;
- Conduct baseline groundwater sampling at the startup of the SVE system; and
- Conduct point-of-compliance groundwater monitoring during intrinsic remediation of the site.

The West Unit

Groundwater contamination at the West Unit is of two major types: chlorinated solvents (primarily trichloroethene, TCE) and fuel-related compounds (primarily benzene). The highest levels of TCE contamination are located in the northeast portion of the West Unit. Low levels of TCE also occur in the western part of the West Unit, but these do not exceed the State of Alaska or Federal Maximum Contaminant Levels (MCLs) for drinking water. Groundwater contamination by benzene and other fuel-related compounds has been identified at the Million Gallon Hill and JP-4 Fillstands source areas.

Soil contamination at the West Unit consists primarily of fuel-related compounds. Diesel range organics (DRO), gasoline range organics (GRO), and BTEX compounds (benzene, toluene, ethylbenzene, and xylene) were present in several surface soils and sediments throughout the West Unit. The distribution of petroleum hydrocarbons suggests that spills and leaks have occurred at several locations over a period of time. Subsurface soil contamination by fuels also occurs within the West Unit. Leaks from underground fuel lines, waste oil tanks, and fuel- or oil-water separators are the sources of this contamination.

The following recommendations are made for the West Unit:

Million Gallon Hill
- Install free-product extraction wells (completed);
- Design and install a bioventing system;
- Conduct baseline groundwater sampling at the startup of the bioventing system; and
- Conduct point-of-compliance groundwater monitoring during intrinsic remediation of the site.

Waste Accumulation Area
- NFRAP.

Power Plant UST #49
- NFRAP.

JP-4 Fillstands
- NFRAP.

Building 1700
- Abandon dry well/floor drain in place.

Building 1845
- NFRAP.

Building 1850
- NFRAP.

A decision document will be prepared to document the closure of several of the source areas at the West Unit.

In addition to the activities recommended for each of the individual source areas, the airport potable water treatment plant has been upgraded to remove TCE and other VOCs using an air stripper.

TCE has been detected in the shallow aquifer at concentrations up to 13,000 µg/L, well above the MCL of 5 µg/L. Although the airport supply wells are screened at approximately 200 ft below ground level (bgl) and TCE has never been detected in these wells, the upgrade to the existing water treatment plant was implemented as an interim remedial action. This action has been conducted since it is doubtful that even further extensive investigation and modeling would prove conclusively that the airport supply wells will never be affected by TCE. Triennial monitoring of the airport supply wells will also be conducted to determine whether TCE reaches the supply wells and, if so, to confirm the continued effectiveness of the treatment system.

Control Tower Drum Storage Area, South

The results of field screening and soil sampling activities at the Control Tower Drum Storage Area, South (CTDSA) during 1993 and 1995 indicate the presence of limited areas of surface contamination. These findings are consistent with the use of the site for storage of drummed liquids, where small spills and leaks may have resulted in limited surface contamination. Other sources for this type of contamination are truck and aircraft traffic and parking. The proposed tarmac extension will cap much of the soil contamination at this site.

Groundwater monitoring, conducted in 1994, indicated the presence of TCE (9 µg/L) in one sample from this site.

The baseline risk assessment found no significant risk to human health or the environment as a result of contamination at this site. Therefore, an NFRAP decision document will be prepared for the CTDSA.

Drums, Perimeter Dike

Although reports that the perimeter dike at Galena Airport is constructed of crushed and empty 55-gal. drums are unconfirmed, a soil gas survey was conducted around the entire dike using two different instruments. The results of the survey show very poor agreement between the two instruments. However, the results of soil screening for total petroleum hydrocarbons (TPH) at this site do not indicate the presence of high concentrations of these compounds. This site is considered to include the drum removal activities currently taking place outside the installation boundary to the north and west. It is recommended that the perimeter dike be removed from the activities taking place at Site SS007.

Southeast Runway Fuel Spill

The presence of contamination caused by a fuel line leak has been confirmed at the Southeast Runway Fuel Spill site (ST010). Site contaminants consists primarily of DRO, GRO, and BTEX compounds in both soil and groundwater. In addition, PNAs were detected in a soil sample and metals and solvents were detected in groundwater samples from the site.

In addition to the fuel line leak, other potential sources of contamination have been identified at the Southeast Runway Fuel Spill site (Assistant Airport Manager Dick Evans, personal communication, 17 July 1995). A tar pit, a burned-down building, and several partially buried drums may be sources of solvents, PNAs, and metals at the site. These potential sources may need to be addressed separately.

The following recommendations are made for contamination associated with the Southeast Runway Fuel Spill:

- Conduct a limited bioventing effort in the immediate vicinity of the pipeline leak;

- Confirm, through record searches and personnel interviews, that the faulty pipeline has been properly cleaned and abandoned; and
- Clean and properly abandon the pipeline if records indicate that this has not been done.

Landfills at the Galena Airport

Field screening activities have identified buried and surficial metallic and nonmetallic debris and evidence of contamination by petroleum hydrocarbons at both the Alternate Landfill and the Southwest Dump. However, since these sites are considered active and are not eligible for Defense Environmental Restoration Account (DERA) funding, they must be turned over to the USAF compliance personnel for review and possible closure activities.

Pesticides at the Galena Airport

The use of pesticides in and around the Galena Airport has not been limited to specific sites. The low levels of pesticides detected in sampling media throughout the airport and areas in the surrounding community are consistent with the controlled application of pesticides for insect control. There are a few elevated detections of pesticides, particularly DDT-related compounds, in surface and near-surface soils in the West Unit and near the apex of the main base triangle, north of the Bureau of Land Management (BLM) housing area. These detections may be the result of the accumulation of applied pesticides in drainage ways or pesticide storage and handling activities in these areas.

The widespread application of pesticides in the Galena area, both by the Air Force and others, make it impractical to conduct a removal action. The cost of a removal action aimed at pesticides in surface soils would be prohibitive, and a complete cleanup would not be possible. Therefore, no further action is planned to address the presence of pesticides in surface soils at Galena Airport

Campion POL Area

RI results have confirmed the presence of soil contamination associated with the former fuel storage facility at the Campion POL Area. On the basis of soil gas survey results and soil and water analyses, it appears that most of the contamination is located in soils within and immediately downgradient of the POL Area. Sediment samples collected at intervals from a small creek that drains the site show evidence of DRO contamination. However, naturally occurring organic matter, which is abundant in soils and sediments in this area, is known to interfere with the analytical method for DRO. DRO and GRO have also been detected in groundwater and surface water, but BTEX compounds do not exceed the MCLs in any water samples.

An interim removal action (IRA) was conducted at the Campion POL Area to remove the contaminated soil associated with the former fuel storage area. This IRA has removed a continuing source of contamination, and the site should now be allowed to recover naturally.

Other Campion Sites

Three other sites at Campion AS were investigated during 1993 to support NFRAP decisions. Investigation activities included collecting soil gas surveys and field screening and laboratory analysis of surface and shallow subsurface soils, surface water, and groundwater, as detailed in Table ES-4. No significant contamination was identified at any of these sites, and the proposed NFRAP status is supported.

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Section 1
INTRODUCTION

The U.S. Air Force (USAF), under the Installation Restoration Program (IRP), has conducted Remedial Investigation (RI) activities at Galena Airport (formerly Galena AFS) and Campion Air Station (AS), Alaska (Figure 1.0-1). Within the framework of the IRP, the objective of this study was to evaluate past hazardous waste disposal and spill sites at Galena Airport and Campion AS. This evaluation included determining the nature and extent of possible contaminants, determining site physical characteristics that may affect contaminant distribution, and defining possible migration pathways. For some sites, remedial actions have been developed.

1.1 IRP Sites

There are 13 identified IRP sites at the Galena Airport. Figure 1.1-1 shows the location of all IRP sites, source areas, and other areas of interest for the installation. Table 1.1-1 summarizes the nomenclature and identifies the Galena Airport sites included in this investigation. Seven IRP sites that have been identified and previously investigated at Campion AS are shown in Figure 1.1-2. Six of the sites have been recommended for site closeout through no further action; one site was studied as part of this investigation. The status and location of an eighth site, OT001, is unknown. Table 1.1-2 summarizes the nomenclature and identifies the Campion AS sites included in this investigation.

1.2 Investigation Objectives

The objectives of this investigation were based on the status of the individual sites. Sites investigated at Galena Airport and Campion AS fell within two broad categories at the beginning of this investigation: 1) previously defined sites—those sites defined by the Phase I records search and studied in earlier stages of the RI, and 2) newly defined sites—those sites that have recently entered the IRP and had not been investigated prior to 1992. These new sites entered the IRP at the Preliminary Assessment/Site Inspection (PA/SI) level. The objective of the investigation at the previously defined sites was to determine the extent of contamination so that a baseline risk assessment could be conducted. The objective of the investigation at the newly defined sites was to confirm, characterize, and quantify the contamination, and move the site into the RI stage if necessary. Tables 1.1-1 and 1.1-2 show the IRP stage at which each site and source area entered this investigation.

New source areas were also found within some of the previously defined sites. At these new source areas, as at the newly defined sites, a PA/SI was conducted, focusing on determining the existence of (and sometimes the type of) contaminants through various methods of field screening. Confirmation of field screening results (by laboratory analysis of groundwater or soil samples) was also performed to document the levels of these contaminants. Some of these newly defined sites and source areas entered the IRP and were investigated further in order to collect data to support a baseline risk assessment or to determine the parameters required to execute remedial action.

1.3 Report Objectives and Organization

This report documents the investigations conducted from 1992 to 1995 for several sites at Galena Airport and Campion AS; presents the results of sampling and analysis; provides a basis for conclusions drawn from the results; and presents recommendations for further action at each site.

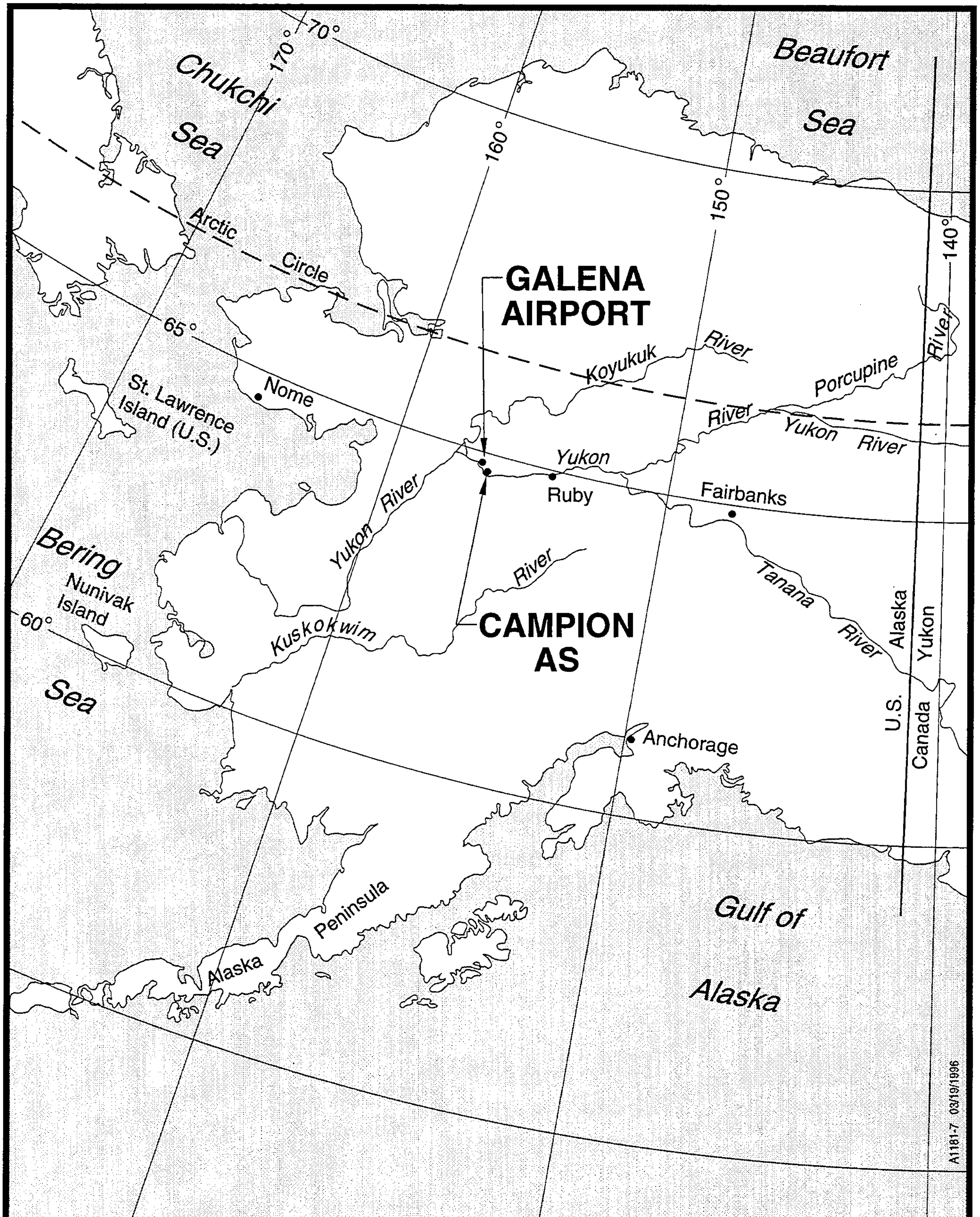
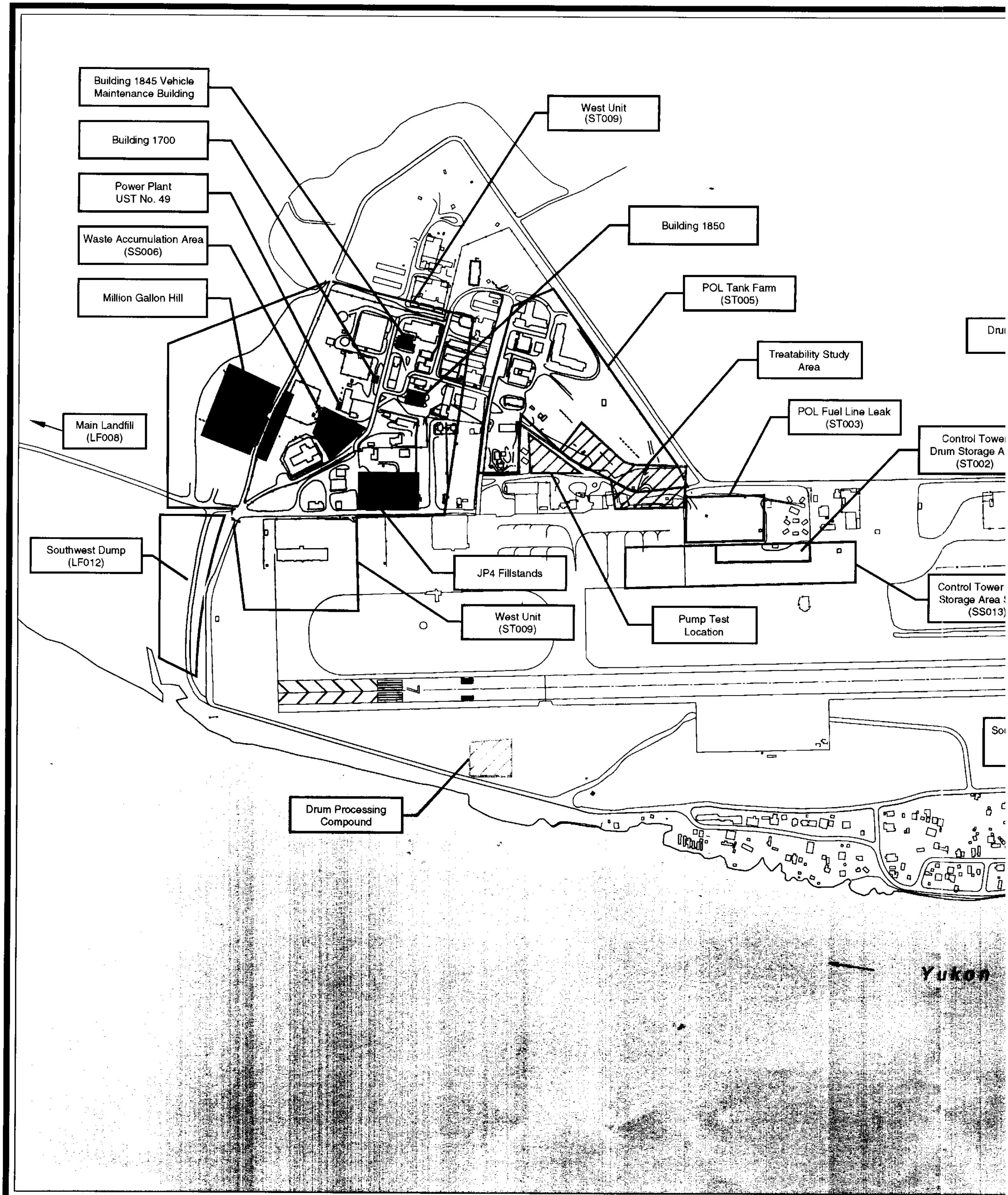


Figure 1.0-1. Location of Galena Airport and Campion Air Station, Alaska


Building 1845 Vehicle Maintenance Building
Building 1700
Power Plant UST No. 49
Waste Accumulation Area (SS006)
Million Gallon Hill
Main Landfill (LF008)
Southwest Dump (LF012)
West Unit (ST009)
Building 1850
POL Tank Farm (ST005)
Treatability Study Area
POL Fuel Line Leak (ST003)
Control Towe
Drum Storage A
(ST002)
Dru
JP4 Fillstands
West Unit (ST009)
Pump Test Location
Control Tower
Storage Area
(SS013)
So
Drum Processing Compound
Yukon

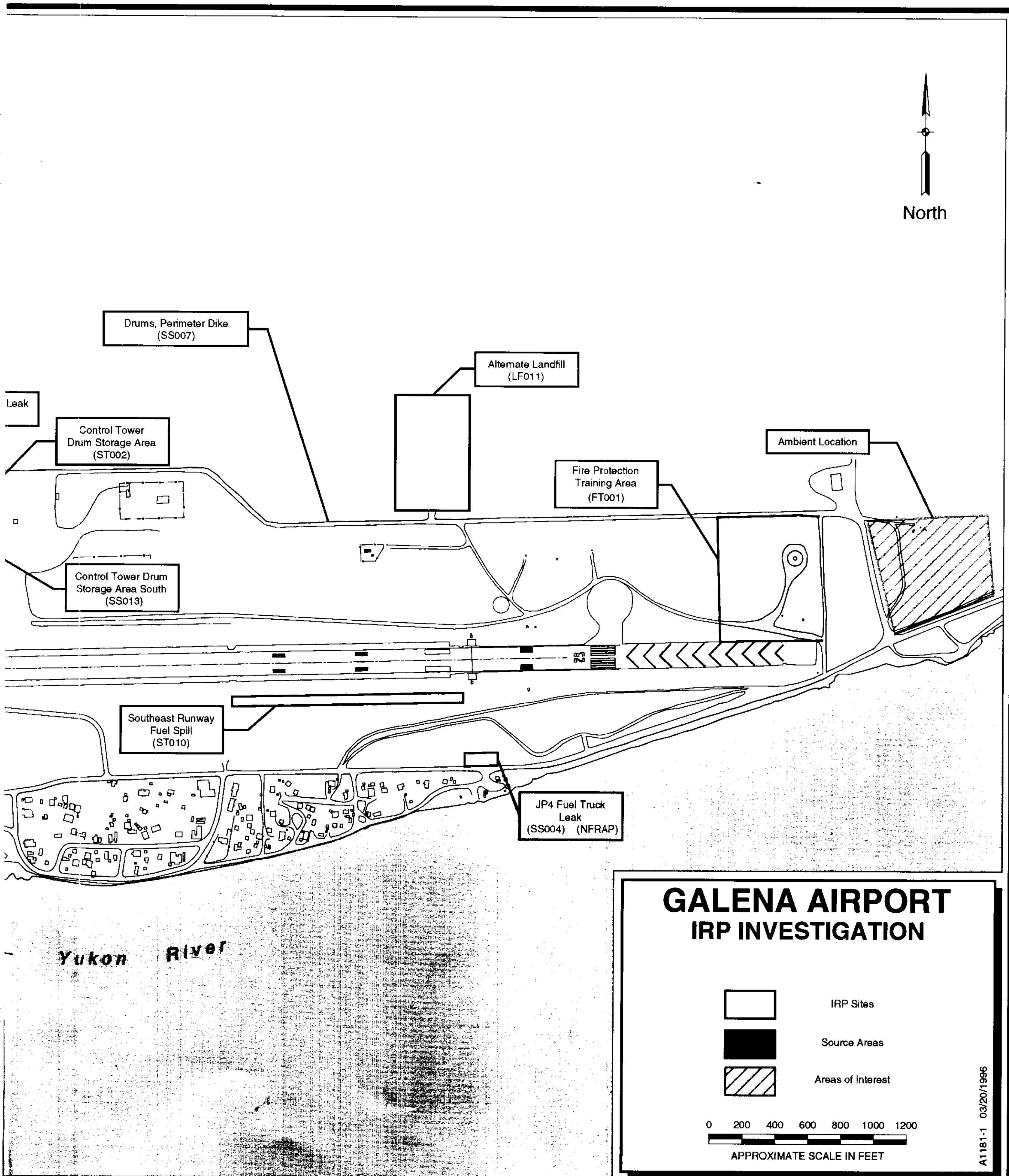


Figure 1.1-1. IRP Sites and Areas of Interest, Galena Airport, Alaska

Table 1.1-1
IRP Sites, Galena Airport, Alaska

WIMS-ES Site IDs	Site Name	Site/Source Area Description	IRP Stage at the Beginning of This Investigation	Included in this Report
FT001	Fire Protection Training Area	Burn Pit Area	RI	Yes
		Fuel Valve and Piping	PA/SI	Yes
SS002	Control Tower Drum Storage Area	Drum Storage Area, Spill Leak No. 1	RI	No
ST003	POL Fuel Line Leak	Spill/Leak No. 2	Site Closeout (Proposed NFRAP)	No
ST004	JP-4 Fuel Truck Spill	Spill/Leak No. 3	Site Closeout (Proposed NFRAP)	No
ST005	POL Tank Farm	Southeast POL, Spill/Leak Nos. 4 and 5	RI	Yes
		Northwest POL	RI	Yes
SS006	Waste Accumulation Area	Waste Accumulation and Drum Storage	RI	Yes
SS007	Drums Perimeter Dike	Perimeter Dike	PA/SI	Yes
LF008	Main Landfill	Refuse Landfill	--	No
ST009	West Unit	Million Gallon Hill, POL Tanks	RI	Yes
		Powerplant UST No. 49	RI	Yes
		JP-4 Fillstands	RI	Yes
		Bldg. 1700	PA/SI	Yes
		Bldg. 1845 Vehicle Maintenance Facility	PA/SI	Yes
		Bldg. 1850	PA/SI	Yes
ST010	Southeast Runway Fuel Spill	POL Pipe Leak	RI	Yes
LF011	Alternate Landfill	Temporary Refuse Landfill	PA/SI	Yes
LF012	Southwest Runway Dump	Abandoned Refuse Landfill	PA/SI	Yes
SS013	Control Tower Drum Storage Area, South	Drum Storage Area	PA/SI	Yes

Note: RI = Remedial Investigation; NFRAP = No Further Response Action Planned; PA/SI = Preliminary Assessment/Site Inspection.

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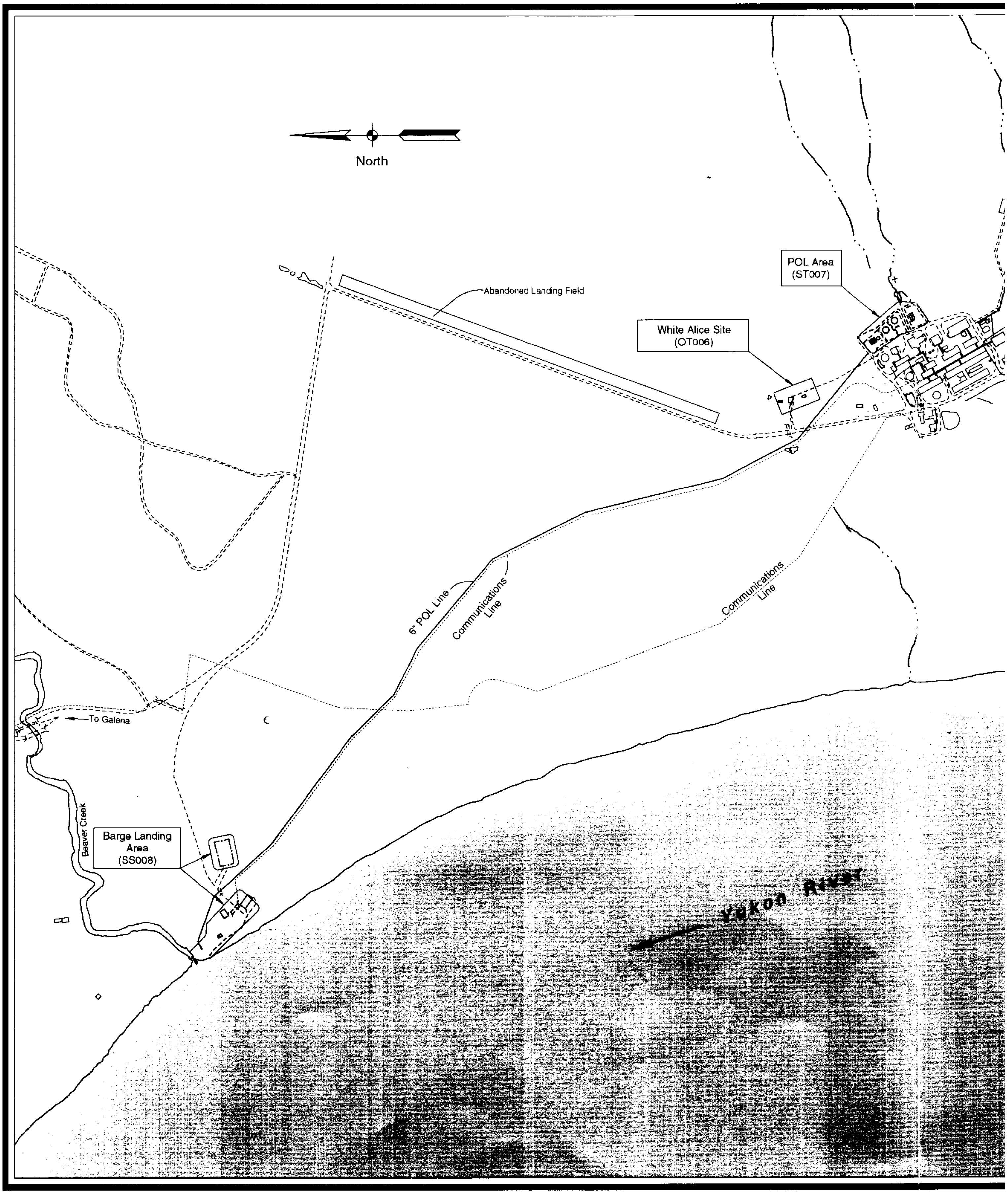
North
Abandoned Landing Field
POL Area
(ST007)
White Alice Site
(OT006)
6" POL Line
Communications
Line
Communications
Line
To Galena
Beaver Creek
Barge Landing
Area
(SS008)
Yukon River

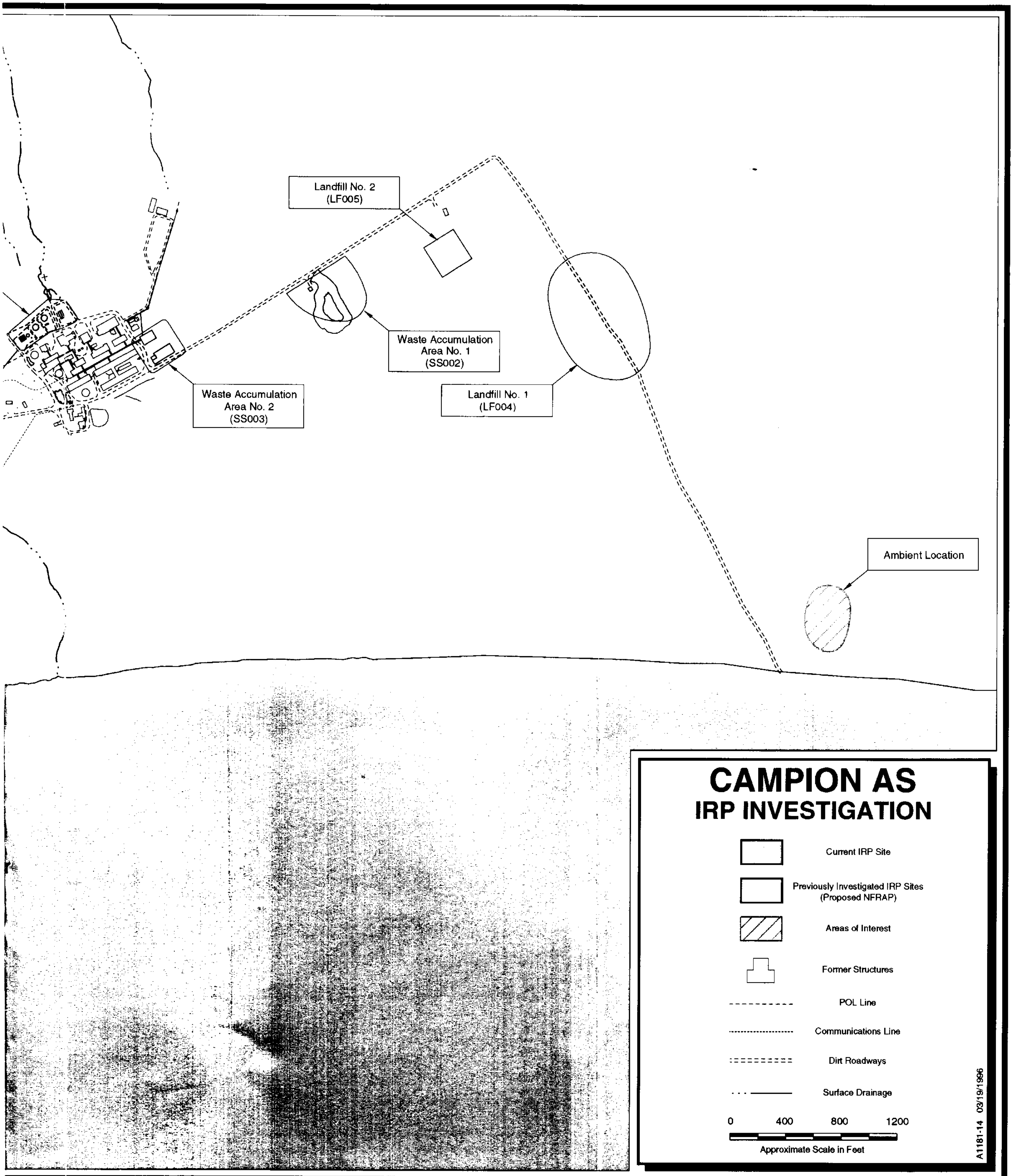

Figure 1.1-2 IRP Sites, Campion Air Station, Alaska

Table 1.1-2
IRP Sites, Campion AS, Alaska

WIMS-ES Site ID	Site Name	Site Description	IRP Stage at the Beginning of This Investigation	Included in this Report
OT001	LRR Station	Former Radar Site	Unknown	No
SS002	Waste Accumulation Area No. 1	Drum Storage Area	Site Closeout (Proposed NFRAP)	No
SS003	Waste Accumulation Area No. 2	Drum Storage Area	Site Closeout (Proposed NFRAP)	Yes
LF004	Landfill No. 1	Refuse Landfill	Site Closeout (Proposed NFRAP)	No
LF005	Landfill No.2	Refuse and Construction Debris Landfill	Site Closeout (Proposed NFRAP)	Yes
OT006	White Alice Site	Former Transformer Location	Site Closeout (Proposed NFRAP)	Yes
STOO7	POL Area	Spill/Leak No. 1, Bulk fuel oil storage area	RI/FS	Yes
SS008	Barge Landing Area	POL Pipeline, Spill/Leak No. 2	Site Closeout (Proposed NFRAP)	Yes

Section 1 of this report introduces the investigation objectives and data evaluation criteria. Section 2, Environmental Setting, contains installation descriptions and summarizes the current hydrogeologic conditions of the installations. Sections 3 and 4 present the results of RI activities and recommend future activities on a site-by-site basis for Galena Airport and Campion AS, respectively.

1.4 Data Generation and Evaluation

Depending on the data quality objectives (DQOs), data generated during this investigation fall into one of three analytical levels with respect to the level of quality control and analytical accuracy of the methods (EPA, 1988) as described in Table 1.4-1. Level I and Level II data, used for initial definition of potential areas of contamination, were generated by field screening methods and mobile field laboratories in support of the preliminary assessment activities at the newly defined source areas. The data were used to quantitatively define the presence or absence of contamination at the site. Level III data were generated to support the investigations at the previously defined sites where defensible data were required to define nature and extent of contamination and support the baseline risk assessment. Field screening data (Level I and Level II) were also used to narrow the focus of the investigation and direct the collection of Level III data.

This section describes the various data quality levels, uses, and objectives for data generated during the 1992-1994 RI at Galena Airport and Campion AS, as well as the criteria used for data presentation and evaluation.

To determine the significance of the detected constituents, Level III data were compared with various evaluation criteria as described in Figure 1.4-1. Level III data were validated to ensure data acceptability and defensibility. Validation includes checking compliance with all specified quality assurance/quality control (QA/QC) procedures and comparison of sample results with blank results in order to define quantitation limits for each analyte. The validated data are presented in Appendix A and the validation process is detailed in Appendix B.

Following validation, data were compared with screening criteria. These screening criteria were taken from State of Alaska and Federal Maximum Contaminant Levels (MCLs), State of Alaska cleanup levels, and U.S. Environmental Protection Agency (EPA) Region III Risk-Based Criteria (RBC) (EPA, 7 March 1995). This comparison was used as a screening tool so that analytes that did not pose a risk to human health and the environment or those that were not detected were eliminated from further consideration.

Soils were screened using the State of Alaska cleanup criteria levels for non-UST (underground storage tank) soils. If Alaska cleanup criteria did not exist for a particular analyte, the Region III residential RBCs were used. Lead, which has no cleanup criteria or RBC, was screened using the value given in the EPA Lead Directive (400 mg/kg) (EPA, 1994).

Groundwater was screened using state and federal MCLs, where applicable. For analytes that do not have a state or federal MCL, the Region III RBC were used.

The list of criteria that were chosen to screen the data for presentation in this document is given in Appendix C. All of the data were compared with half the screening criteria and only those analytes that exceeded these levels in a given matrix are presented in the site summary tables within this document. The factor of one-half the screening criteria was chosen as the cutoff to prevent elimination of those analytes whose concentrations approached, but did not exceed, the screening criteria. Although residential land use

Table 1.4-1
Analytical Levels Used in this Investigation

Level	Type	Use	Data Quality Objective
I	Portable Instruments • PID/FID/CAT[a] • Infrared TPH/AH[b] Analyzer • Water Quality Meter and Field Test Kits • Immunoassay PCB[c] Test Kit	To reduce the overall schedule of the RI: • Generates "real time" data to direct the efforts of field screening activities; and • Allows for the strategic placement of monitoring wells and soil borings without delaying field crews.	Identify presence or absence of general types of contaminants or general range of concentration of specific contaminant.
II	Mobile Gas Chromatography Laboratory	To confirm the presence of contamination as indicated by Level I results: • Allows for the speciation of several constituents in groundwater; and • Helps to determine potential sources and differentiate between contaminant plumes from adjacent source areas.	Quantitative data backed by basic laboratory quality control procedures.
III	CLP Laboratory Using EPA Procedures	To produce defensible data: • Used in the baseline risk assessment, contingent upon validation.	Validated data based on all analytical quality assurance/quality control procedures described in the quality assurance project plan.

Notes: [a]PID = photoionization detector, FID = flame ionization detector, CAT = hydrocarbon analyzer with catalytic detector.
[b]TPH = total petroleum hydrocarbons, AH = aromatic hydrocarbons.
[c]PCB = polychlorinated biphenyls.

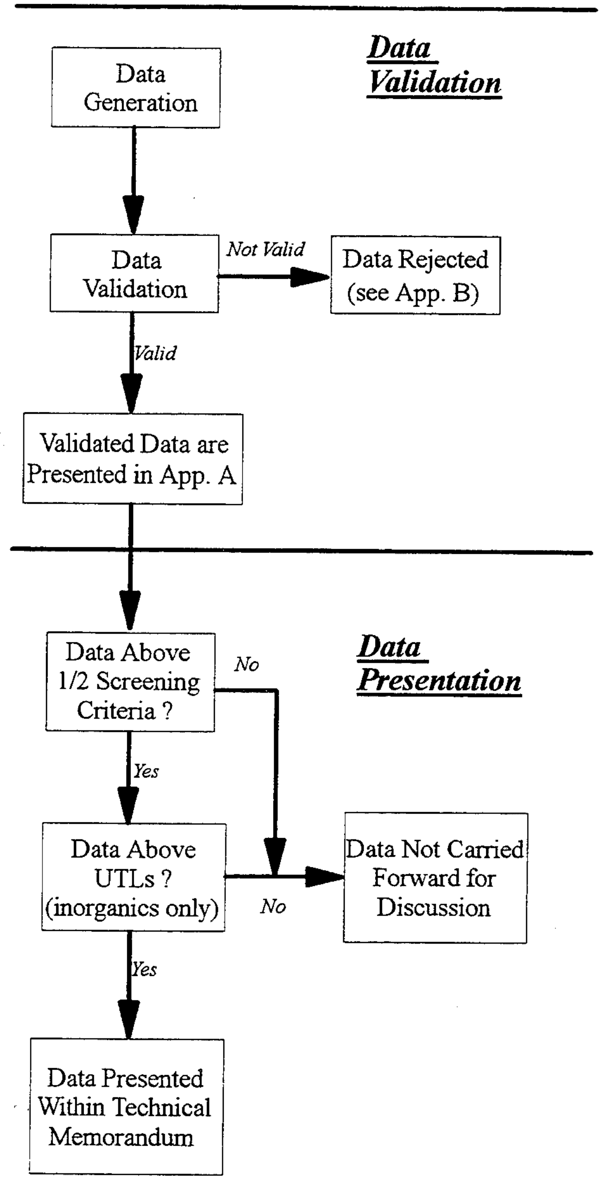

Figure 1.4-1. Data Screening

scenarios were used in the initial screening, soil results from all sites except the Galena and Campion petroleum, oil, and lubricants (POL) areas and the Southeast Runway Fuel Spill site were also compared with industrial RBCs. All results exceeding residential RBCs are presented in the summary tables, whereas only results exceeding industrial RBC criteria (except at the POL areas and the Southeast Runway Fuel Spill site) are shaded. Future land use scenarios at both the Galena and Campion POL sites include possible residential use—as a boarding school location and native land allotments, respectively. The Southeast Runway Fuel Spill site is located on the other side of the dike road from the old town of Galena, and several vegetable gardens are located adjacent to the site.

The inorganic analytes that were retained by the screen were then compared with the naturally occurring background concentrations. For each inorganic analyte, a statistical upper tolerance limit (UTL) was calculated for background data to compare site data with a reference concentration (see Sections 2.6 and Appendix D). If no samples at a site exceeded the UTL for a given inorganic analyte, the analyte was eliminated from further consideration and does not appear in the summary tables.

Section 2
ENVIRONMENTAL SETTING

This section discusses the general physiographic, climatic, geologic, and hydrogeologic setting of Galena Airport and Campion AS. In addition, the background levels of metals in soil and water are reviewed and discussed.

2.1 Basewide Contaminant Release Models (CRMs)

The basewide CRMs for Galena Airport and Campion AS summarize current information regarding the geography and hydrogeology in conjunction with source areas and release mechanisms. Information relating to the transport of contaminants and exposure routes and receptors are presented under separate cover in a baseline risk assessment report (USAF, 1996).

2.1.1 Galena Airport CRM

Thirteen sites have been identified at Galena Airport as areas of contaminant release. These sites and their respective source areas are shown in the CRM in Figure 2.1-1. Section 3 discusses the sampling results from the RI field investigation and provides tables listing the chemicals detected in water and soil samples collected during the RI (at levels exceeding one half the analyte specific screening criteria, as described in Section 1.3). The predominant groundwater contaminants identified consist of fuels, fuel constituents, and chlorinated solvents. Soils analyses indicate the presence of fuels and fuel-related constituents, pesticides, PNAs, and chlorinated solvents.

Conceptual contaminant release mechanisms are shown in the CRM in Figure 2.1-1 and are pertinent to several sources for both groundwater and soil contamination. Soil contamination can result from the spill and release of fuels or solvents from pipelines, tanks, floor drains, waste disposal/storage facilities, and the fire protection training area. Contamination of the soil can also occur from fuel-handling-related spills and aggressive application of pesticides. Many of these contaminants have seeped into the soil and become bound to soil by sorptive or capillary forces. Contaminated soils can slowly release contaminants as precipitation infiltrates to the groundwater table. Substantial water table fluctuations (up to 20 ft) can also increase the transfer of contaminants from the soil to groundwater.

2.1.2 Campion AS CRM

Eight sites have been identified at Campion AS as areas of past contaminant release. No further action has been proposed for seven of these sites, shown on the Campion CRM (Figure 2.1-2). The location and status of one site, the Long Range Radar (LRR) Station (OT001), is not known. The current area of interest is limited to the POL Area (ST007), although some work was conducted at three of the proposed NFRAP sites. Section 4 discusses the results from the RI and provides summary tables of the analytical results for soil and water samples. Fuels that leaked from former fuel oil storage tanks appear to be the source of soil contamination at the Campion POL Area. Surface water flow from the site may have contributed to the migration of contaminants from the POL Area.

2.2 Climate

Both Galena Airport and Campion AS lie in the Continental Climatic Zone of Central Alaska. Precipitation and surface winds are generally light and variations in winter and summer temperatures can be extreme. Table 2.2-1 gives temperature, precipitation, snowfall, and wind data for Galena Airport.

2.3 Regional Geologic Setting

Galena Airport and Campion AS are located in west-central Alaska in the Central

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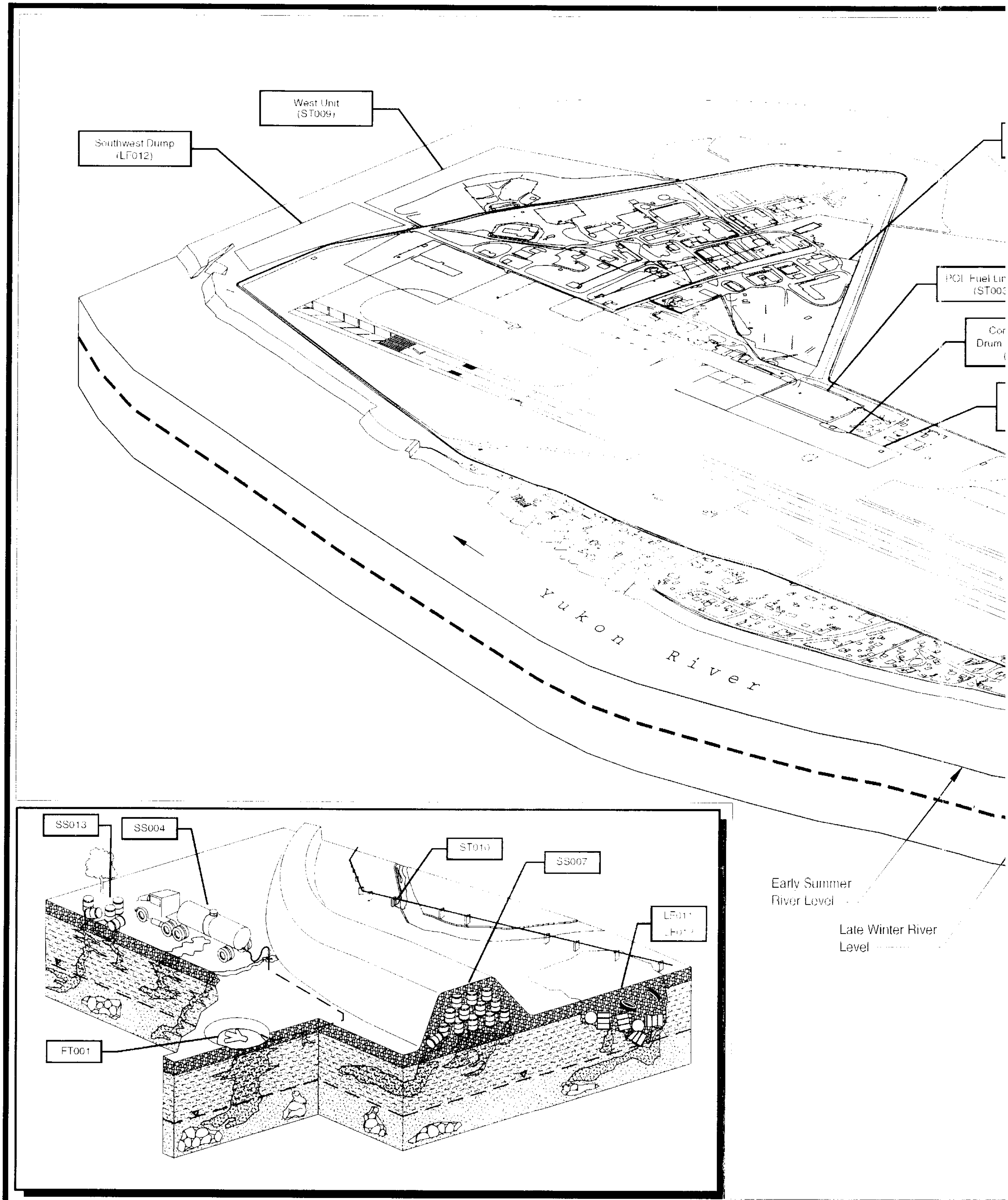


West Unit (ST009)
Southwest Dump (LF012)
POL Fuel Lin (ST003
Yukon River
Early Summer River Level
Late Winter River Level
SS013
SS004
ST010
SS007
FT001

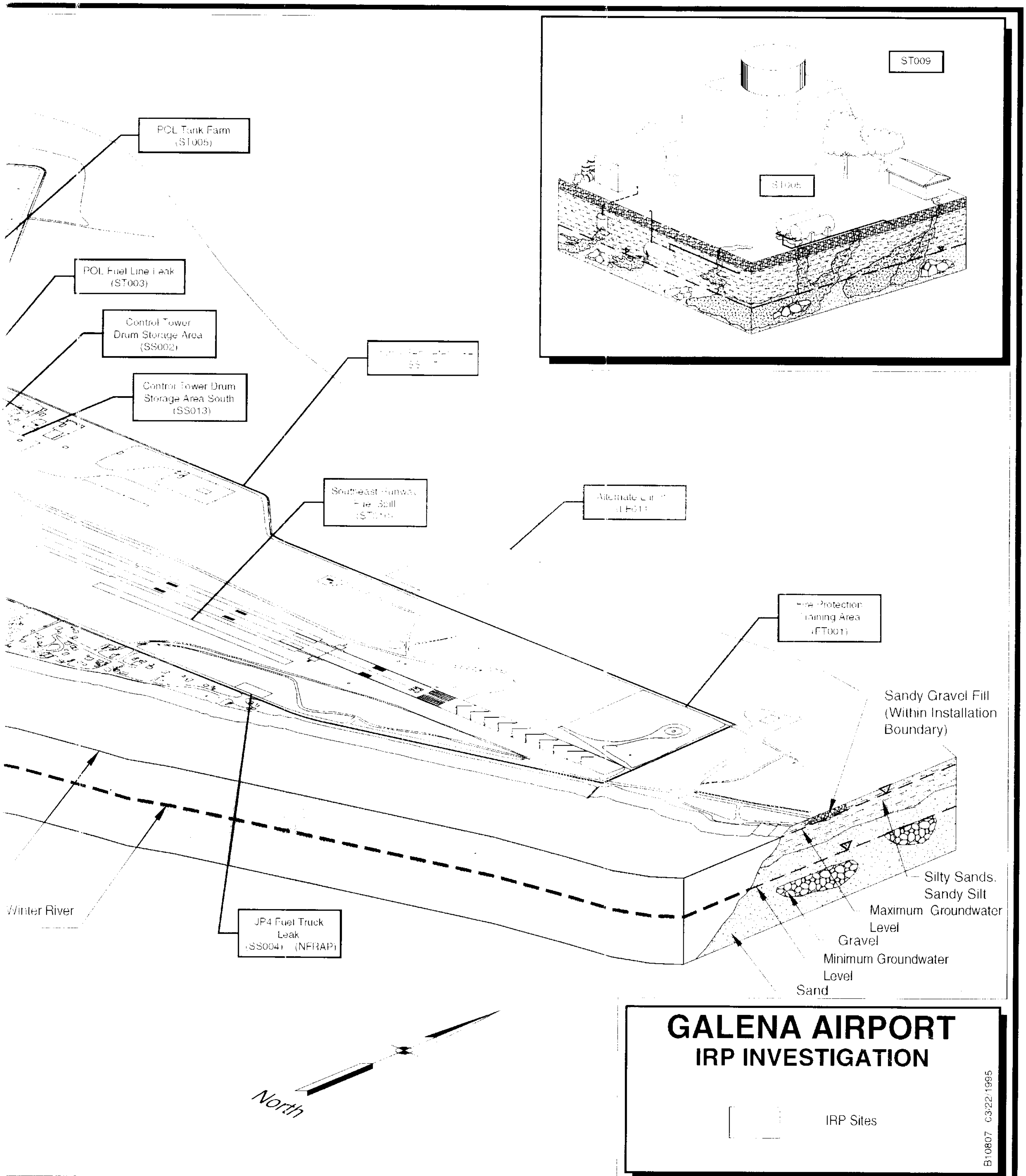
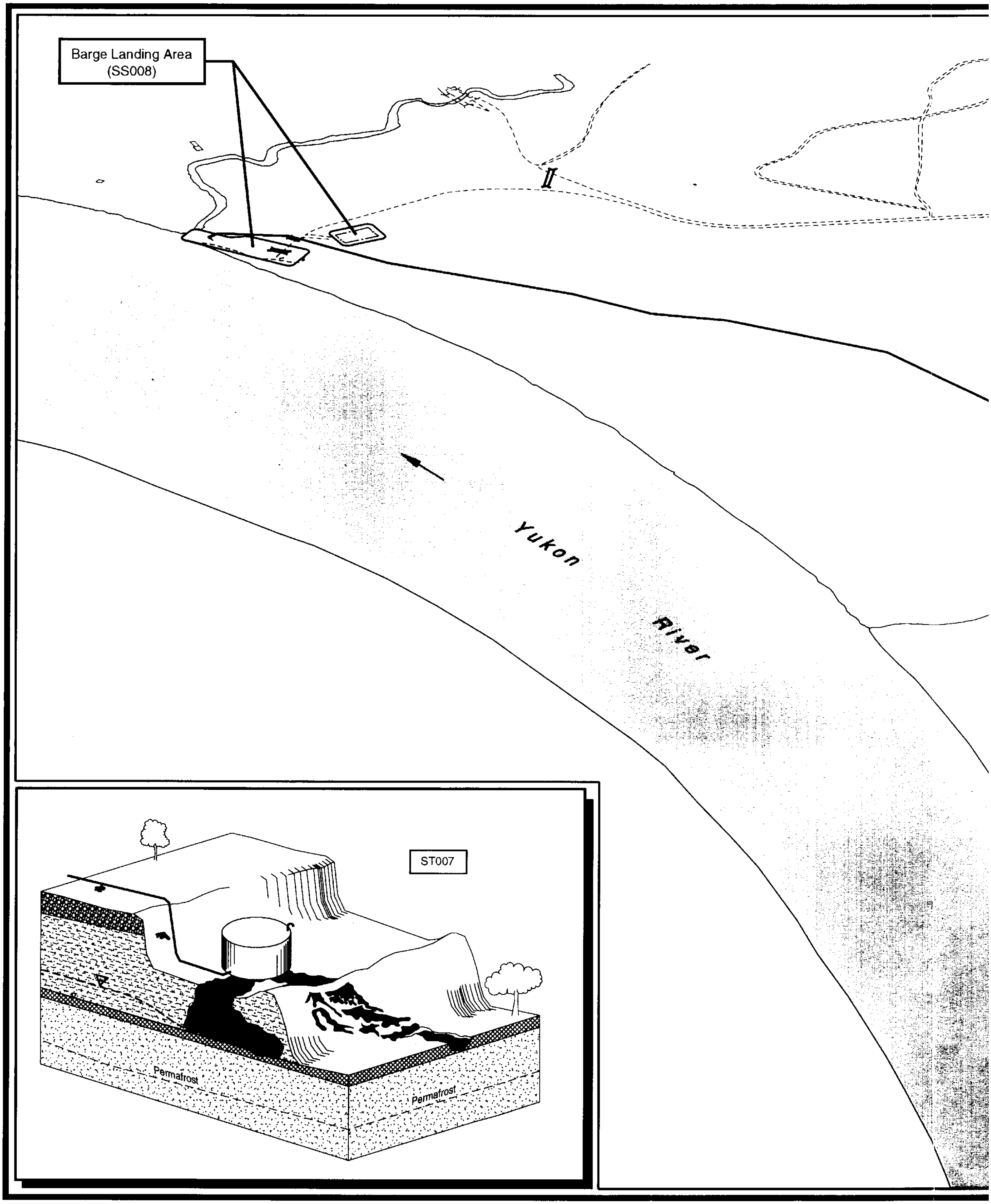


Figure 2.1-1. Galena Airport Basewide Contaminant Release Model


Barge Landing Area
(SS008)
Yukon River
ST007
Permafrost
Permafrost

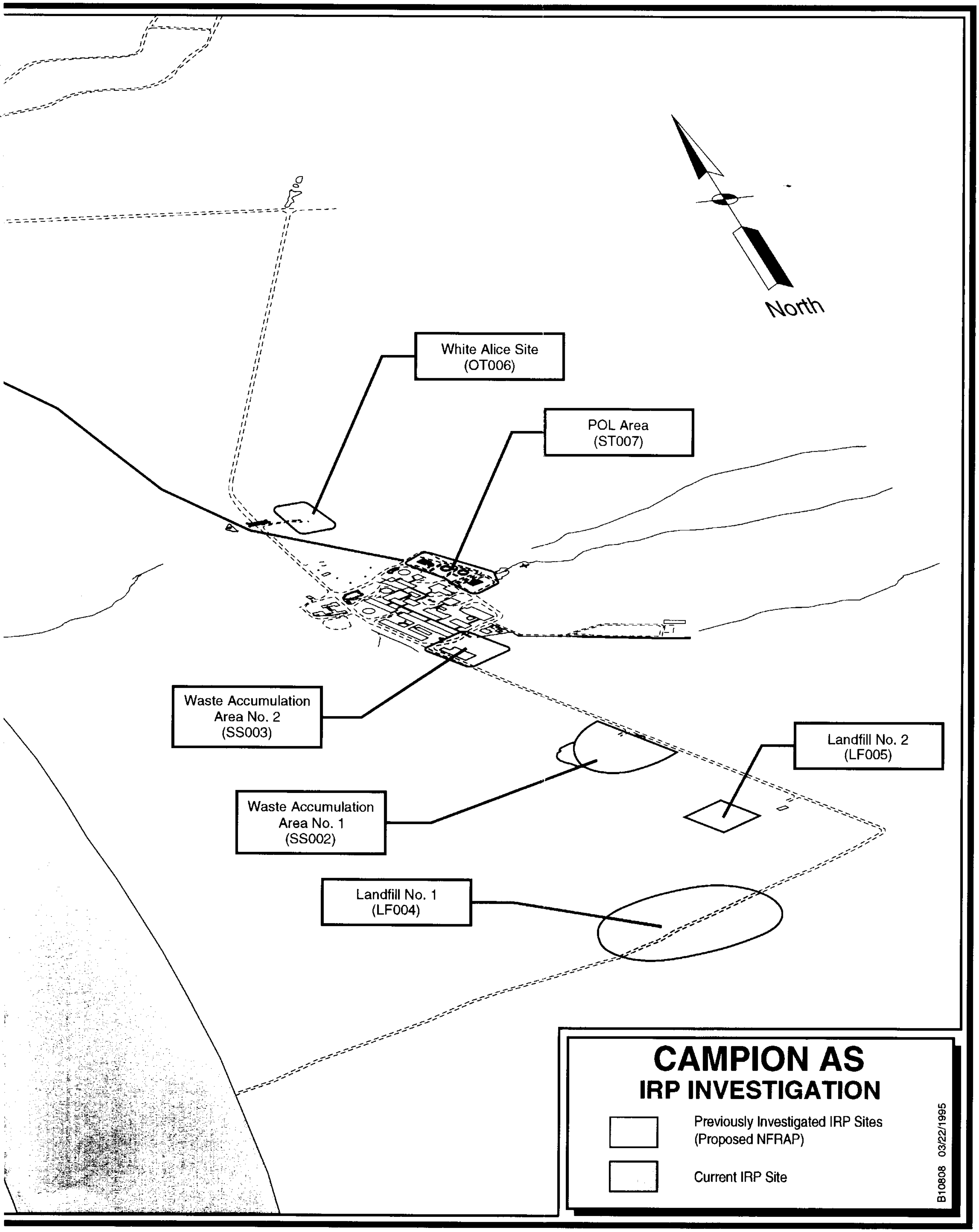


Figure 2.1-2. Campion AS Basewide Contaminant Release Model

Table 2.2-1
Galena Airport Climatological Data

	Temperature (°F)					Precipitation (in.)			Snowfall (in.)		Surface Winds	
	Mean			Extreme		Monthly		Max	Monthly			
Month	Max	Min	Monthly	Max	Min	Mean	Max	24 hrs	Mean	Max	Prevailing Direction	Speed (kt)
January	-3	-19	-11	45	-64	0.7	2.0	0.9	7.8	32.0	N	4.1
February	2	-17	-7	41	-57	0.8	2.0	1.2	8.8	37.0	N	5.0
March	16	-5	6	50	-54	0.7	2.0	1.5	8.0	42.0	N	5.5
April	32	13	23	64	-35	0.6	1.5	0.6	6.0	42.0	N	6.4
May	53	35	44	82	-1	0.6	1.6	1.2	0.5	28.0	N	6.0
June	66	49	57	92	33	1.2	2.4	1.3	0.0	0.0	WSW	5.9
July	67	52	60	89	36	2.0	4.5	1.0	0.0	0.0	WSW	5.6
August	62	48	55	87	28	2.3	5.0	1.4	0.0	0.0	SW	6.0
September	51	37	44	75	12	1.4	4.0	1.2	0.3	2.0	N	6.1
October	29	18	24	56	-29	1.0	2.1	1.1	8.5	16.0	N	5.8
November	12	-2	5	45	-49	1.0	1.1	0.9	10.3	21.0	N	4.9
December	-2	-17	-10	44	-62	0.8	1.2	0.9	10.1	30.0	N	3.8
ANNUAL AVERAGE (A) OR TOTAL (T)	**32.1 (A)**	**15.9 (A)**	**24.0 (A)**			**12.7 (T)**			**60.2 (T)**		**N (A)**	**5.4 (A)**

Period of Record: 1949-1984.
Source: Alaska Climate Summaries, Arctic Environmental Information and Data Center.

Subregion of the Yukon River Physiographic Region, as shown in Figure 2.3-1. The Central Subregion is composed of the lowlands, plains, and interior highlands that are drained by the Yukon River and its tributaries between the Koyukuk and Tanana River watersheds. Regionally, exposed bedrock consists of predominantly Mesozoic and Cenozoic volcanic rocks, Lower Paleozoic metamorphic rocks, and Cretaceous and Lower Cretaceous sedimentary rocks. Also present in the region, but to a lesser extent, are numerous exposed Mesozoic and Cenozoic intrusive and ultramafic rocks.

In terms of structural geology, the area is defined by the Yukon-Koyukuk Basin, which extends from the Bering Sea to the Canadian border and occupies an extensive structural trough formed by subsidence during the Cenozoic period. The Kaltag Fault, a major east-west tracing fault, also extends across the region. The Yukon River follows the trace of the fault from Tanana to the meander south of Campion AS where the river course becomes more northerly.

The entire Yukon valley area is characterized by meandering and braided streams. Oxbow lakes, point bar accretionary ridges, and river chutes combine to create a ridges-and-trough topography that reflects the constant readjustment of the meandering Yukon River system to changes initiated by seasonal flooding events. In general, large quantities of sediment are deposited along the inside of meander loops, whereas the opposite banks experience extensive erosion. Large accumulations of wind-blown sediments, called loess, are also common across the floodplain.

2.4 Galena Airport Hydrogeology

An understanding of the hydrogeologic framework is important for characterization of contaminant distribution and migration. This information is also important to accurately evaluate site-specific risk and remedial action alternatives. Geologic and hydrologic conditions present at Galena Airport are summarized in this section.

2.4.1 Galena Airport Geology

Galena Airport is located within the floodplain of the Yukon River, a typical coarse-grained meandering bed-load river that is characterized by highly variable discharge, flow velocities and gradients, and typically high width:depth channel ratios. Suspended sediment content varies seasonally, and is highest in the spring and summer. Bedload sediment transport varies with flow velocity and consists of sand, gravel, and cobbles. Chute cutoffs are common features and, during high seasonal flow, rapid thalweg (the deepest portion of the channel) and meander shifts occur, resulting in extensive bank erosion, flow alignment modification, and bar deposition. Spring flooding is common on the river because of high surface runoff associated with seasonal snow melt and the local formation of river ice dams during breakup.

The Yukon River deposits broad laterally and vertically amalgamated sand bodies from the rapid lateral migration of bed-load channels. Erosion is common on the river's banks during high flow conditions, and previously deposited floodplain sediments are often transported further downstream. This results in the limited preservation of normally extensive floodplain deposits. The meandering Yukon has also resulted in the erosion of the banks just upstream of Old Town Galena, prompting the construction of a sheet piling wall in 1960 to minimize further erosion.

The geology of Galena Airport is dominated by undifferentiated fluvial Quaternary sediments deposited by the Yukon River to a depth greater than 200 ft. These sediments consist of unconsolidated stratified layers of silt and sand near the top of the sequence, underlain by gravel, sandy gravel, silty sand, and sand. The fence

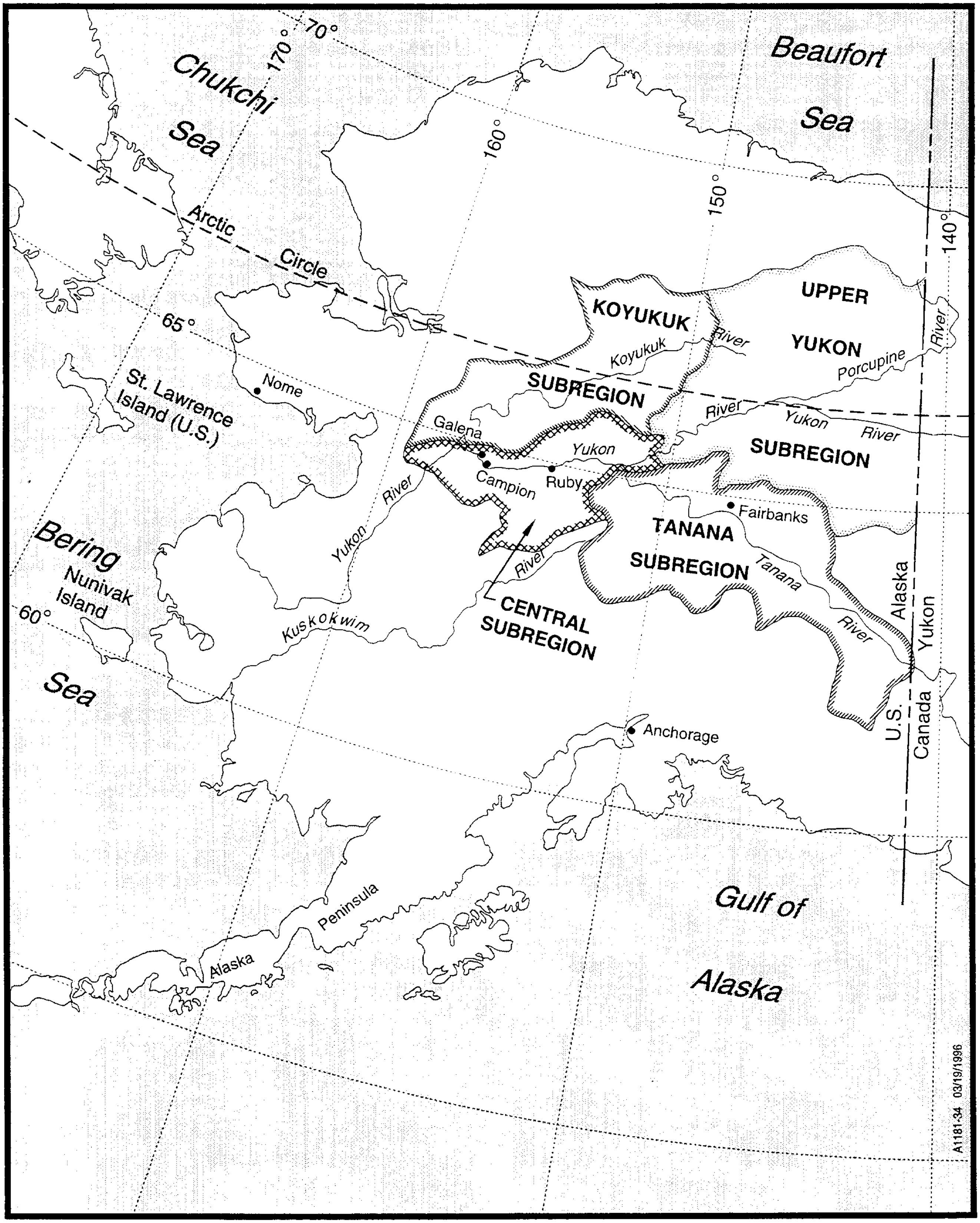


Figure 2.3-1. Physiographic Provinces and Major Watersheds, Central Alaska

diagram in Figure 2.4-1 was constructed from the drilling logs of monitoring wells completed during the 1992 and 1993 RI in the main installation area. The drilling logs and other field forms are provided in Appendix E. Four main units are defined in the subsurface. These units include the following:

- Construction fill material;
- Floodplain silty sand and sandy silt;
- Channel fill sand; and
- Channel fill sandy gravel and gravel.

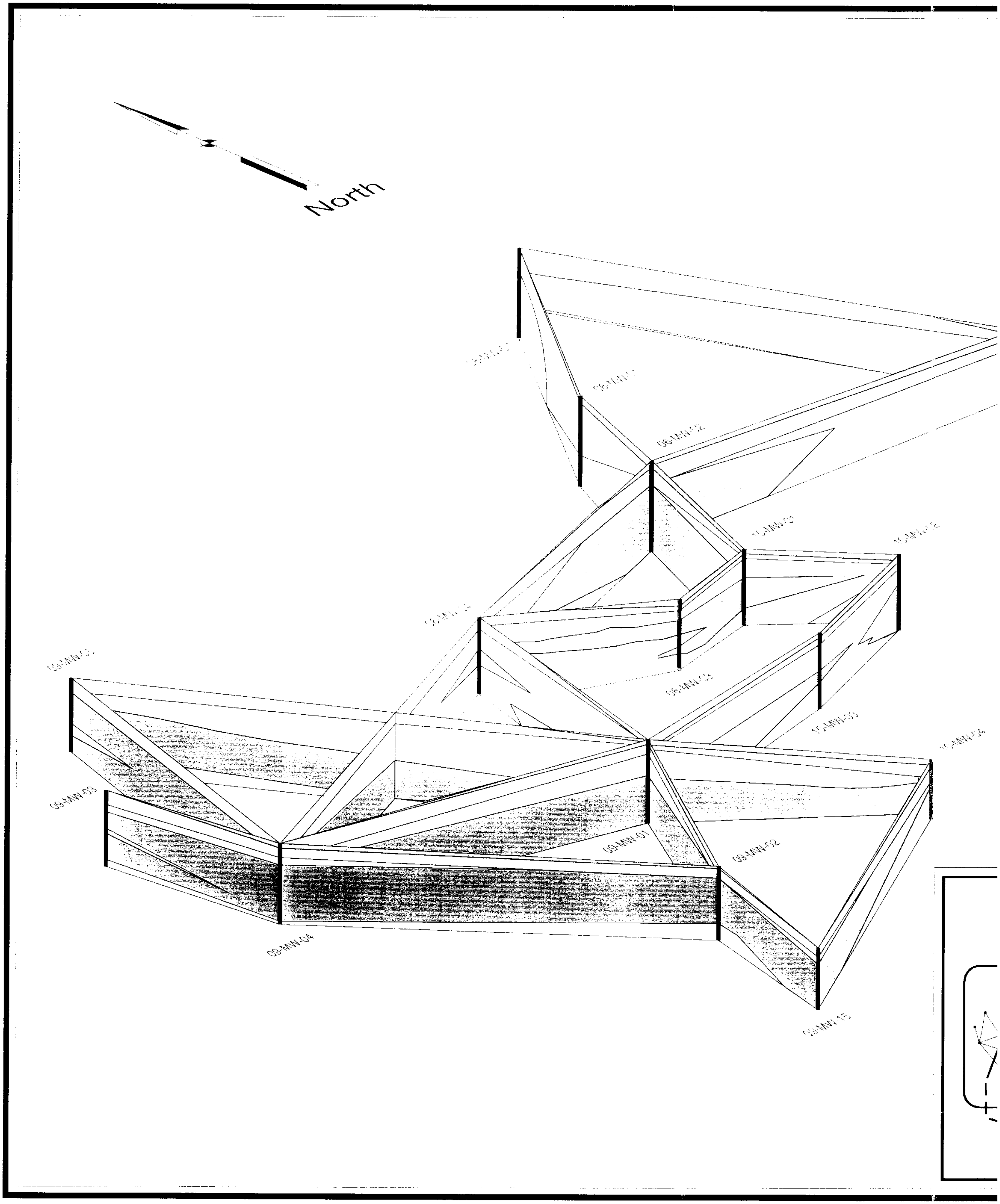
Logs of test borings and test wells indicate that much of the northern portion of Galena Airport has been covered with fill material consisting of silty gravel and poorly graded gravel that generally ranges in thickness from 0 to 6.5 ft. This material was "mined" from the large transverse bar in the Yukon River that is exposed during periods of low flow, generally late summer. Fill material is abnormally thick (20 ft) in the area of Million Gallon Hill, where a substantial amount of material was brought in during the construction of USTs No. 37 and No. 38.

The uppermost naturally occurring unit consists of floodplain deposits that are composed of 3 to 25 ft of dark olive gray to brown, mostly poorly graded silt to silty sand. This unit contains abundant wood chips, rootlets, and other organic fragments and appears to be thickest in the northern portion of the main installation and at the FPTA.

The complex scour and fill processes that occur during channel migration result in the deposition of stacked and amalgamated channel complexes that are difficult to interpret. The lowest units observed during the drilling exercises are believed to represent this type of deposit. Olive gray/black to yellowish-brown, fine- to medium-grained, poorly graded sands and gravelly sands are found immediately below the floodplain deposits. Discontinuous lenses of poorly to well graded, well-rounded sandy gravel and gravel are representative of historic channel lag deposits.

Many of the test borings, test pits, and wells completed at Galena Airport in the 1950s and 1960s encountered areas of permanently frozen ground, or permafrost, either as near-surface isolated lenses or as continuous layers beginning 20 ft or more below grade. In undisturbed vegetated terrain, the permafrost is usually present within 10 ft of the ground surface, and may also be present at depth, depending on the porosity and permeability of the alluvium. However, the distribution of permafrost beneath the airport facility is increasingly sporadic closer to thaw zones created by the Yukon River and recently abandoned meander loops.

During development of the Galena Airport facilities, gravel pads were constructed to minimize thawing of permafrost and subsidence of the compressible alluvial soils. In addition, some heavy structures (e.g., a power plant) have been built on pilings both to minimize settlement and to reduce the effects of permafrost thaw on buildings. Nevertheless, in much of the area near the main installation, permafrost zones are now absent as deep as 60 ft (based on observations from boreholes), and may be absent to over 200 ft (based on an Air Force water supply well log). The removal of insulating vegetative cover and the absorption of radiant heat from installation buildings and utilities have probably thawed most of the permafrost that was once present at the airport. On the basis of the recent borehole logs, the presence of permafrost in the airport area is now believed to be very sporadic and limited to thin isolated lenses. Discontinuous permafrost lenses were encountered while drilling soil borings and wells immediately south of the POL Tank Farm and under the tarmac at monitoring well 05-MW-15. Continuous permafrost was observed only at the eastern edge of the FPTA and across the Ambient Location.


North
06-MW-12
09-MW-03
09-MW-04
09-MW-01
09-MW-02

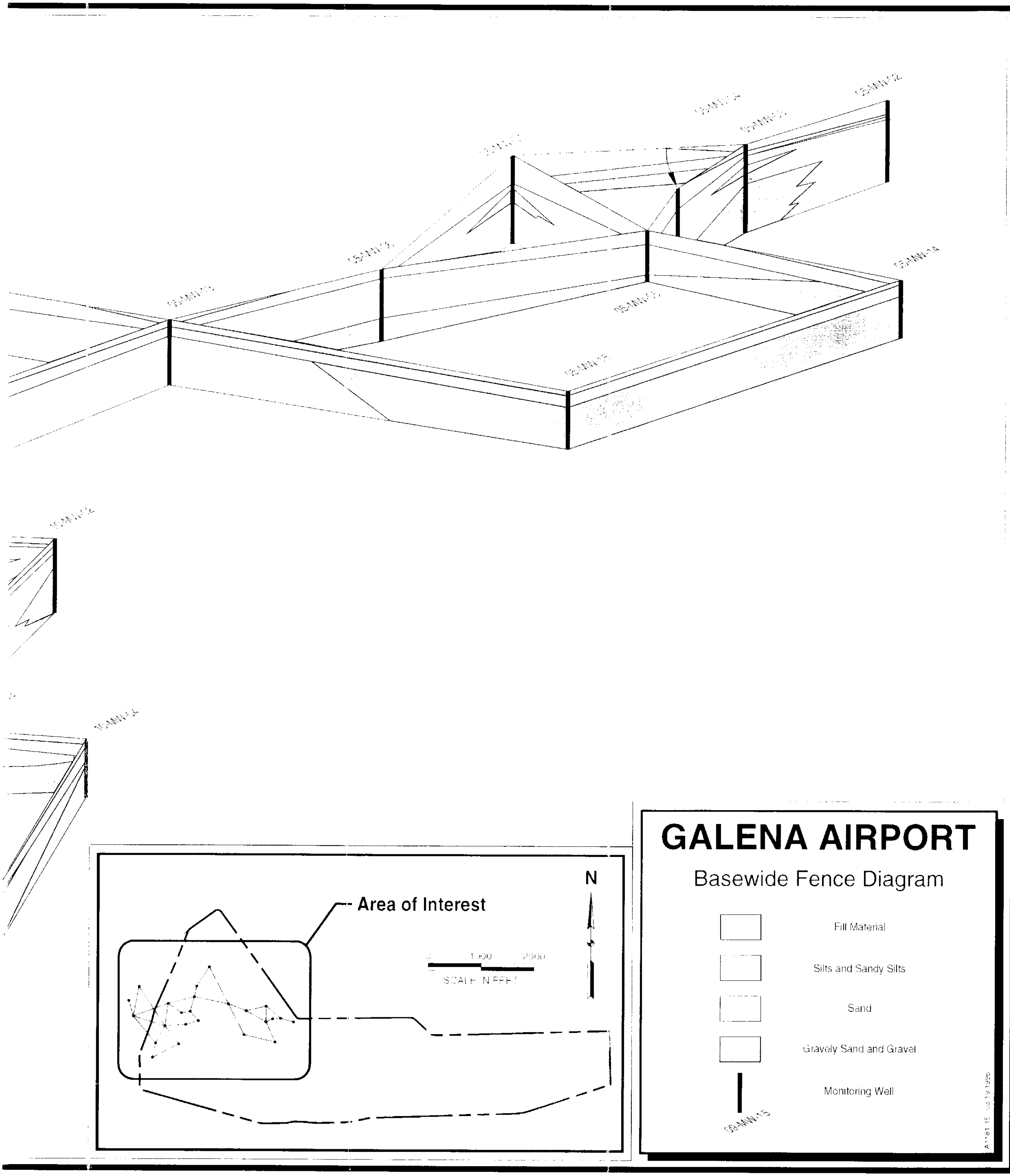


Figure 2.4-1. Geologic Fence Diagram, Galena Airport, Alaska

2.4.2 Galena Airport Surface Hydrology

The Yukon River is the dominant surface water feature in the Galena Airport area. The closest U.S. Geological Survey gauging station to Galena is located in Ruby, Alaska, approximately 50 miles upstream from Galena, and was monitored between 1956 and 1978. During this time the highest recorded discharge occurred 20 June 1964 at 970,000 cfs; the lowest flow, measured during March and April 1959, was only 17,000 cfs. The streamflow hydrograph in Figure 2.4-2 illustrates the typical high seasonal flow variability of Yukon River. The rapid rise in discharge occurring in May marks the breakup of the river and rapid influx of snow melt. The river flood wave peaks in June and begins a gradual decline that continues until the following spring breakup. The river is typically frozen November through May, and during this time river discharge continues to decrease.

Streams and rivers in the vicinity of Galena Airport, shown in Figure 2.4-3, are characterized by low gradients, meandering courses, and spring flooding. Thaw lakes, oxbow lakes, and river-flooded basins are also surface features of the nearby area. Surface water drainage outside the Galena flood control dike occurs by overland flow into unnamed drainages or sloughs that discharge directly into the Yukon River. Ephemeral discharge may occur into Bear Creek, which flows along an abandoned meander loop north of the Galena Airport boundary and discharges into the Yukon River approximately 5 miles downstream of Galena.

Surface water within the diked portion of Galena Airport is limited to ephemeral drainage ditches and associated small stagnant water bodies. During the summer of 1992, small ponds composed of Yukon River flood-water persisted for several months. Generally, precipitation rates do not exceed the soils infiltration capacity, and surface water flow in the drainage ditches is rare. However, in the early spring, when the shallow subsurface soil remains frozen, precipitation runoff and snow melt flows to open ditches and ultimately accumulates in the southwest corner of the installation. There, the pump lift station pumps the water from the diked facility to an outfall adjacent to the Yukon River. These lift pumps are used only for a short period each year during spring breakup when large quantities of snow melt accumulate in the southwest corner of the facility.

2.4.3 Galena Airport Aquifer Properties

Groundwater at Galena Airport exists in an unconfined alluvial aquifer consisting of interbedded sequences of sand and gravelly sand, with minor silt fractions. An extensive hydrological investigation of the main Galena installation was conducted during the summer of 1993. The results of these tests are reported separately in the *Aquifer Test Report, Galena Airport, Alaska* (USAF, 1994) and are summarized here.

The unconfined aquifer at Galena Airport is greater than 200 ft deep and exhibits strong communication with the Yukon River. The depth to water table varies from approximately 5 to 25 ft below ground level (bgl) on a seasonal cycle in response to changes in stage of the Yukon River. The hydrographs in Figure 2.4-4 show the relationship between groundwater table elevation and Yukon River elevation. The streamflow hydrograph in Figure 2.4-2 shows the rapid increase in river stage due to the arriving flood wave. During this time the Yukon River becomes a losing river, meaning that flow is induced into the river banks and recharges the local unconfined groundwater aquifer. This condition, referred to as bank storage, continues for a short period, until the river crests and begins its gradual decline. At that point, the river becomes a gaining stream, meaning that groundwater flow is reversed and groundwater discharges into the Yukon River. When the Yukon River floods in the spring and early summer, the resulting groundwater rise saturates the upper silty sand zone of the aquifer. During the remainder of the year, as regional precipitation, recharge rate,

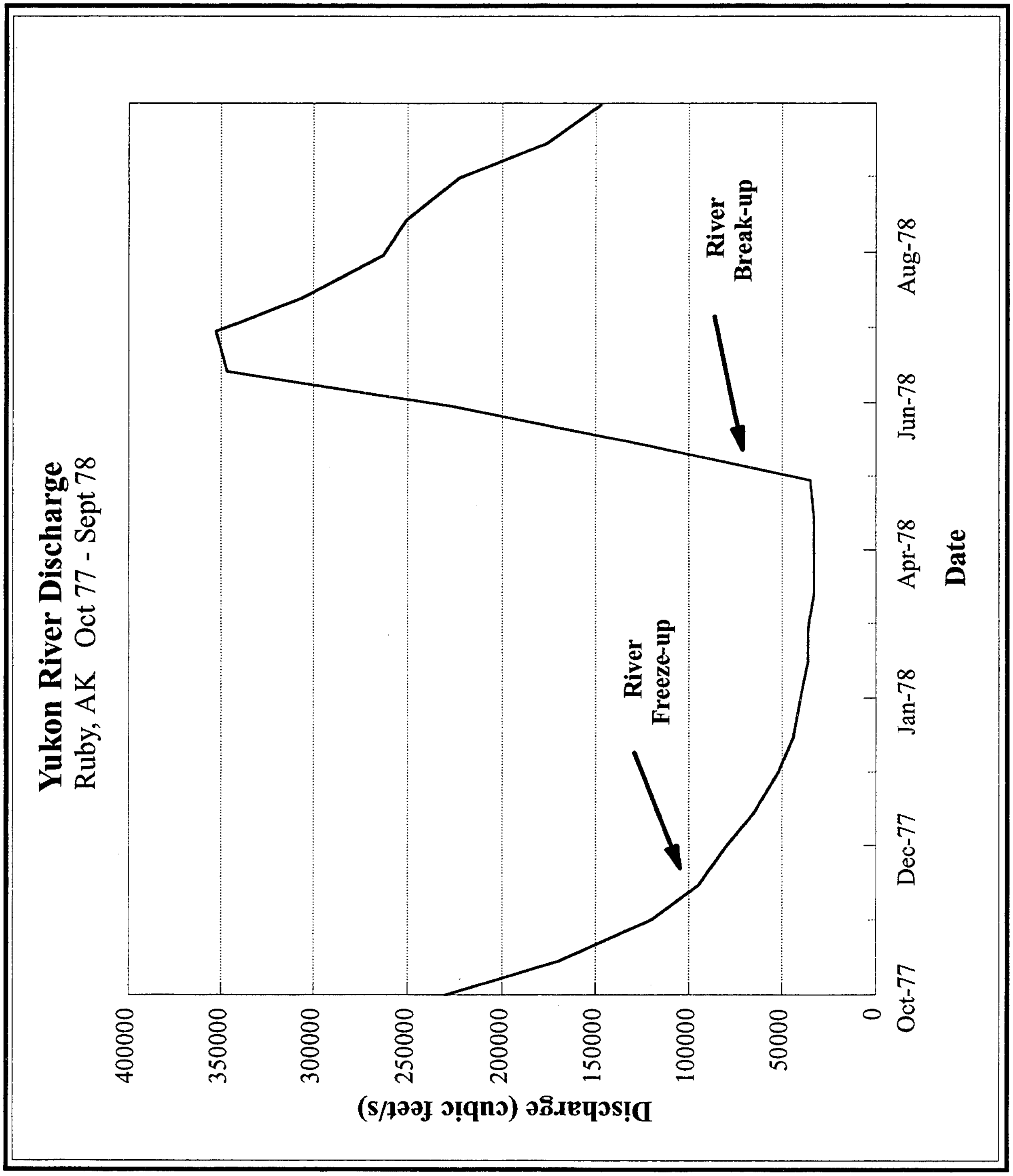


Figure 2.4-2. Yukon River Streamflow Hydrograph, Ruby, Alaska

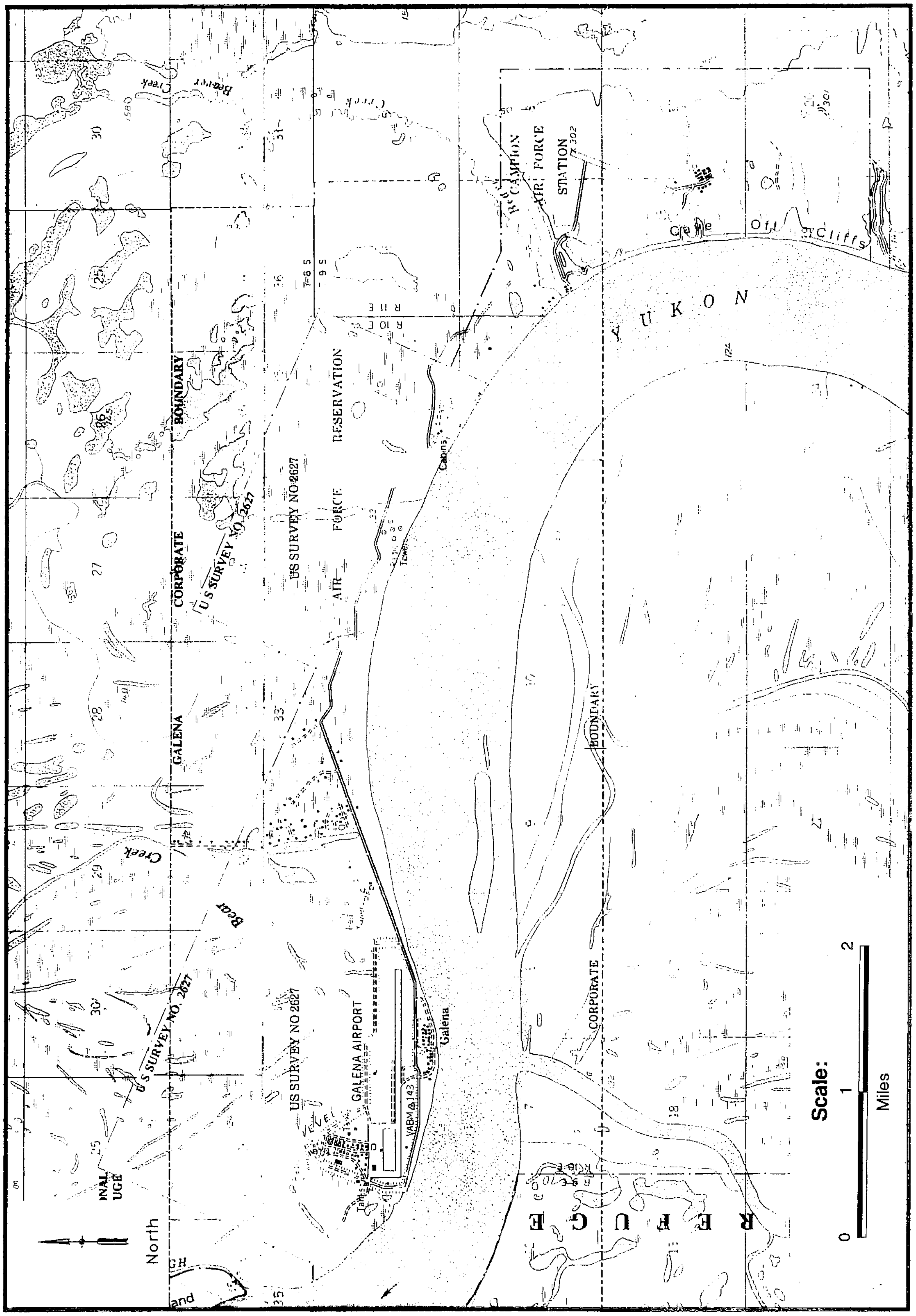


Figure 2.4-3. Galena Airport and Campion AFS Topography and Surrounding Surface Water Features

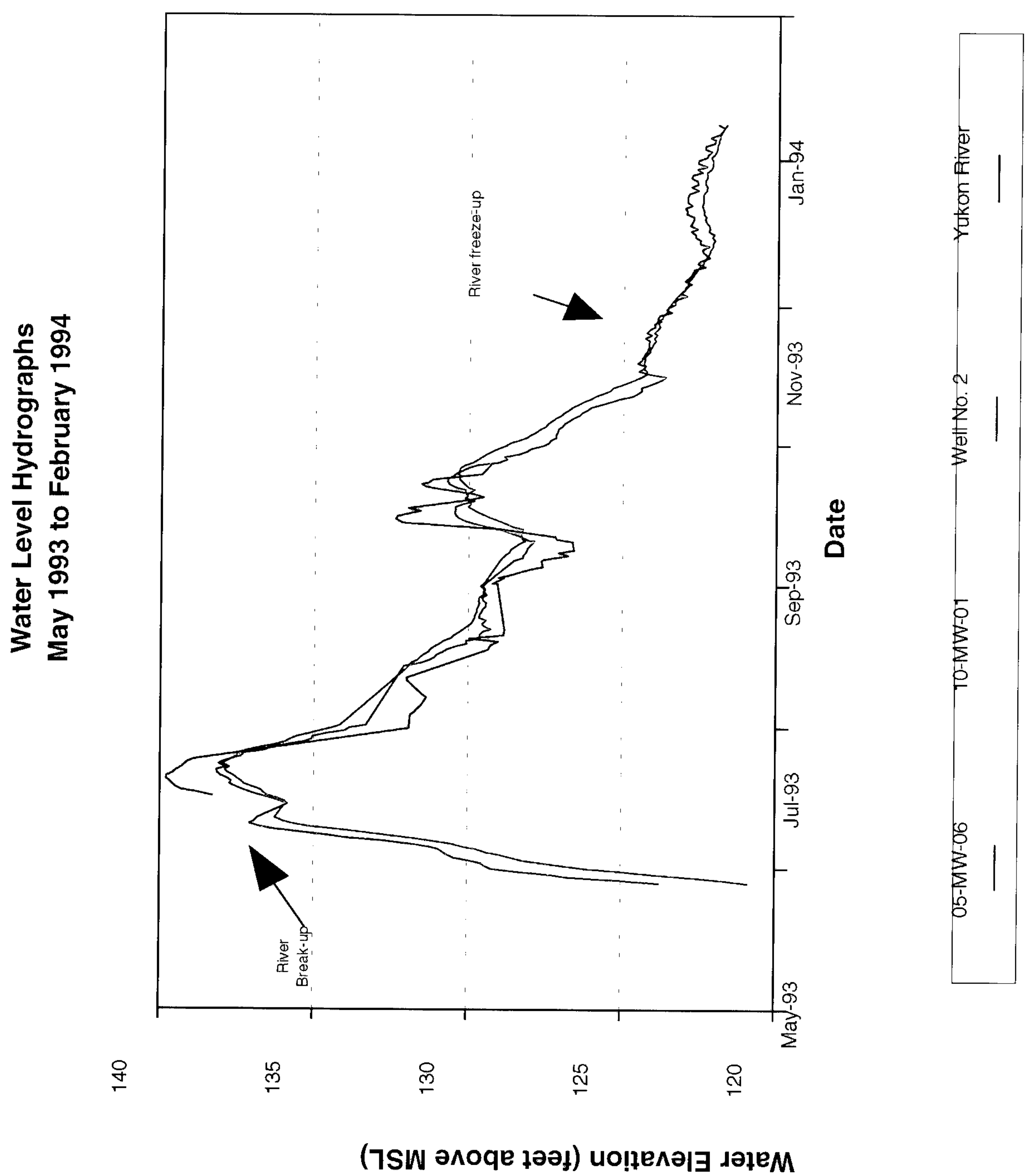


Figure 2.4-4. Groundwater and Yukon River Elevations, May 1993 Through February 1994

and Yukon River level decreases, the groundwater level also declines, and the water table retreats to the deeper coarser grained portion of the aquifer. During the winter months, the aquifer level continues to subside after the Yukon River freezes.

The close correlation between water level fluctuations recorded in the shallow portion of the aquifer at monitoring wells 05-MW-06 and 10-MW-01 and the deeper aquifer at the base water supply well No. 2 suggests that there is unrestricted communication between these aquifer zones. Previous investigations (USAF, 1985, 1989a) assumed that permafrost at Galena acted as a confining layer that separated an upper and lower aquifer. It is now believed that the upper water table aquifer extends to depths greater than 200 ft.

Changes in groundwater flow direction and velocity as a result of changes in river stage were measured directly by the 11 CEOS/CEVR using a down-hole flowmeter in a group of wells installed for pump test observations near monitoring well 05-MW-06. The results of these flow meter tests are presented in detail in the *Aquifer Test Report, Galena Airport, Alaska* (USAF, 1994). Figure 2.4-5 summarizes groundwater flow velocities and flow directions recorded during the Yukon River flood stage from 25 to 28 May 1993 and during late summer low water stage from 21 to 24 August 1993. These results show that groundwater flow during river flood stage is away from the river, or toward the north, at a rate of 1 to 5 ft/day, with maximum groundwater velocity near the top of the sand and gravel unit. During the late summer low river stage, groundwater flow is southwest toward the river at velocities ranging from approximately 1 to 11 ft/day. Zones with high groundwater velocity are present at depths of 16, 36, 56, and 65 ft bgl, presumably correlating with highly transmissive gravel zones.

Pump test results generally confirm the flow meter observations of increased flow rates in sediments with larger particle size, although the velocities calculated from the pump test results are generally much lower than the velocities measured directly in the wells, as shown in Figure 2.4-6. Velocities calculated from pump test data ranged from 0.19 ft/day to 1.20 ft/day. The factors responsible for the differences in groundwater velocities determined by these two methods include the relatively short duration of the pump test, assumptions concerning the depth of influence of the pump test and other parameters included in velocity calculations, and vertical flow components affecting the flowmeter velocities.

On the basis of water level surveys conducted during July and August 1993 and January and April 1994, potentiometric surfaces have been calculated for the main airport triangle (Figures 2.4-7 through 2.4-10, respectively). Each of the maps show that isopotential lines trend northwest to southeast across the base, indicating that the direction of groundwater flow is to the south-southwest. The gradient is very low (0.0002 to 0.0005), with the lowest gradients occurring during the winter.

Groundwater flow at source areas outside of the main airport area has not been investigated in as much detail, and flow rates and directions may differ. In particular, groundwater near the northeast portion of the perimeter dike, including the alternate landfill area, may flow to the northeast into Bear Creek. This drainage initially flows away from the Yukon River, but follows an abandoned river meander and drains into the Yukon River a few miles downstream of the installation. Groundwater at the primary Galena Landfill, to the west of the Galena Airport, may flow to the west or northwest into the Yukon River, which curves to the northwest just downstream of Galena.

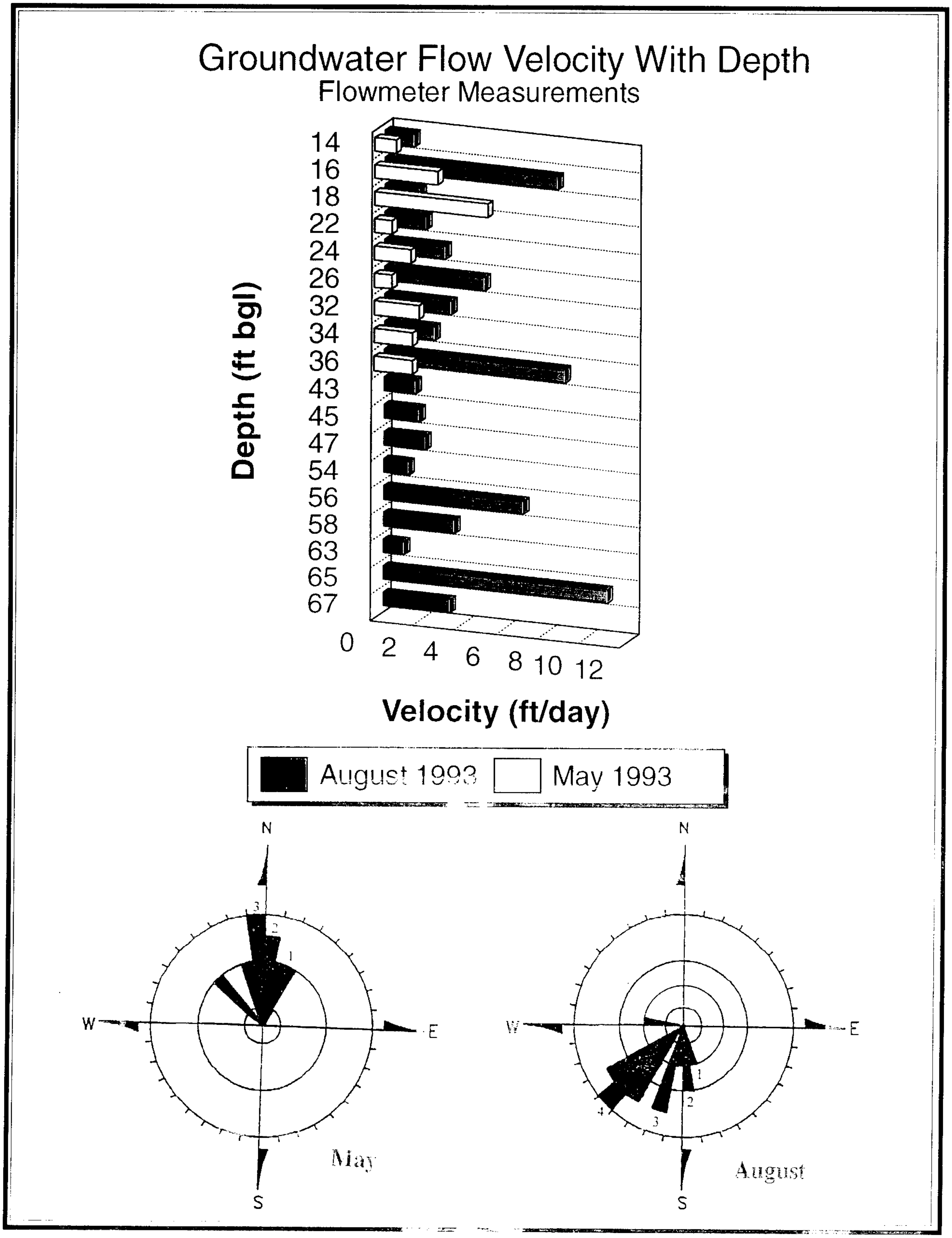


Figure 2-4-5. Flowmeter Velocity Plot and Flow Direction Rose for May and August 1993

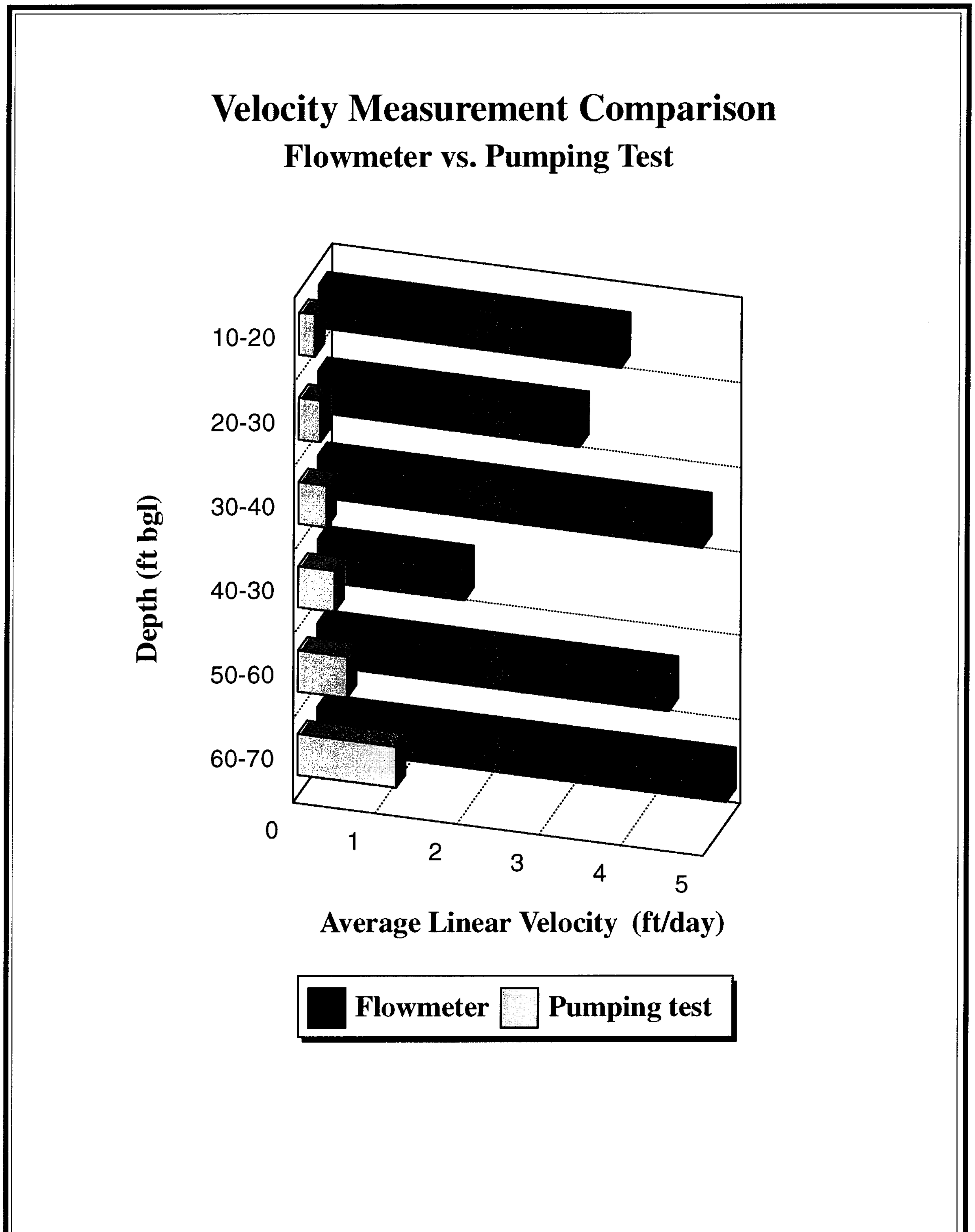


Figure 2.4-6. Comparison of Groundwater Velocities From Direct Flowmeter Measurements and Pumping Test Calculations

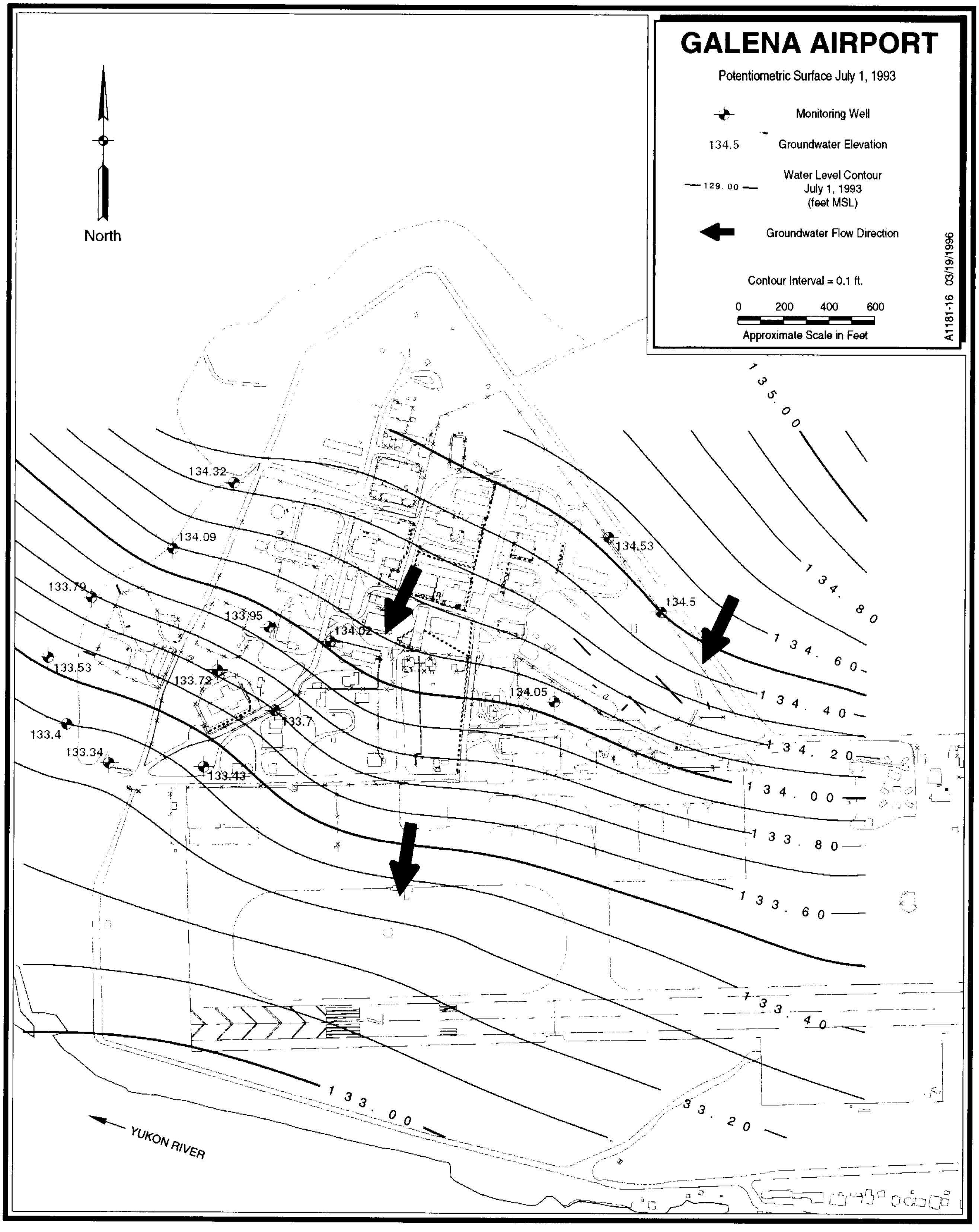


Figure 2.4-7. Galena Airport Basewide Potentiometric Contour Map for July 1993

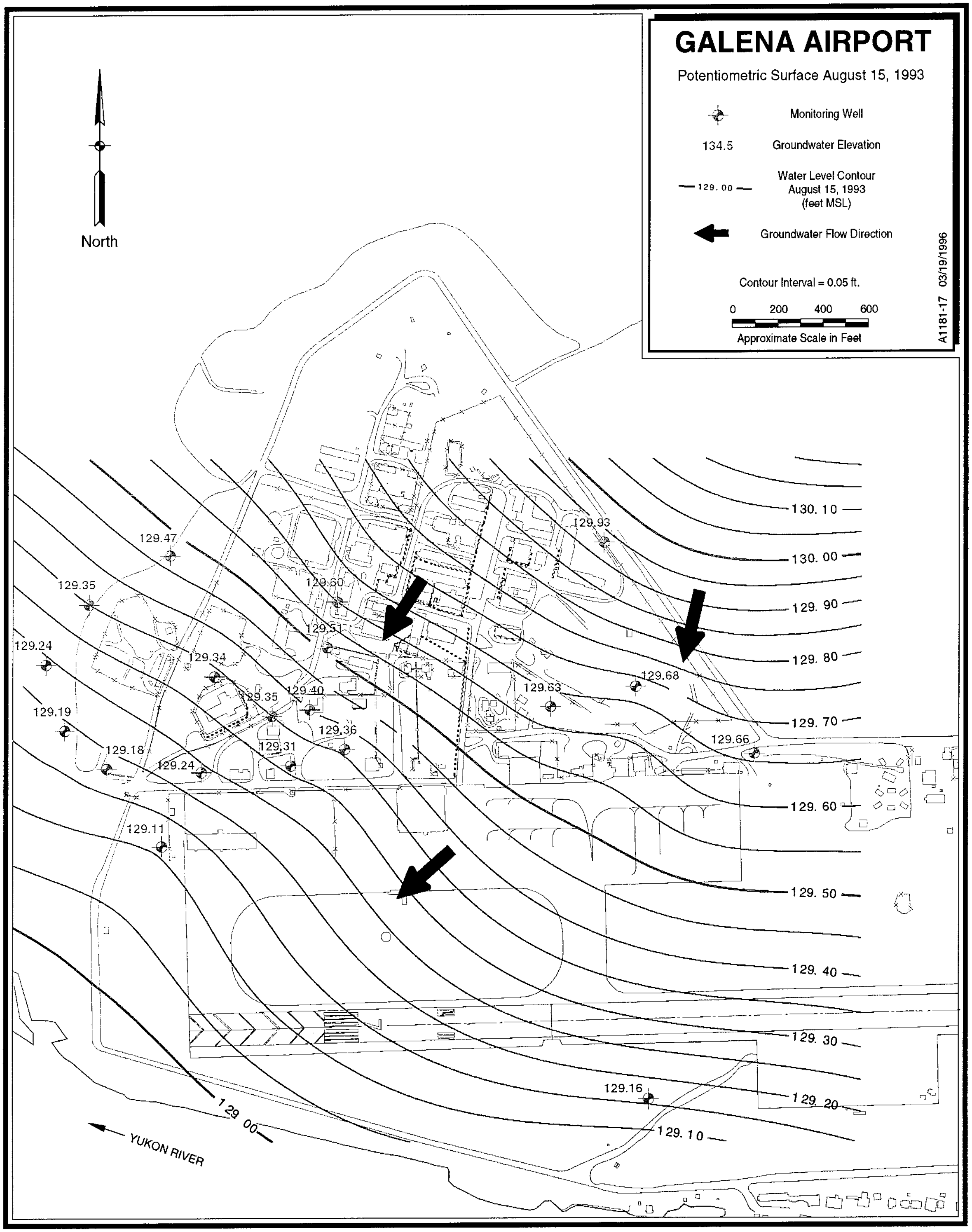


Figure 2.4-8. Galena Airport Basewide Potentiometric Contour Map for August 1993

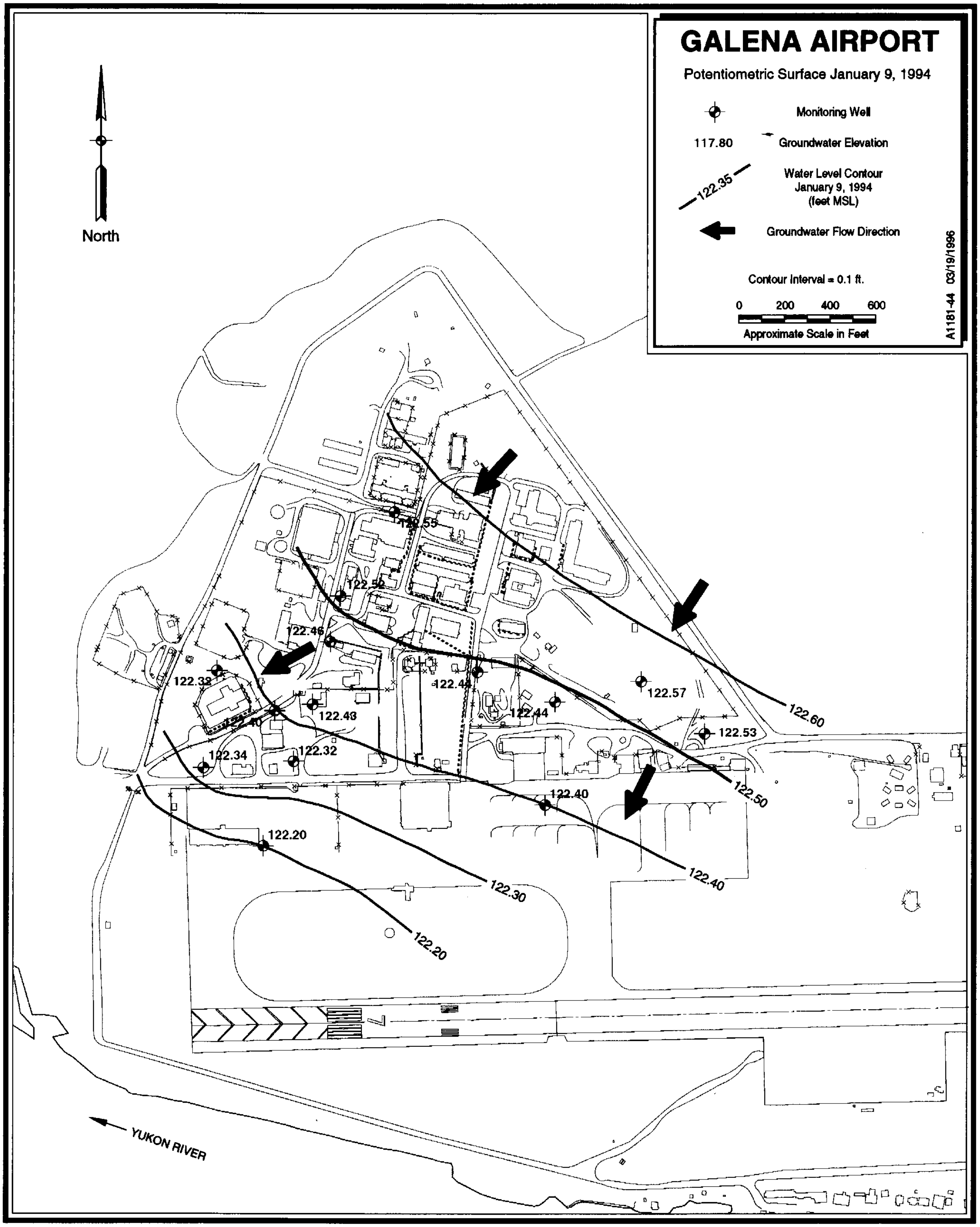


Figure 2.4-9. Galena Airport Basewide Potentiometric Contour Map for January 1994

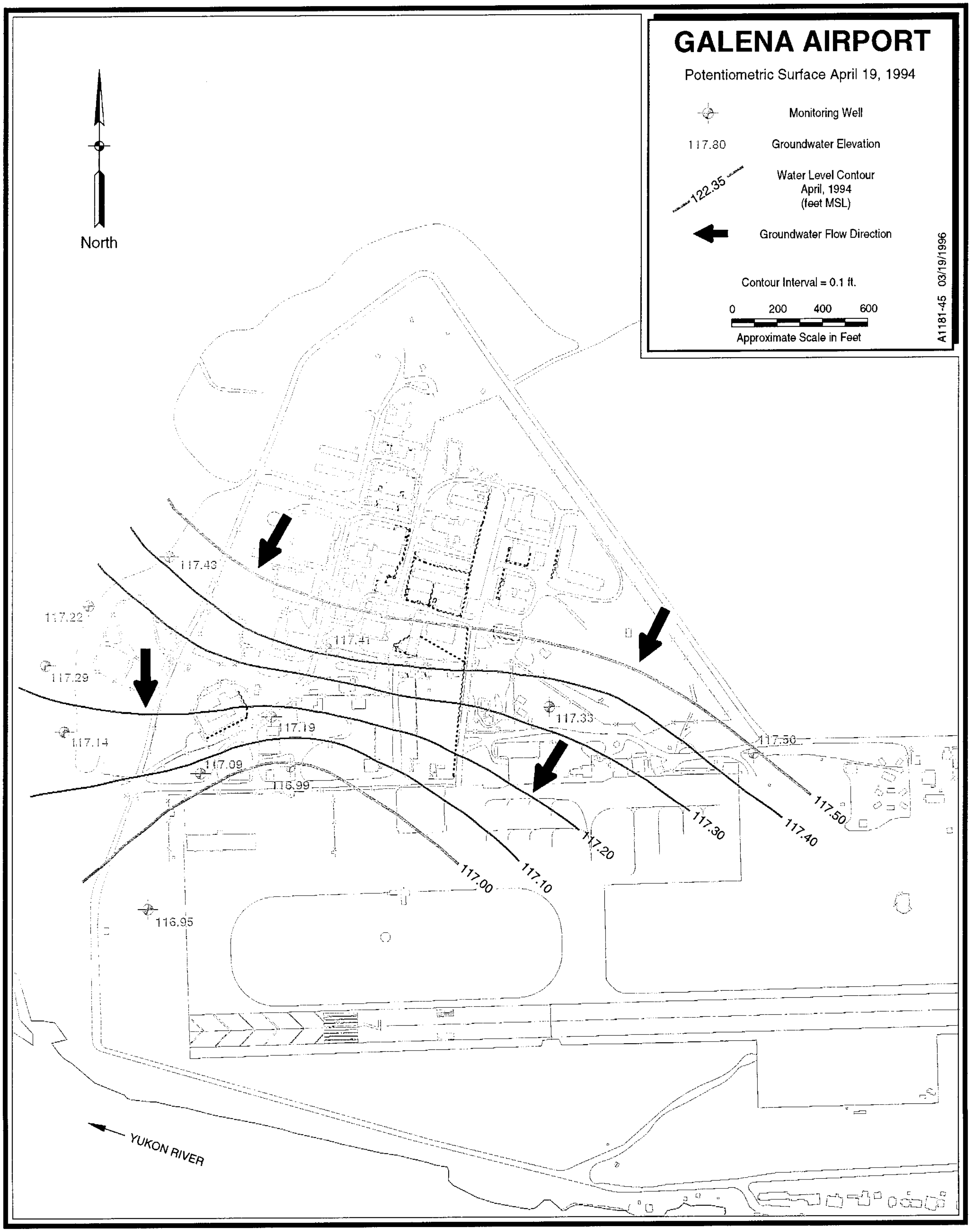


Figure 2.4-10. Galena Airport Basewide Potentiometric Contour Map for April 1994

2.5 Campion AS Hydrogeology

An understanding of the hydrogeologic framework of Campion AS is important for characterization of contaminant distribution and migration. Geologic and hydrologic conditions present at Campion AS are summarized in this section. A detailed discussion of the regional hydrogeology is presented in Section 2.3.

2.5.1 Campion AS Geology

The local subsurface conditions at Campion AS were defined by direct sampling and observation of the drilling operations during installation of the four monitoring wells, which were drilled to depths of 15, 16.5, 20, and 54.5 ft, and two soil borings. Drilling logs from these borings (Appendix E) and previous drilling activities at the site provide detailed information about the stratigraphy and geologic properties at the site.

Cross section A-A' (Figure 2.5-1) shows the subsurface geology and water table location at the site. The location of the cross section is shown in Figure 2.5-2. Monitoring well 07-MW-04 is located on the open fields to the west of the former POL Area, in the now-demolished base housing site. The ground level in this location is approximately 20 ft above the lower marshy area to the east where all of the other monitoring wells and soil borings are located. The log for this well indicates the presence of 5 ft of light brownish gray to pale yellow brown, poorly graded gravelly silt to gravelly sand. This material is probably fill that was placed over the construction areas at Campion AS. Underlying the gravelly silt/sand unit is a unit of light brownish gray to olive gray, well to poorly graded, subangular to subrounded sandy silt to sand. Organic material, such as woody plant remains, are concentrated in layers or lenses within this unit. The next unit, which is an organic-rich, olive gray to olive black clayey silt, is the shallowest unit in this boring, which correlates with the stratigraphy in the three well borings to the east. This unit ranges in thicknesses from 1.5 to 5 ft, and was also noted in boring logs for the two wells which were installed in 1986. The lowest unit drilled at the Campion POL Area is an olive to dark gray, poorly graded, subangular to rounded, silty sand to sand unit. This unit appears to be a more uniform subrounded to rounded sand to the west (07-MW-04), which grades laterally to the east (away from the Yukon River) into a subangular to subrounded silty sand (07-MW-02). Permafrost was encountered in all monitoring wells at depths between 10.5 ft and 21 ft bgl in the three wells east of the POL Area and at 50 ft bgl in well 07-MW-04, located on the hill west of the site. The persistent permafrost layer may act as a local lower confining unit.

2.5.2 Campion AS Hydrology

Regional hydrology is discussed for both Campion and Galena in Section 2.3.3. Locally, the groundwater that was encountered during drilling at Campion AS is a shallow unconfined aquifer that is perched above the permafrost. The water table is within a few feet of the ground surface over much of the eastern part of the investigation site and discharges to the surface in large seep areas, forming the majority of the surface runoff from the site. Springs and seeps are common northeast of the former POL Tank Farm resulting in swampy conditions. Water-level data collected at this site in September 1992 were used to calculate a hydraulic gradient of 0.02 and a northeastern flow direction (Figure 2.5-2).

2.6 Background Metal Concentrations

The UTLs for background metal concentrations in soils and waters were calculated using data from samples collected at the Galena Airport and Campion AS Ambient Locations. For information on the statistical procedures used to determine the UTLs, refer to Appendix D.

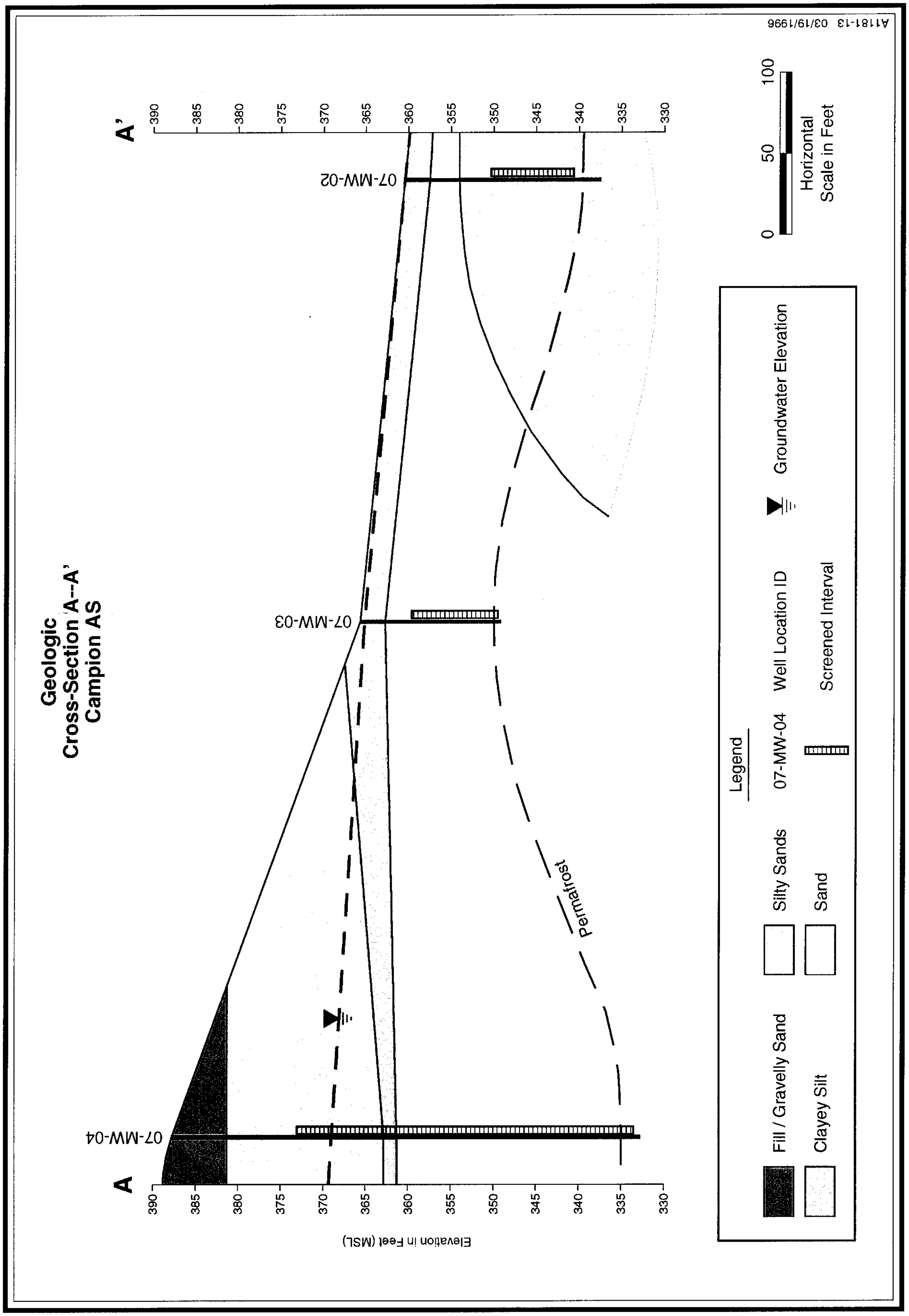


Figure 2.5-1 Geologic Cross Section A--A' for Campion AS, Alaska

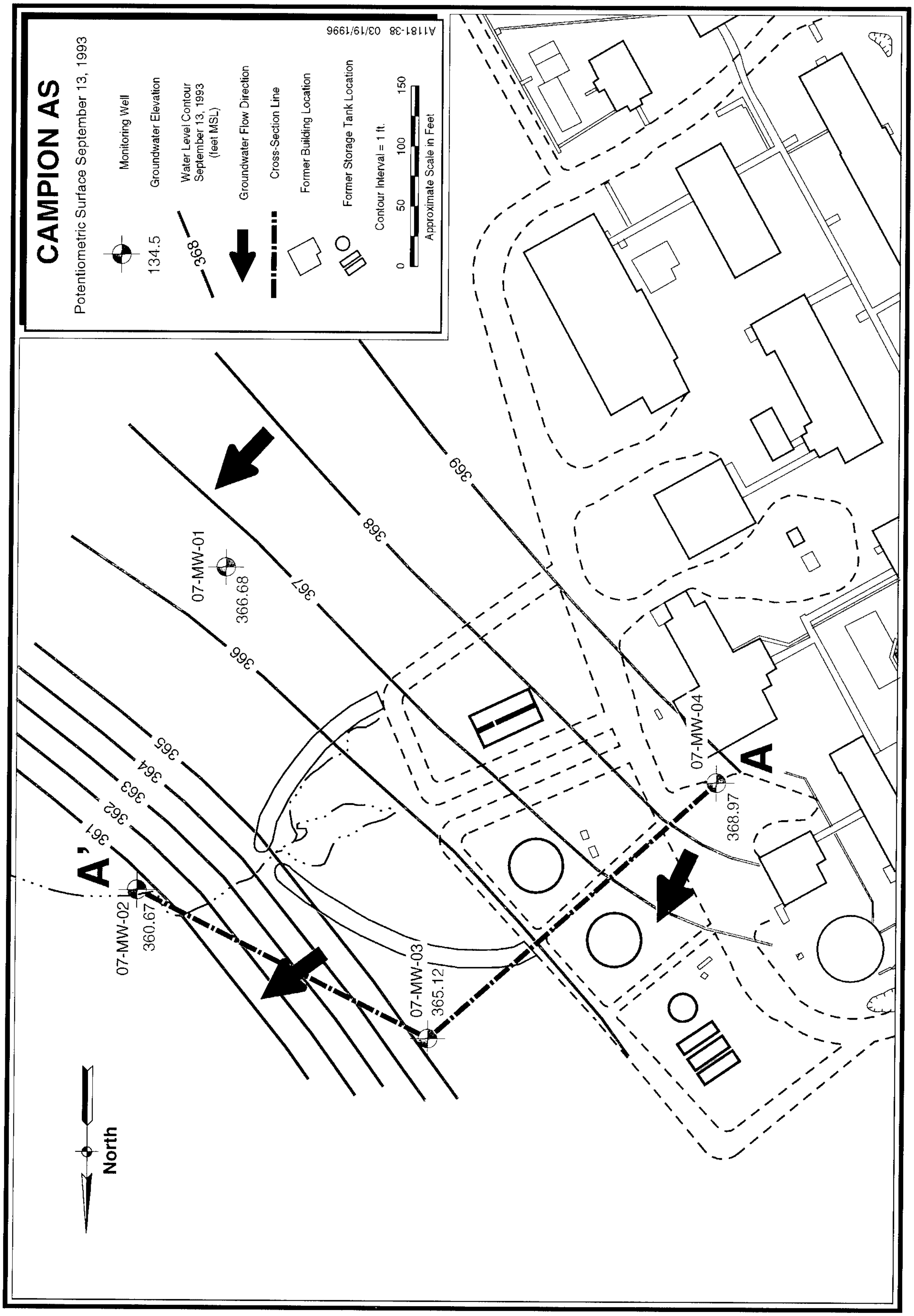


Figure 2.5-2. Campion AS Potentiometric Contour Map Showing Cross-Section A-A'

2.6.1 Background Metal Concentrations—Galena Airport

The Galena Ambient Location is situated east of the runway in a field used for recreational activities (see Figure 1.1-1). A softball field occupies the northwestern portion of the site and the remaining area is an unused field. The south and west sides of the site are bordered by a raised gravel road. A gravel-covered pathway, used by pedestrians, snow machines, and small all-terrain vehicles, parallels the road to the south. The eastern and northern boundaries are wooded primarily with willows and black spruce. During spring flooding, standing water may be present over much of the Galena Ambient Location.

The Galena Ambient Location was chosen to represent background conditions at Galena Airport on the basis of a review of historical data that indicated it was probably not contaminated as a result of Air Force activities. It is hydrologically upgradient from all of the investigative sites at the Galena Airport, and has drainage conditions, geology, and vegetation similar to those encountered within the airport boundaries.

Separate UTLs were calculated for metals in groundwater, surface water, surface soils/sediments, and subsurface soils. The results of these calculations are given in Tables 2.6-1 and 2.6-2. From 1992 to 1994, three rounds of groundwater samples and four surface water samples were collected at the site. Four sediment samples were collected at the same locations as the surface water samples, and three surface soil samples were collected from higher ground. Subsurface soil samples were collected in each of the four borings where monitoring well installation was attempted. Because of pervasive shallow permafrost, only two wells were successfully installed. All water and soil samples were submitted to a certified laboratory for analysis. The results of these analyses are given in Appendix A.

2.6.2 Background Metal Concentrations—Campion AS

The UTLs for background metal concentrations in surface water and groundwater at Campion AS are the same as those used for the Galena Airport (see Table 2.6-1). The UTLs for background metal concentrations in soils at Campion AS were calculated using data from soil samples collected at the Campion Ambient Location (see Figure 1.5-2). Separate UTLs for surface and subsurface soils were not calculated for Campion AS, since most of the soil samples from the POL Area were collected from the surface and shallow subsurface (< 5 ft bgl) because of the high water table. The Campion soil UTLs are shown in Table 2.6-3. For information on the statistical procedures used to determine the UTLs, refer to Appendix D.

The Campion Ambient Location is situated near the point where the road from Campion intersects the Yukon River upstream from Campion. This location was chosen because of its position upgradient from any potential contaminant source associated with Air Force activities at Campion AS. It was also selected because of the similarity of the drainage conditions, soil, and vegetation to those at the Campion POL Area. It was thought that the high organic content and saturated conditions of the soils at these areas would result in higher background metal concentrations compared with those from the Galena Ambient Location. This appears to be the case with several of the trace elements, such as arsenic, barium, manganese, and selenium.

A total of six soil samples were collected at the Campion Ambient Location. Two samples were collected with a hand auger from each of two shallow soil borings. These samples were collected from depths of less than 2.2 ft. Ice lenses prevented sampling below this depth. Two surface soils, from within 6 in. of the ground

Table 2.6-1
Background UTLs for Galena Water Samples

Analyte	Method	UTL (mg/L)	
		Ground-water	Surface Water
Aluminum	SW6010	0.241	0.40
Antimony		0.100	0.20
Barium		0.893	0.086
Beryllium		0.005	0.0040
Cadmium		0.006	0.010
Calcium		499	75
Chromium		0.011	0.020
Cobalt		0.079	0.020
Copper		0.019	0.020
Iron		30.7	5.9
Magnesium		125	7.8
Manganese		45.4	1.1
Molybdenum		0.058	0.10
Nickel		0.179	0.040
Potassium		10.3	7.3
Silver		0.015	0.020
Sodium		17.1	2.7
Thallium		0.202	0.20
Vanadium		0.025	0.040
Zinc		0.034	0.039
Arsenic	SW7060	0.027	0.0080
Lead	SW7421	0.016	0.025
Mercury	SW7470	0.001	0.00040
Selenium	SW7740	0.027	0.010

NA = Not applicable.

Table 2.6-2
Background UTLs for Galena Soil Samples

Analyte	Method	UTL (mg/kg)	
		Subsurface Soil (> 2 ft bgl)	Surface Soil and Sediments (0 to 2 ft bgl)
Aluminum	SW6010	26,000	14,000
Antimony		32	30
Barium		350	380
Beryllium		0.88	0.36
Cadmium		1.6	1.5
Calcium		22,000	15,000
Chromium		48	30
Cobalt		13	14
Copper		61	60
Iron		36,000	27,000
Magnesium		9,500	8,700
Manganese		480	770
Molybdenum		16	15
Nickel		43	34
Potassium		3,100	2,400
Silver		3.2	3.0
Sodium		980	470
Thallium		32	30
Vanadium		92	48
Zinc		140	82
Arsenic	SW7060	20	15
Lead	SW7421	14	17
Mercury	SW7471	0.65	0.30
Selenium	SW7740	1.8	1.5

surface, were also collected. All six soil samples were submitted for analysis by the methods shown in Table 2.6-3, and the complete results are presented in Appendix A.

Table 2.6-3
Background UTLs for Campion Soil Samples

Analyte	Method	UTL (mg/kg)
Aluminum	SW6010	20,000
Antimony		25
Barium		1,900
Beryllium		0.66
Cadmium		3.7
Calcium		210,000
Chromium		35
Cobalt		87
Copper		63
Iron		140,000
Magnesium		7,600
Manganese		28,000
Molybdenum		44
Nickel		85
Potassium		3,300
Silver		2.4
Sodium		1,100
Thallium		90
Vanadium		122
Zinc		210
Arsenic	SW7060	69
Lead	SW7421	17
Mercury	SW7471	0.20
Selenium	SW7740	5.0

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Section 3
RESULTS OF REMEDIAL INVESTIGATION—GALENA AIRPORT

The following sections provide descriptions and background information for all of the sites currently under investigation at the Galena Airport. The investigation results, conclusions, and recommendations are also presented. Data in Section 3 are summarized and presented as outlined in Section 1.3.

3.1 Airport and Community Water Supply

Water for drinking, cooking, cleaning, and sanitary purposes in the Galena area generally comes from water supply wells tapping both shallow and deep parts of the local aquifer. The following sections provide information on both the airport and community water supply wells.

3.1.1 Galena Airport Water Supply

Galena Airport has obtained water from seven water supply wells within the installation boundaries. Three of these wells have supplied water for consumption. Table 3.1-1 gives the status of all seven wells; the locations or former locations of the wells are shown in Figure 3.1-1.

Currently, Galena Airport obtains its potable water from two main wells, which are screened in alluvial sediments at approximately 200 ft bgl. Wells No. 1 and No. 7 pump at a rate of approximately 55 gpm and are switched off when the 100,000-gal. holding tank reaches capacity. Well No. 2, which was used for potable water supply until it was replaced by well No. 7 in September 1992, is now inactive and used only to monitor groundwater head changes in the deeper part of the aquifer.

Water for dust control and fire protection is supplied by well No. 3, which is not used for potable water and is inactive during the winter months (Gordon Cruger, personal communication, March 1993). Three water supply wells at the Galena Airport have not been sampled as part of the RI: well No. 4 is capped and inactive, and wells No. 5 and No. 6 were abandoned when the buildings that housed them were demolished as part of the base deactivation (Gordon Cruger, personal communication, January 1996).

The Galena Airport wells that are used for consumption have been sampled triennially by the USAF Bio-Environmental Group since the passage of the Clean Water Act in 1986 (Major L. Waterhouse, personal communication, April 1992). These water samples are analyzed for organic and inorganic compounds, bacteria, and radionuclides. The only contaminant detected during these routine analyses has been chloroform at low concentrations (up to 1.2 µg/L) in non-potable supply well No. 3. Additional sampling of the base water supply wells was conducted in 1987 (USAF, 1989a). Chloroform was again detected in well No. 3 at concentrations ranging from 4 to 26 µg/L, less than the state and federal MCL of 100 µg/L for total trihalomethanes. Toluene was also detected in all the potable wells at concentrations ranging from 2 to 3 µg/L, well below the state and federal MCL of 1,000 µg/L. The two drinking water wells, No. 1 and No. 7, were resampled in 1992. No analytes were detected at concentrations exceeding the state and federal MCLs in these samples (USAF, 1993a). (Note: well No. 7 is referred to as No. 2 in this report.)

As part of the RI activities, airport supply wells Nos. 1, 2, 3, and 7 were sampled once or more from 1992 to 1994. Samples were collected from all active wells in the main airport triangle in 1992 and 1994, and analyzed for a full suite of compounds. Only one well—No. 7—was sampled in 1993, for VOCs only. All of these samples were collected from pretreatment sampling points. The

Table 3.1-1
Galena Airport Water Supply Well Data

	Well No. 1	Well No. 2	Well No. 3	Well No. 4	Well No. 5	Well No. 6	Well No. 7
Location	Bldg. 1549	Bldg. 1578	Bldg. 1812	Bldg. 1428	Bldg. 400	Bldg. 1401	Bldg. 1578
Depth (feet)	205	210	200	210	43	50	198
Casing Diameter (inches)	6	8	6	8	4	6	8
GPM (max pump flow)	130	--	500	--	10	10	100
Drawdown (feet)	10.83	4.4	4.4	--	--	--	36.7
Static Water Level (feet below surface)	80	196	196	--	14.6	35	18.5
Pump	Myers	Layne & Bowler	Fairbanks-Morse	Jacuzzi	--	Jacuzzi	--
Model	Submersible	Submersible	Turbine	Submersible	--	Submersible	--
Horsepower	5	5	25	3/4	--	1/2	--
Date of Installation	1963	1956	1956	1955	1954	1963	1990
Remarks	--	--	--	Capped	--	--	Replaced Well No. 2
Condition and Use	Operational (potable water supply)	Deactivated (former main water supply)	Standby fire protection	Inactive	Abandoned	Abandoned	Operational (potable water supply)

-- = unknown.

Source: Installation Documents dated January 1974. Updated March 1993 via personal communication with base personnel.

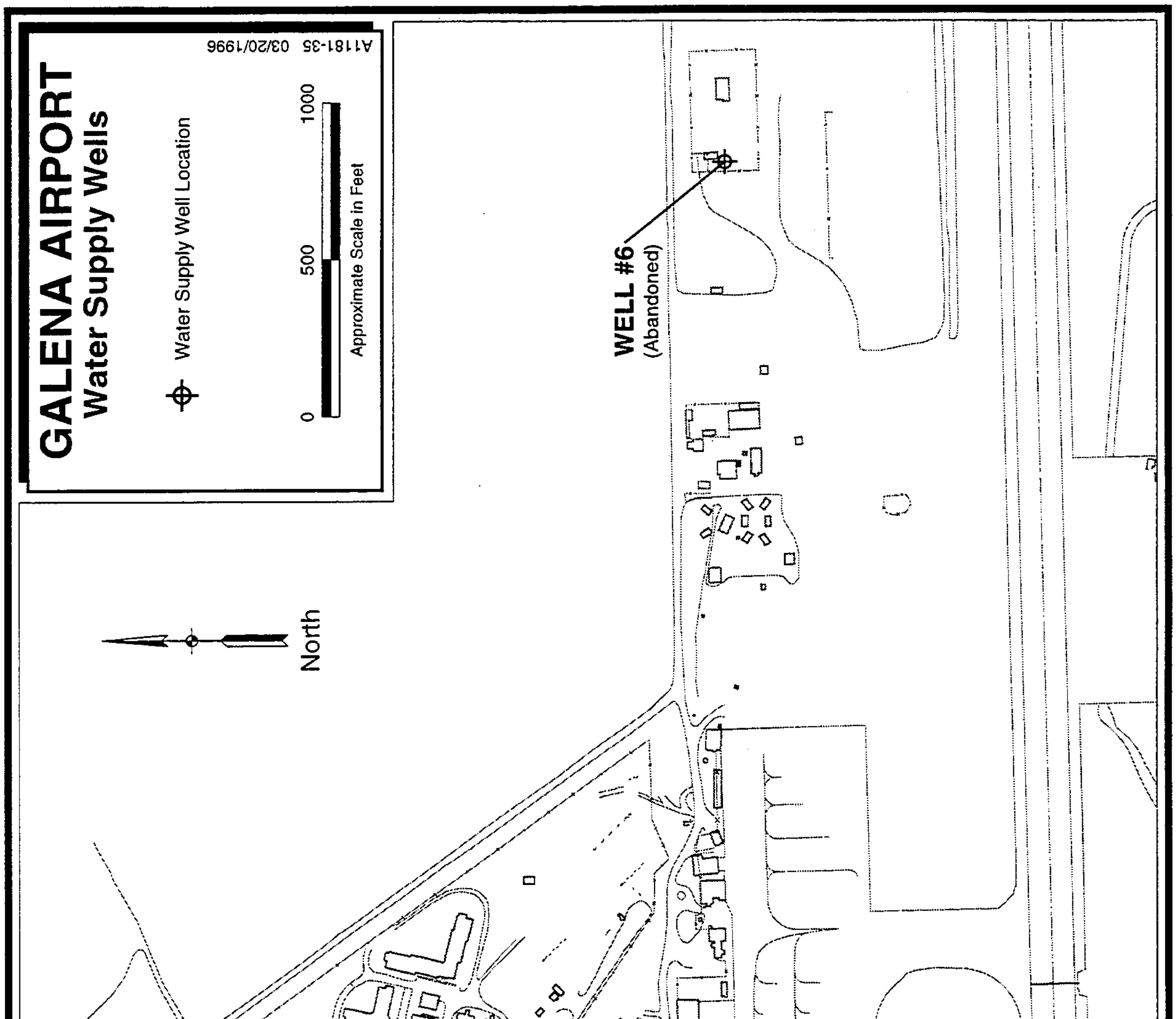

Figure 3.1-1. Location of the Galena Airport Water Supply Wells

analytical results are summarized in the attachment to Section 3.1. located at the end of this section.

Chloroform was again detected in the 1992 sample from well No. 3, at a concentration of 9.8 µg/L, well below the MCL. No chloroform was detected in the 1994 sample from this well. DRO were also detected in the 1992 sample from well No. 3 (at 200 µg/L), but were not detected in the 1994 sample. Aldrin and dieldrin were detected in several samples from the airport supply wells at concentrations generally near both the detection limit and the screening criteria. All of the 1992 detections of these two compounds were either unconfirmed by second-column analysis or were similar to detections in laboratory blanks. Each of these analytes were detected in the 1994 samples from well No. 7 at concentrations just above the detection limit and the screening criteria. The occurrence of pesticides within the Galena Airport boundaries is discussed in more detail in Section 3.9. No other analytes were detected in airport supply wells at concentrations exceeding screening criteria, and all metals were well below the background UTLs.

TCE has been detected in the upper portion of the aquifer (up to 60 ft bgl) near wells No. 3 and No. 7 at concentrations up to 13,000 µg/L. This is well above the MCL for TCE of 5 µg/L. The airport supply wells, however, are screened at much deeper depths (200 ft bgl) than the monitoring wells where TCE has been detected (06-MW-01 and -02). No TCE has been detected in any of the airport supply wells. The location of the TCE plume is discussed in more detail in Section 3.4 and shown in Figure 3.4-2.

3.1.2 Community of Galena Water Supply

Most residents of the community of Galena have drinking water trucked in from the city well in the new town area, upgradient from the Galena Airport. However, interviews with community members and a review of City Hall records showed that at least seven private wells are still in use in the old town of Galena. Permission from owners was obtained to sample four of these wells, shown in Figure 3.1-2, in 1992 and 1993 as part of the RI. These wells, which are all less than 60 ft deep, supply water for cooking, cleaning, and drinking. One well is located on a sandbar of the Yukon River and supplies water to several private residences and businesses in the old town.

The sampling results for the privately owned supply wells are summarized in the attachment to Section 3.1. Metals were not detected in concentrations exceeding the UTLs in any of the samples. Several pesticides were detected; however, none of the pesticides were detected in the same well two years in a row. Heptachlor epoxide was found in one sample at a concentration of 2 µg/L, an order of magnitude higher than the state and federal MCL of 0.2 µg/L. This well also had concentrations of alpha-BHC and beta-BHC that exceeded the Region III RBCs, but were less than the sample quantitation limit (SQL). However, none of these analytes were detected in a 1993 sample from this well, which yielded only an unconfirmed detection (i.e., no second-column detection) of aldrin at a concentration below the SQL. The 1992 samples from two of the other privately owned supply wells were found to contain low concentrations (approximately 0.01 µg/L) of dieldrin that exceeded the RBC. Dieldrin was not detected in the 1993 samples from these wells; however, alpha-BHC was detected at approximately the same concentration (0.01 µg/L) in one of them. No pesticides exceeded screening criteria in either the 1992 or 1993 samples from one of the privately owned supply wells (03-GW-02).

3.1.3 Conclusions and Recommendations

Pesticides have been detected at concentrations exceeding the SQL in both airport and community supply wells. However, with the exception of low concentrations of chloroform in one of the non-potable airport supply wells (well No. 3), detection of analytes in these water supply

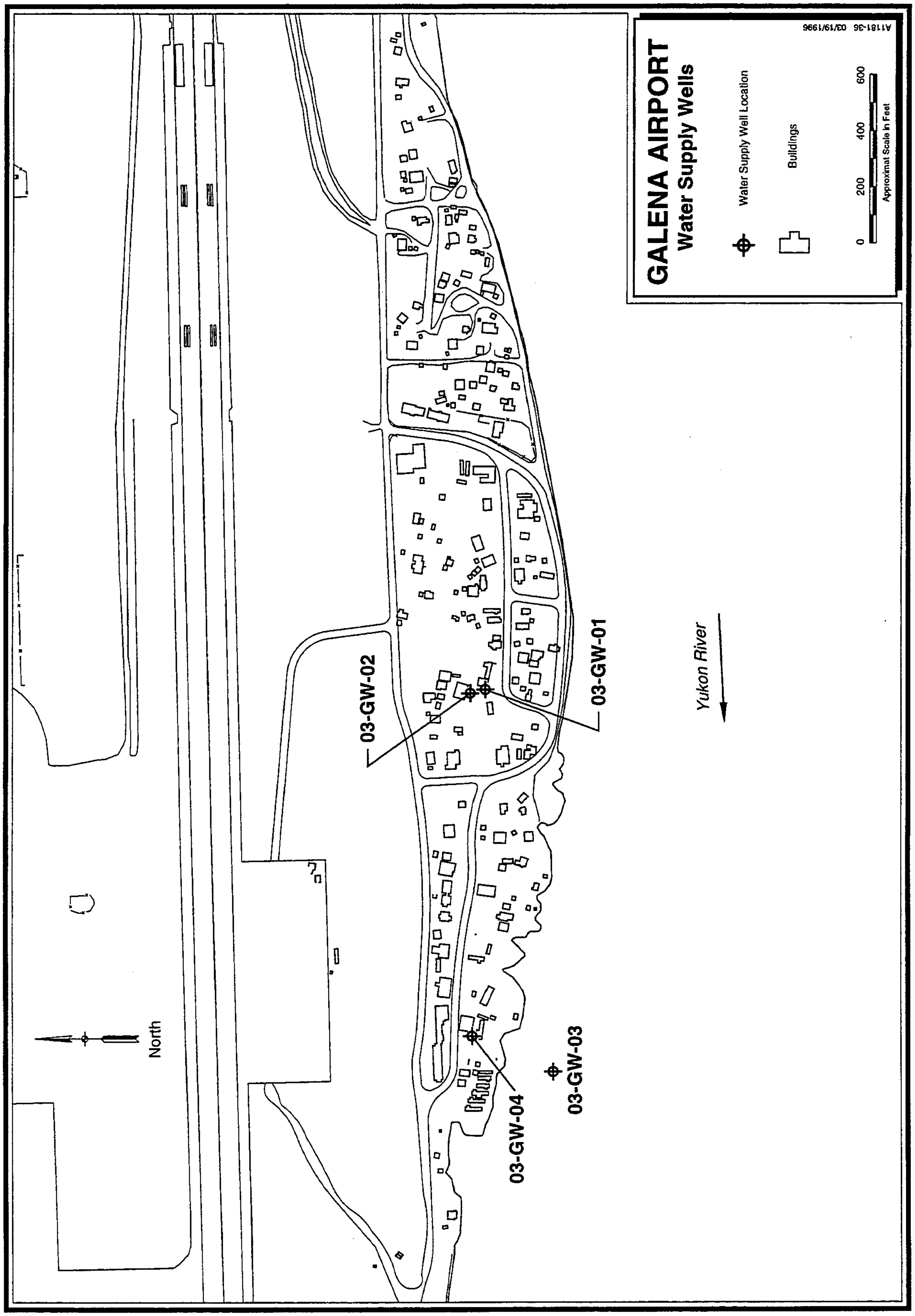

Figure 3.1-2. Location of Privately Owned Wells Sampled During the RI

wells has been very inconsistent. The non-reproducibility of the data makes it difficult to draw any conclusions regarding potential contamination of the drinking water supply in the Galena area.

Any risk from the existence of a TCE plume in the upper portion of the aquifer near airport supply wells No. 3 and No. 7 has been addressed. No TCE has been detected in the airport supply wells to date. Extensive additional investigation and groundwater modeling will not conclusively show whether any future contamination to drinking water supply wells will occur. Therefore, the Air Force has chosen to upgrade the Galena Airport water treatment plant by installing an air stripper. This upgrade will remove VOCs and TCE from drinking water, should any such contamination reach potable water supply wells. Furthermore, wells No. 1, No. 3, and No. 7 will also be monitored on a triennial basis for the presence of TCE. This monitoring program will ensure early warning of contamination to the drinking water supply wells, if any should occur. The risk assessment has shown that no risk exists for ecological receptors. Therefore, the Air Force believes these two recommendations are protective of human health and the environment.

ATTACHMENT TO SECTION 3.1

AIRPORT AND COMMUNITY WATER SUPPLY DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Airport Supply Well Data -- 1992

Analyte	Method (Units)	Screening Criteria	Location ID 02-GW-01 (Well No. 1)	02-GW-02 (Well No. 2)	02-GW-03 (Well No. 7)	02-GW-04 (Well No. 3)
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (100)	ND (100)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (190)	ND (200)	ND (210)	210 (200)
Aldrin	SW8080 (µg/L)	0.0040 RC	ND (0.010)	ND (0.010)	ND (0.010)	0.011 B (0.010)
Dieldrin		0.0042 RC	0.0079 KJB (0.010)	0.0090 KJ (0.010)	0.010 KJ (0.011)	0.0096 KJ (0.011)

Airport Supply Well Data -- 1993

Analyte	Method (Units)	Screening Criteria	Location ID 02-GW-03 (Well No. 7)
Gasoline Range Organics	AKGRO (µg/L)	NA	NA
Diesel Range Organics	AKDRO (µg/L)	NA	NA
Aldrin	SW8080 (µg/L)	0.0040 RC	NA
Dieldrin		0.0042 RC	NA

Airport Supply Well Data -- 1994

Analyte	Method (units)	Screening Criteria	Location ID 02-GW-01 (Well No. 1)	02-GW-03 (Well No. 7)	02-GW-04 (Well No. 3)
Gasoline Range Organics	AK101 (µg/L)	NA	2 JB (50)	3 JB (50)	4 JB (50)
Diesel Range Organics	AK102 (µg/L)	NA	ND (100)	ND (100)	ND (100)
Aldrin	SW8080 (µg/L)	0.0040 RC	ND (0.00403)	0.00680 (0.00392)	ND (0.00278)
Dieldrin		0.0042 RC	ND (0.00399)	0.00840 (0.00267)	ND (0.00384)

Old Town Galena Supply Well Data--1992

Analyte	Method (units)	Screening Criteria	Location ID			
			03-GW-01	03-GW-02	03-GW-03	03-GW-04
Gasoline Range Organics	SW8020 mod (µg/L)	NA	ND (500)	ND (100)	ND (100	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)	ND (200)	ND (200)	ND (200)
Aldrin	SW8080 (µg/L)	0.0040 RC	ND (0.0099)	ND (0.0099)	ND (0.010)	ND (0.011)
alpha-BHC		0.011 RN	0.017 P (0.0099)	ND (0.0099)	ND (0.010)	ND (0.011)
beta-BHC		0.037 RN	0.061 P (0.0099)	ND (0.0099)	ND (0.010)	ND (0.011)
Dieldrin		0.0042 RC	ND (0.0099)	ND (0.0099)	0.011 (0.010)	0.0099 KJ (0.011)
Heptachlor epoxide		0.2 M	2.0 (0.0099)	ND (0.0099)	0.016 B (0.010)	ND (0.011)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	3.3 JB (9.7)	ND (10)	ND (10)	ND (11)

Old Town Galena Supply Well Data--1993

Analyte	Method (units)	Screening Criteria	Location ID			
			03-GW-01	03-GW-02	03-GW-03	03-GW-04
Gasoline Range Organics	AKGRO (µg/L)	NA	NA	NA	NA	NA
Diesel Range Organics	AKDRO (µg/L)	NA	NA	NA	NA	NA
Aldrin	SW8080 (µg/L)	0.0040 RC	0.175 KJ (0.880)	ND (0.00235)	ND (0.00402)	ND (0.00240)
alpha-BHC		0.011 RN	ND (0.206)	ND (0.00137)	0.0108 B (0.00196)	ND (0.00200)
beta-BHC		0.037 RN	ND (0.674)	ND (0.0461)	ND (0.0461)	ND (0.0470)
Dieldrin		0.0042 RC	ND (0.645)	ND (0.00549)	ND (0.0461)	ND (0.00470)
Heptachlor epoxide		0.2 M	ND (0.336)	0.0655 (0.00324)	0.00890 B (0.00324)	ND (0.00330)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	NA	NA	NA	NA

3.2 Fire Protection Training Area (FT001)

The FPTA is located north of the runway overrun at the eastern extreme of the airport (Figure 1.1-1). Previous investigations at the site identified areas of soil and groundwater contamination. The purpose of the 1992-1994 investigation was to confirm the presence of soil and groundwater contamination, to delineate the nature and extent of contamination, to define the site-specific-hydrogeology, and to collect sufficient data in order to complete the baseline risk assessment (USAF, 1996).

The conceptual diagram for the FPTA is presented as Figure 3.2-1. This diagram provides a plan view, a geologic cross section, and a table that lists the range of detected concentrations for analytes that have exceeded their screening criteria. The plan view shows the location of all analytical data points (surface soil samples, surface water samples, soil borings, sediment samples, and monitoring well locations). The areas of soil and groundwater contamination (exceedance of screening criteria) are shown as an overlay to the plan view. The area of soil contamination is defined by samples where DRO was detected above 200 mg/kg, and the area of groundwater contamination is defined by 5-µg/L benzene and greater. Areas of detections less than the screening criteria are also shown. The plan view and the lithologic cross section can be used in conjunction to provide a three-dimensional visualization of site characteristics and contaminants.

3.2.1 Site Description

According to Department of Transportation (DOT) land occupancy records updated 3 May 1988, the formal FPTA covers 476,000 ft^2 and is currently occupied by the "Army Corps Fire Training Area." The site now consists of an unlined, shallow soil burn pit that is surrounded by a small sand and gravel dike. An aircraft mockup that occupied the center of the burn pit was removed during the summer of 1992.

The FPTA is surrounded to the north and east by the flood control dike, to the south by the runway overrun, and to the west by an open field vegetated primarily by tall grasses. The addition of fill material to build up the runway overrun altered the original topography of the site. The ground now slopes to the northeast, resulting in a topographic low in the area of the burn pit. During the spring breakup, surface water from snowpack melt accumulates on top of the frozen soil and floods the area. Beyond the installation dike wall north and east of the site, the natural terrain consists of Yukon floodplain lowlands, which are marshy and forested.

The subsurface conditions at the FPTA were defined through direct sampling during the drilling of monitoring wells and soil borings and the collection of both long-term continuous monitoring and periodic water level surveys. As described in detail in Section 2, the subsurface sediments are composed of an upper unit that is 20 to 25 ft thick and composed of floodplain deposits consisting of interbedded silts and silty sands. A small channel sand deposit observed in monitoring well 01-MW-01 from 7 to 15 ft bgl was also identified by ground penetrating radar (GPR) as discussed in the *Remedial Investigation Geophysical Survey Report* (Appendix G). The lower unit is composed of river channel material consisting of sands and gravelly sands. Permafrost was observed along the eastern edge of the site at a depth of 25 ft bgl at monitoring wells 01-MW-03 and -06 and at depths between 7 and 15 ft bgl at the Galena Ambient Location, which is east of the site (Figure 1.1-1) (USAF, 1989a). Permafrost was absent from all other FPTA wells completed to depths ranging from 25 to 60 ft bgl.

Groundwater at the site exists under unconfined conditions and flows in a west to southwesterly direction. The occurrence of permafrost in the eastern portion of the site may influence localized groundwater flow. Seasonal

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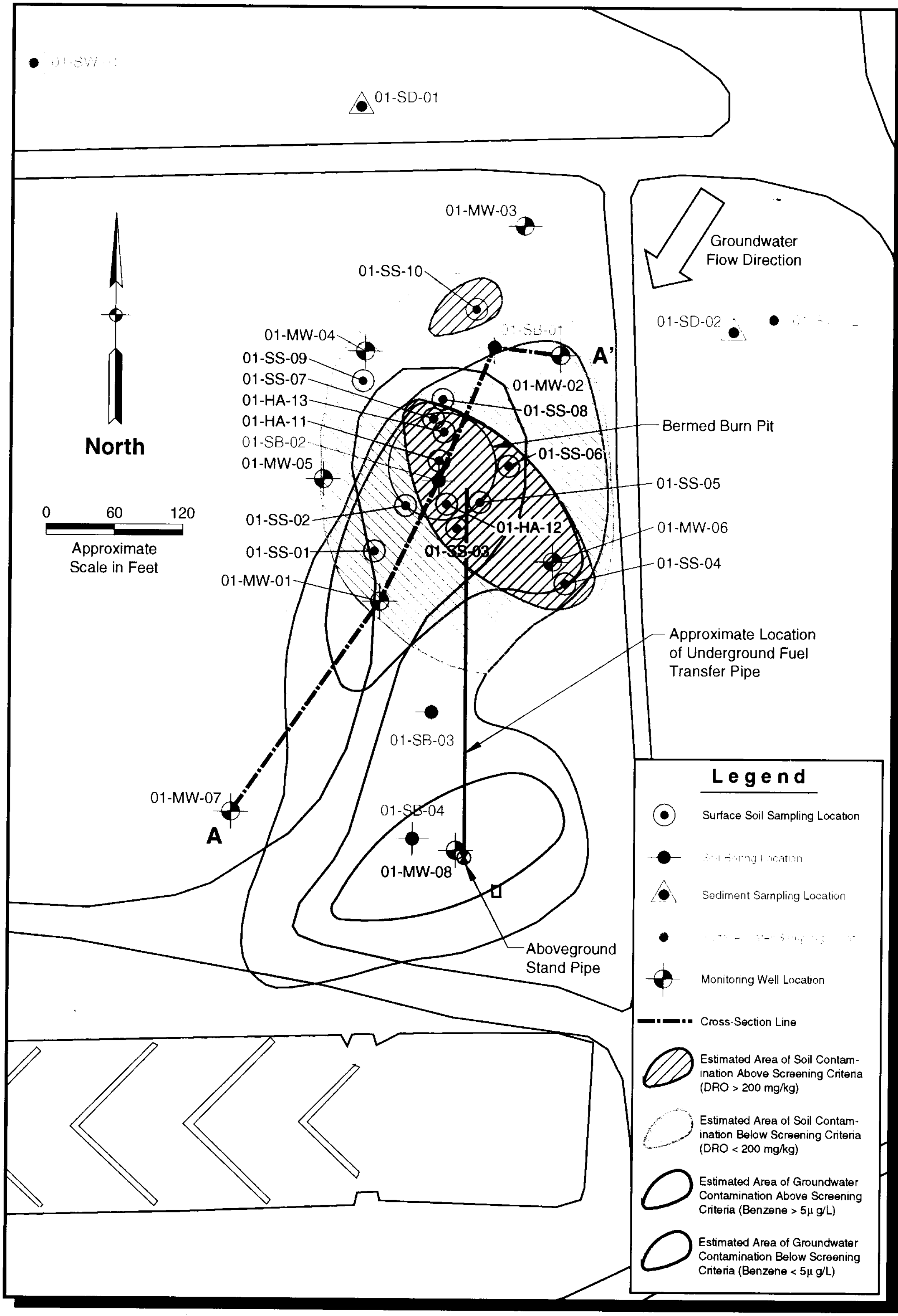
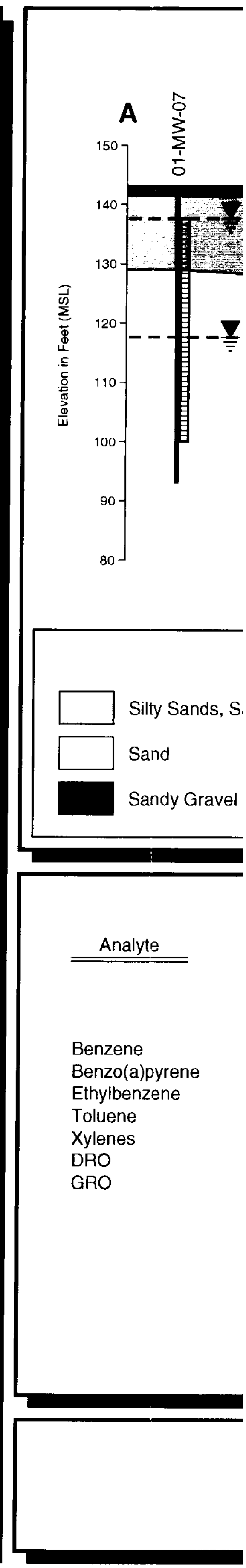
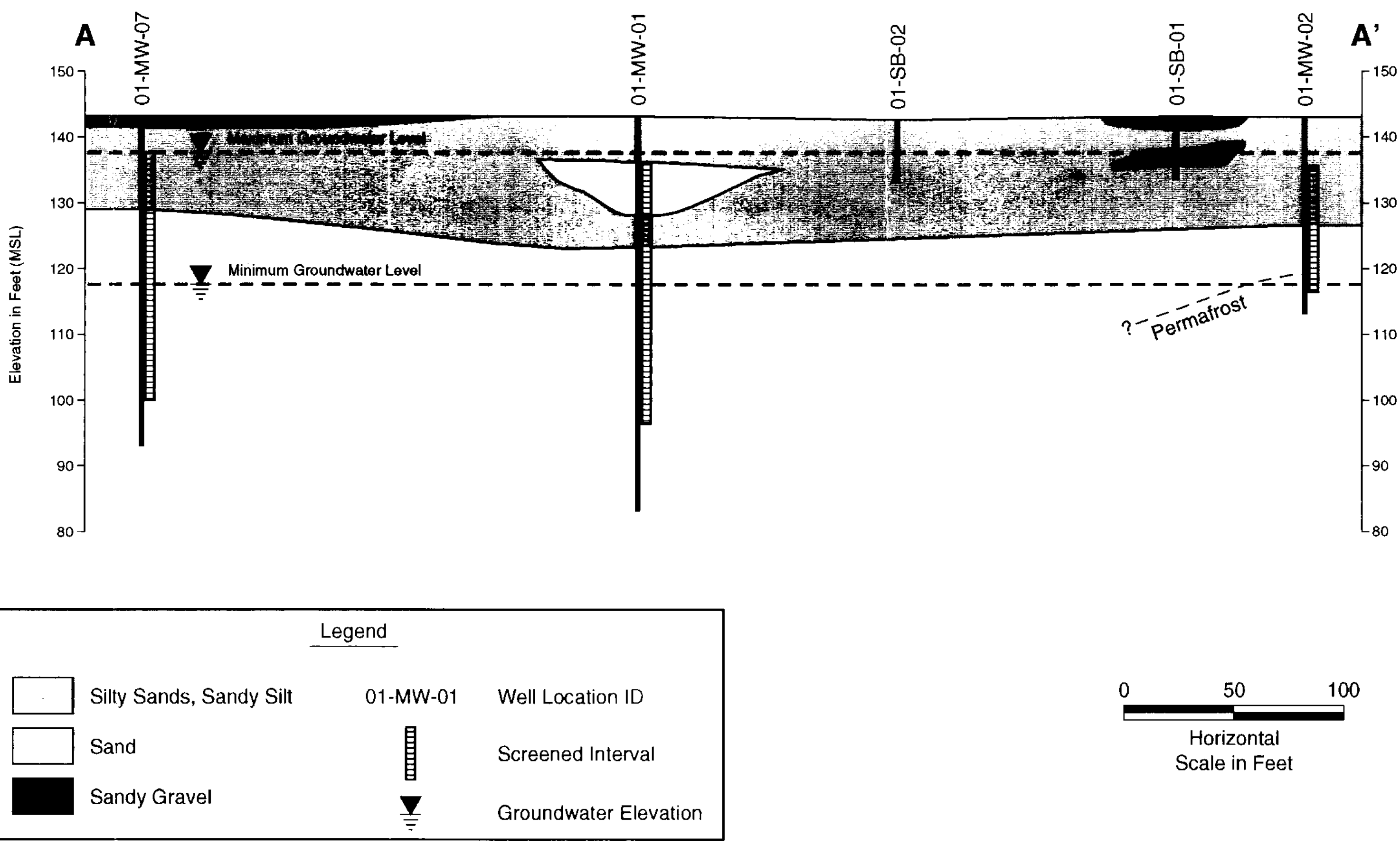

01-SD-01
01-MW-03
Groundwater Flow Direction
01-SS-10
01-SD-02
01-MW-04
01-SS-09
01-SS-07
01-HA-13
01-HA-11
01-SB-02
01-MW-05
A'
01-MW-02
01-SS-08
Bermed Burn Pit
01-SS-06
01-SS-05
North
0
60
120
Approximate Scale in Feet
01-SS-02
01-HA-12
01-MW-06
01-SS-01
01-SS-03
01-SS-04
01-MW-01
Approximate Location of Underground Fuel Transfer Pipe
01-SB-03
01-MW-07
A
01-SB-04
01-MW-08
Aboveground Stand Pipe
Legend
Surface Soil Sampling Location
Sediment Sampling Location
Monitoring Well Location
Cross-Section Line
Estimated Area of Soil Contamination Above Screening Criteria (DRO > 200 mg/kg)
Estimated Area of Soil Contamination Below Screening Criteria (DRO < 200 mg/kg)
Estimated Area of Groundwater Contamination Above Screening Criteria (Benzene > 5µ g/L)
Estimated Area of Groundwater Contamination Below Screening Criteria (Benzene < 5µ g/L)


A
01-MW-07
150
140
130
120
110
100
90
80
Elevation in Feet (MSL)
Silty Sands, S
Sand
Sandy Gravel
Analyte
Benzene
Benzo(a)pyrene
Ethylbenzene
Toluene
Xylenes
DRO
GRO

Geologic Cross-Section



Compounds Exceeding Screening Criteria

Analyte	Soil: Screening Criteria (µg/kg)	Soil: Range of Detections (µg/kg)	Groundwater: Screening Criteria (µg/L)	Groundwater: Range of Detections (µg/L)
Benzene	500 AK	3,000 - 120,000	5 M	22 - 420
Benzo(a)pyrene	780 RC	2.7 - 1,500		
Ethylbenzene	15,000 AK	2,300 - 200,000		
Toluene	15,000 AK	$1.4x10^4$ - $1.1x10^6$		
Xylenes	15,000 AK	$1.2x10^4$ - $1.2x10^6$		
DRO	200,000 AK	27,000 - $7.2x10^7$		
GRO	100,000 AK	130,000 - $2.4x10^7$		

Key:
AK - State of Alaska Cleanup Standard
RC - EPA Region III Risk-Based Concentration, Carcinogenic
M - Maximum Contaminant Level

Galena Airport - FPTA

Conceptual Diagram and Summary of Compounds Exceeding Screening Criteria

A1181-4 03/19/96

Figure 3.2-1. Conceptual Diagram for the Fire Protection Training Area (FT001)

variation in groundwater elevation is high, as described in Section 2, and fluctuations of 20 ft or more are common. During the winter, the groundwater level falls below the bottom of wells 01-MW-03 through -06, which are screened predominantly in the upper silt and silty sand unit.

3.2.2 Background

Galena firefighters have conducted fire training activities at the FPTA since the late 1950s. Review of aerial photographs taken from 1963 to 1978 suggest that drums of unknown (but presumably flammable) materials were stored on the ground around the burn pit area. An underground pipeline connecting an aboveground fuel valve to fuel sprayers around the aircraft mockup is believed to have been used to deliver flammable liquids to the burn pit during fire training exercises. Figure 3.2-2 shows the location of these potential source areas. According to the Phase 1 Records Search (USAF, 1985), the training pit area was used through 1985 about once per week from June to November. In the wetter months of April and May, the training sessions were conducted about once per month. The facility was not used in the winter months from December to March. The training area has reportedly been closed to burning activity since 1991 (USAF, 1991).

Approximately 300 to 500 gal. of fuel were used per fire, and two fires per training session were typical. When the surface soils were not frozen, the combustion pit was prewetted with water before pouring fuel on the surface. No water was applied when the ground was frozen. Some surface soil areas are stained black, probably from unburned materials and residual materials remaining after ignition. Until 1991, fuels used were clean and contaminated JP-4. In the 1950s and 1960s, some combustible shop wastes such as AVGAS, thinners, paints, oils, and so forth were also used. Fire extinguishing agents used at the site have included protein foam, chlorobromethane, dry chemicals, halon, and aqueous film-forming foam.

Previous investigations at the site have included the installation and sampling of four groundwater monitoring wells and the collection and analysis of surface and subsurface soil samples. Results from these previous investigations suggest that approximately 0.75 acres of surface soils have been contaminated by petroleum hydrocarbons that were ignited during training activities (USAF, 1989a, 1991). The presence of BTEX detected in well 01-MW-06 (renamed from MW-008 to comply with Air Force IRP requirements) suggests that petroleum contamination in the soils may have migrated to groundwater as early as 1989. Previous findings are summarized in Table 3.2-1.

3.2.3 RI Activities and Findings

Field investigations conducted at the FPTA from 1992 to 1994 included the installation and sampling of four monitoring wells; the sampling of four preexisting wells; the collection and analysis of surface and subsurface soil, sediment, and surface water samples; the completion of a geophysical survey; and the completion of a soil gas and groundwater field screening survey. All soil and water sampling locations are shown in the conceptual diagram (Figure 3.2-1). The location of soil gas, Geoprobe groundwater, and geophysical surveys are detailed in Figure 3.2-3. The following paragraphs present and discuss the results of the RI activities completed in 1992, 1993, and 1994. The analytical results for soil and water samples are presented in Appendix A and summarized in the attachment to Section 3.2, located at the end of this section.

The results of the RI suggest that past fire protection training activities at the FPTA have resulted in the contamination of soils and groundwater. A soil gas survey conducted across the site in 1993 identified two distinct areas of potential

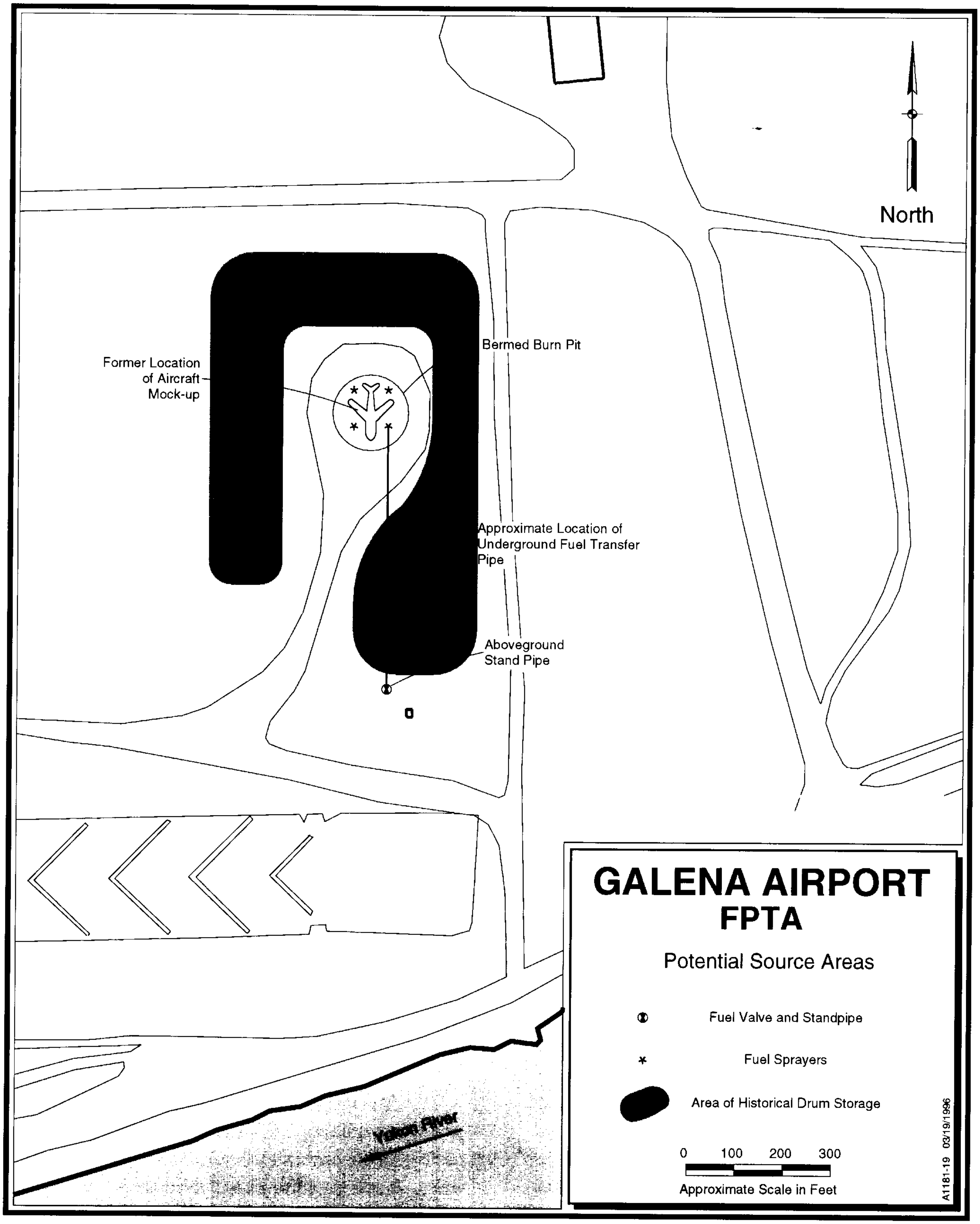


Figure 3.2-2. Location of Former Potential Source Areas at the Fire Protection Training Area (FT001)

Table 3.2-1
Summary of Previous Investigations and Findings—Fire Protection Training Area

Year	Activities	Analyses Performed	Maximum Level of Contamination		Comments
1985[a]	Records search.				
1986-87[b]	Installed 4 groundwater monitoring wells, sampled groundwater (2 rounds) and soils from the well borings, sampled 4 surface water samples.	Volatile organics, PCBs (surface only), and lead—soils; purgeable hydrocarbons, purgeable aromatics, volatile organics, and dissolved lead—waters; TPH—all samples.	**Water:** Benzene Toluene Ethylbenzene Lead **Soil:** TPH	 930 µg/L 5 µg/L 1 µg/L 31 mg/L 37 mg/kg	
1989[b]	Collected 2 rounds of groundwater samples from the 4 wells installed in 1986.	TPH, dissolved lead, purgeable aromatics.	Benzene	660 µg/L	Sampling was conducted in September and December.
1990[b]	Collected 1 round of groundwater samples from the 4 wells installed in 1986.	TPH, dissolved lead, and purgeable aromatics.	TPH Benzene Xylenes Methylene chloride 1,2-DCA	0.62 mg/L 990 µg/L 9.5 µg/L 2.8 µg/L 1.2 µg/L	Sampling was conducted in June.

Notes: [a] USAF, 1985. [b] USAF, 1989a, 1991.

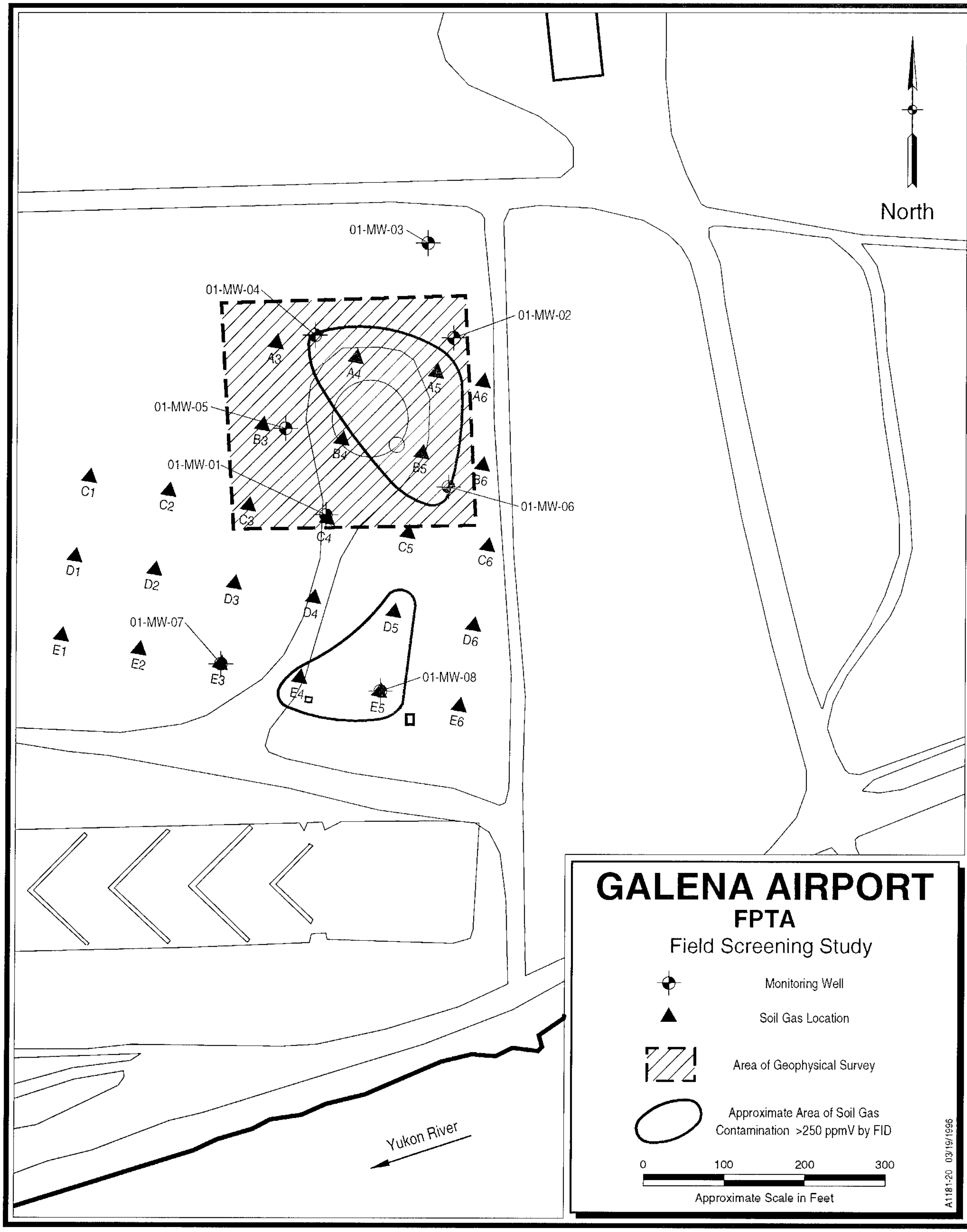


Figure 3.2-3. Soil Gas Survey Results for the Fire Protection Training Area (FT001)

VOC contamination at the FPTA (Figure 3.2-3). The northern area of potential contamination includes the burn pit and coincides with previously identified soil contamination (USAF, 1989a, 1991). The southern area of potential VOC contamination may suggest the presence of a previously unidentified source area. A detailed discussion of the soil gas survey results is included in the *Remedial Investigation Soil Gas Maps Report* (Appendix G).

Soils at the FPTA contain fuel constituents and PNAs at levels that exceed the screening criteria. Two of the surface soil locations, 01-SD-01 and 01-SD-02, were collected outside the site boundary. A review of groundwater flow data and surface topography indicates that these points are not in the path of subsurface discharge or surface water runoff from the site. Therefore, analytes detected in these samples are not believed to be related to activities that occurred at the FPTA. Likely sources of the DRO detected in these samples include the privately owned construction facility located north of the dike and runoff from the adjacent gravel roads, which were historically oiled for dust control.

Fuel contamination in the soils at the FPTA occurs from the transfer and partial combustion of waste fuels that were historically used during fire protection training exercises. The area of soil contamination is generally limited to the area within and adjacent to the burn pit as illustrated in Figure 3.2-1. The DRO were detected at nine surface locations and to a depth of 15 ft at 01-SB-02. GRO and BTEX constituents were also detected in soil samples collected from inside the burn pit and to the east near monitoring well 01-MW-06. The fuels detected in samples 01-SS-04 and 01-SS-10, located approximately 200 ft east and 200 ft north of the burn pit, respectively, may be from spills or leaks of drums temporarily stored on site. Localized spring flooding of the site from the accumulation of snow melt may also contribute to the migration of surface contaminants from the burn pit.

PNAs were detected in the shallowest sample (3-5 ft bgl) from soil boring 01-SB-01. The presence of benzo(a)anthracene, benzo(a)-pyrene, benzo(b)fluoranthene, and dibenzo(a,h)-anthracene may be the result of combustion of chlorinated solvents produced during a burn exercise. The distribution of the PNAs is limited to the shallow soil in the burn pit; the highest concentrations were encountered in the 3- to 5-ft interval of 01-SB-01. However, only benzo(a)pyrene exceeds the screening criteria in this sample. PNAs do not appear to be present at significant levels below 8 ft bgl.

During 1994, three surface and three subsurface soil samples were collected from within the burnpit and submitted for dioxin and furan analysis. None of these analytes were detected above the screening criteria.

The results of groundwater sample analyses indicate that the observed soil contamination from fuels has migrated to the water table. Benzene, the primary contaminant of concern in groundwater, was observed in monitoring wells 01-MW-01, 01-MW-06, and 01-MW-08. The inferred areas of benzene groundwater contamination are illustrated in Figure 3.2-1. Benzene concentrations in 01-MW-06 (previously referred to as MW-008) has been detected consistently since its installation in 1986, and was measured at 420 and 224 μg/L in 1992 and 1994, respectively. Monitoring well 01-MW-01, installed in 1992, has contained 38, 372, and 152 μg/L of benzene in 1992, 1993, and 1994, respectively. On the basis of the results of the soil gas survey and the calculated groundwater flow direction, it appears that the source of the groundwater contamination in these wells is the contaminated soil at the FPTA. Contaminants, which show a southwestern trend, have not reached 01-MW-07 as of 1994. Concentrations of benzene in samples collected within the groundwater plume appear to have stabilized.

Monitoring well 01-MW-08 was installed on the basis of the results of the soil gas survey, which indicated a separate area of potential VOC contamination south of the burn pit. This area is in the vicinity of the stand pipe that was used to pump combustible liquids to the aircraft mockup during training exercises. This area is also where drums of combustible materials were stored. The benzene detected in the groundwater (29.4 µg/L in 1993 and 22.0 µg/L in 1994) suggests that fuel and liquid waste handling practices may have resulted in the release of contaminants to groundwater at this site. Two soil borings, 01-SB-03 and 01-SB-04, were placed adjacent to the underground pipeline that carried combustible liquids to the mockup. Samples collected from these borings showed no evidence of fuel contamination. The extent of the southern benzene groundwater plume is uncertain, but the northern groundwater plume at this site does not appear to be moving.

3.2.4 Conclusions

The analytical results suggest that the soil and groundwater at the FPTA are contaminated with fuels that were used as flammables during past fire protection training exercises. Burn products, such as PNAs, also appear to be present in the shallow subsurface soils. The soil contamination is mainly limited to the area within the burn pit.

Two areas of benzene groundwater contamination were identified at the FPTA. The northern area is the result of migration of surface soil contamination through the unsaturated zone to the water table. The groundwater contamination appears to extend from the burn pit to the southwest, but does not appear to have migrated to monitoring well 01-MW-07. The southern area of groundwater contamination is likely to be the result of fuel and waste liquid handling that occurred in the vicinity of the pipeline fuel valve that supplied the mock-up with combustible material. Another possible source of the groundwater contamination in the southern plume is the release of fuel from drums stored on site. Groundwater monitoring results at the FPTA suggest that the benzene plume has stabilized with respect to both location and concentration.

3.2.5 Recommendations

The results of the field investigation and the chemical analysis of soil and groundwater samples have been used to complete the baseline risk assessment for the FPTA (USAF, 1996). The baseline risk assessment showed that contamination at the FPTA poses no unacceptable risk to human health or the environment. However, in order to remove any future contamination potential and exposure pathways, the Air Force recommends the following actions:

- Remove the piping network leading to the burn pit from the south to eliminate any potential for further contamination from residual fuels;
- Remove all monitoring wells that penetrate the aquifer;
- Grade and/or fill site to promote drainage and prevent the accumulation of standing water that may increase the migration of soil contamination to the groundwater;
- Revegetate the area to return the site to "natural" conditions and to eliminate potential ecological risks; and
- Prepare an NFRAP decision document.

ATTACHMENT TO SECTION 3.2

FIRE PROTECTION TRAINING AREA
DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Fire Protection Training Area 1992 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth									
			01-MW-01 5-7 ft.	01-MW-02 5-7 ft.	01-SB-01 3-5 ft.	01-SB-01 8-10 ft.	01-SB-01 12-15 ft.	01-SB-02 3-5 ft.	01-SB-02 5-7 ft.	01-SB-02 12-15 ft.	01-SD-01 0-0.5 ft.	01-SD-02 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (13)	16 B (12)	ND (230)	ND (12)	ND (12)	24,000 (4,300)	13,000 (5,100)	ND (520)	ND (14)	ND (14)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	27 (27)	ND (24)	100 (24)	51 (24)	33 (25)	30,000 (11,000)	9,800 (2,600)	1,500 (260)	280 (29)	340 (29)
Benzene	SW8240 (µg/kg)	500 AK	ND (6.7)	ND (6.2)	ND (130)	ND (6.2)	ND (6.2)	120,000 (5,800)	49,000 (32,000)	3,000 (130)	ND (7.3)	ND (7.2)
Ethylbenzene		15,000 AK-BTEX	ND (6.7)	ND (6.2)	ND (130)	ND (6.2)	ND (6.2)	200,000 (5,800)	74,000 (32,000)	2,300 (130)	ND (7.3)	ND (7.2)
Toluene		15,000 AK-BTEX	ND (6.7)	ND (6.2)	ND (130)	ND (6.2)	0.48 JB (6.2)	1,100,000 (29,000)	370,000 (32,000)	14,000 (330)	ND (7.3)	ND (7.2)
Total Xylenes		15,000 AK-BTEX	ND (6.7)	ND (6.2)	53 J (130)	ND (6.2)	ND (6.2)	1,200,000 (29,000)	380,000 (32,000)	12,000 (130)	ND (7.3)	ND (7.2)
Benzo(a)anthracene	SW8310 (µg/kg)	3,900 RC	ND (0.58)	0.70 J (1.6)	1,400 (150)	0.63 J (1.6)	0.31 J (1.6)	28 (15)	ND (17)	2.0 (1.7)	2.2 (0.64)	ND (0.62)
Benzo(a)pyrene		390 RC	ND (1.0)	0.92 J (2.8)	1,500 (270)	1.4 J (2.9)	0.97 J (2.8)	20 J (26)	ND (29)	1.5 J (3.0)	2.7 (1.1)	0.73 J (1.1)
Benzo(b)fluoranthene		3,900 RC	1.0 (0.80)	1.7 J (2.2)	940 (210)	3.1 (2.2)	0.95 J (2.2)	26 (21)	ND (23)	3.8 (2.3)	5.5 (0.88)	0.96 (0.86)
Dibenzo(a,h)anthracene		390 RC	ND (1.3)	ND (3.7)	260 (36)	ND (3.7)	ND (3.7)	ND (35)	ND (38)	ND (3.9)	1.4 J (1.5)	0.36 JB (1.4)

Fire Protection Training Area 1992 Soil Data (Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth									
			01-SS-01 0-0.5 ft.	01-SS-02 0-0.5 ft.	01-SS-03 0-0.5 ft.	01-SS-04 0-0.5 ft.	01-SS-05 0-0.5 ft.	01-SS-06 0-0.5 ft.	01-SS-07 0-0.5 ft.	01-SS-08 0-0.5 ft.	01-SS-09 0-0.5 ft.	01-SS-10 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (9.8)	ND (9.9)	13 B (12)	370 (220)	ND (11)	ND (11)	130 (97)	ND (11)	ND (240)	ND (10)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	130 (21)	130 (21)	410 (24)	210 (23)	72,000 (11,000)	220 (21)	15,000 (4,000)	190 (21)	32 (24)	1,500 (200)
Benzene	SW8240 (µg/kg)	500 AK	ND (5.3)	ND (5.2)	48 J (590)	ND (570)	ND (5.5)	ND (5.4)	ND (500)	ND (5.4)	ND (6.1)	ND (5.2)
Ethylbenzene		15,000 AK-BTEX	ND (5.3)	ND (5.2)	ND (590)	ND (570)	ND (5.5)	ND (5.4)	ND (500)	ND (5.4)	ND (6.1)	ND (5.2)
Toluene		15,000 AK-BTEX	ND (5.3)	ND (5.2)	100 J (590)	550 J (570)	ND (5.5)	ND (5.4)	43 J (500)	ND (5.4)	ND (6.1)	ND (5.2)
Total Xylenes		15,000 AK-BTEX	ND (5.3)	ND (5.2)	77 J (590)	120,000 (1,100)	ND (5.5)	ND (5.4)	ND (500)	ND (5.4)	ND (6.1)	ND (5.2)
Benzo(a)anthracene	SW8310 (µg/kg)	3,900 RC	ND (4.5)	1.4 (0.45)	3.1 J (5.1)	ND (0.5)	63 (48)	0.73 (0.47)	18 (4.4)	1.8 (1.4)	ND (0.53)	2.3 (0.45)
Benzo(a)pyrene		390 RC	ND (8.0)	4.2 J (8.0)	8.8 J (9.1)	ND (0.88)	27 J (84)	1.5 (0.83)	19 (7.7)	5.4 (2.5)	0.32 J (0.94)	4.4 J (7.9)
Benzo(b)fluoranthene		3,900 RC	ND (6.3)	5.8 J (6.2)	9.1 (7.1)	ND (0.69)	21 J (66)	1.6 (0.65)	25 (6.1)	6.1 (1.9)	0.86 (0.74)	4.7 J (6.2)
Dibenzo(a,h)anthracene		390 RC	ND (10)	ND (10)	ND (12)	ND (1.1)	ND (110)	0.53 J (1.1)	4.2 J (10)	1.1 J (3.2)	ND (1.2)	ND (1.0)

Fire Protection Training Area 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth							
			01-SB-03 0-2 ft.	01-SB-03 2.5-4.5 ft.	01-SB-03 5-7 ft.	01-SB-03 7.5-9.5 ft.	01-SB-04 0-2 ft.	01-SB-04 2.5-4.5 ft.	01-SB-04 5-7 ft.	01-SB-04 7.5-9.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	ND (20)	1 JB (20)	ND (20)	ND (20)	1 JB (20)	1 JB (20)	1 JB (20)	1 JB (20)
Benzene	SW8240 (µg/kg)	500 AK	ND (7.00)	ND (6.00)	0.900 J (6.00)	ND (6.00)	0.400 JB (5.00)	1.00 J (7.00)	0.800 J (6.00)	ND (6.00)
Ethylbenzene		15,000 AK-BTEX	ND (7.00)	ND (6.00)	ND (6.00)	ND (6.00)	ND (5.00)	ND (7.00)	ND (6.00)	ND (6.00)
Toluene		15,000 AK-BTEX	ND (7.00)	ND (6.00)	ND (6.00)	ND (6.00)	ND (5.00)	ND (7.00)	ND (6.00)	ND (6.00)
Total Xylenes [a]		15,000 AK-BTEX	ND (30.0)	ND (20.0)	ND (20.0)	ND (20.0)	ND (20.0)	ND (30.0)	ND (20.0)	ND (20.0)
Benzo(a)anthracene	SW8310 (µg/kg)	3,900 RC	ND (1.50)	0.563 J (1.60)	0.470 J (1.60)	0.413 J (1.79)	1.43 J (1.56)	0.0120 J (1.75)	ND (1.66)	ND (1.58)
Benzo(a)pyrene		390 RC	0.674 JB (4.58)	0.191 JB (4.88)	3.46 JB (4.86)	1.65 JB (5.46)	2.73 JB (4.75)	1.81 JB (5.32)	1.74 JB (5.06)	3.04 JB (4.82)
Benzo(b)fluoranthene		3,900 RC	0.739 J (7.20)	4.54 J (7.67)	4.70 J (7.63)	6.45 J (8.58)	3.62 J (7.47)	3.22 J (8.35)	2.07 J (7.95)	3.96 J (7.58)
Dibenzo(a,h)anthracene		390 RC	ND (3.49)	0.649 JB (3.72)	2.42 JB (3.70)	1.66 JB (4.16)	3.03 JB (3.62)	5.28 B (4.05)	1.12 JB (3.86)	4.79 B (3.67)

[a] Total xylenes are the sum of m&p-xylene and o-xylene.

Fire Protection Training Area 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID							
			01-MW-01	01-MW-02	01-MW-03	01-MW-04	01-MW-05	01-MW-06	01-SW-01	01-SW-02
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (200)	ND (100)	ND (100)	ND (100)	ND (100)	1,400 E (100)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	390 (210)	ND (210)	ND (200)	980 (200)	ND (210)	260 (200)	1,200 (190)	1,600 (190)
1,2,3-Trichloropropane	SW8010 (µg/L)	0.0015 RC	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.6)
Benzene	SW8020 (µg/L)	5 M	38 (0.60)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	420 (7.5)	ND (0.30)	ND (0.30)

Fire Protection Training Area 1993 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID			
			01-MW-01	01-MW-02	01-MW-07	01-MW-08
Gasoline Range Organics	AKGRO (µg/L)	NA	610 (100)	36 JB (100)	30 JB (100)	68 J (100)
Diesel Range Organics	AKDRO (µg/L)	NA	4 JB (200)	4 JB (200)	2 JB (200)	110 J (200)
1,2,3-Trichloropropane	SW8010 (µg/L)	0.0015 RC	ND (0.120)	ND (0.120)	ND (0.120)	0.0107 KJB (0.115)
Benzene	SW8020 (µg/L)	5 M	372 (0.700)	0.111 B (0.0700)	ND (0.0790)	29.4 (0.0790)

Fire Protection Training Area 1994 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID					
			01-MW-01	01-MW-02	01-MW-05	01-MW-06	01-MW-07	01-MW-08
Gasoline Range Organics	AK101 (µg/L)	NA	380 (50)	ND (50)	15 J (50)	580 (50)	3 JB (50)	79 (50)
Diesel Range Organics	AK102 (µg/L)	NA	170 (100)	ND (100)	ND (100)	350 (100)	ND (100)	380 (100)
1,2,3-Trichloropropane	SW8020 (µg/L)	0.0015 RC	ND (0.233)	ND (0.233)	ND (0.0233)	ND (0.0233)	ND (0.0233)	ND (0.233)
Benzene	SW8260 (µg/L)	5 M	152 (0.154)	ND (0.0307)	0.0400 B (0.0307)	224 (0.154)	0.0400 B (0.0307)	22.0 (0.0307)

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3.3 POL Tank Farm (ST005)

The Galena POL Tank Farm is located in the eastern portion of the main airport triangle (Figure 1.1-1). Previous investigations at the site identified areas of soil and groundwater contamination. The purpose of the investigation at this site was to confirm the presence of soil and groundwater contamination, to delineate the nature and extent of contamination, to define the site-specific hydrogeology, and to collect sufficient data to complete the baseline risk assessment (USAF, 1996).

The conceptual diagram for the POL Tank Farm is presented in Figure 3.3-1. This diagram provides a plan view, a geologic cross section, and a table that lists the range of detected concentrations for analytes that have exceeded their screening criteria. The plan view shows the location of all analytical data points (surface soil samples, surface water samples, soil borings, sediment samples, and monitoring well locations). Estimated areas of soil and groundwater contamination are shown as an overlay to the plan view. An area of free product was estimated on the basis of observations in monitoring wells (free-phase hydrocarbons). The southern boundary of this area was estimated through the soil gas survey. The plan view and the lithologic cross section can be used in conjunction to provide a three-dimensional visualization of site characteristics.

3.3.1 Site Description

The POL Tank Farm lies immediately north of the main road to all civilian airport facilities at Galena Airport. Passenger and freight terminals for the flying services associated with the airport are located just south of this road.

The topography at the POL Tank Farm is generally flat, except for the earthen dikes surrounding the fuel storage tanks. Vegetation within the diked area is generally low and sparse and consists mostly of grass. Willows grow along some dike slopes and in the southeast corner of the site.

The geology of the POL area consists predominantly of recent alluvial deposits from the Yukon River. The majority of the site is covered with a layer of gravelly sand fill. A thin layer of bentonite clay, most likely placed as spill protection, was encountered near the surface in some locations within the diked area. The natural stratigraphy consists of two main units: the upper unit (2 to 10 ft typical) consists of a silt or silty sand with abundant organic matter, and the lower unit is composed of sand and gravel (10 to at least 60 ft—maximum depth of boreholes). Shallow zones of frozen soils were encountered 6 to 8 ft bgl in two borings drilled in the southern portion of the site. The water level at the POL Tank Farm varies from approximately 5 to 25 ft bgl on a seasonal cycle in response to changes in stage of the Yukon River. A more detailed account of the local geology and hydrology is presented in Section 2.

3.3.2 Background

The POL Tank Farm has contained as many as 33 tanks to manage jet fuel, MOGAS, diesel, and other fuels used at Galena Airport. The tanks, ranging in capacity from 25,000 to 50,000 gal., were situated horizontally on wooden or concrete saddles and surrounded by clay-lined dikes. Tank trucks or buried transfer lines were used to carry fuels from the barge loading area to the POL Tank Farm; aboveground distribution lines were used to transfer fuels from the tanks to several fillstands.

With the exception of eight tanks located in the northwest part of the POL, all saddle tanks at the site have been removed. Four of the eight tanks are empty, two contain diesel, and two contain MOGAS. The west central portion of the POL Tank Farm was regraded following removal of the saddle tanks. Construction of a new million-gallon fuel tank took place during 1994. Two monitoring wells, 05-MW-01 and 05-MW-10, were abandoned to make room for the new tank. Figure 3.3-2 shows the location of former and current fuel storage and distribution features at the POL Tank Farm.

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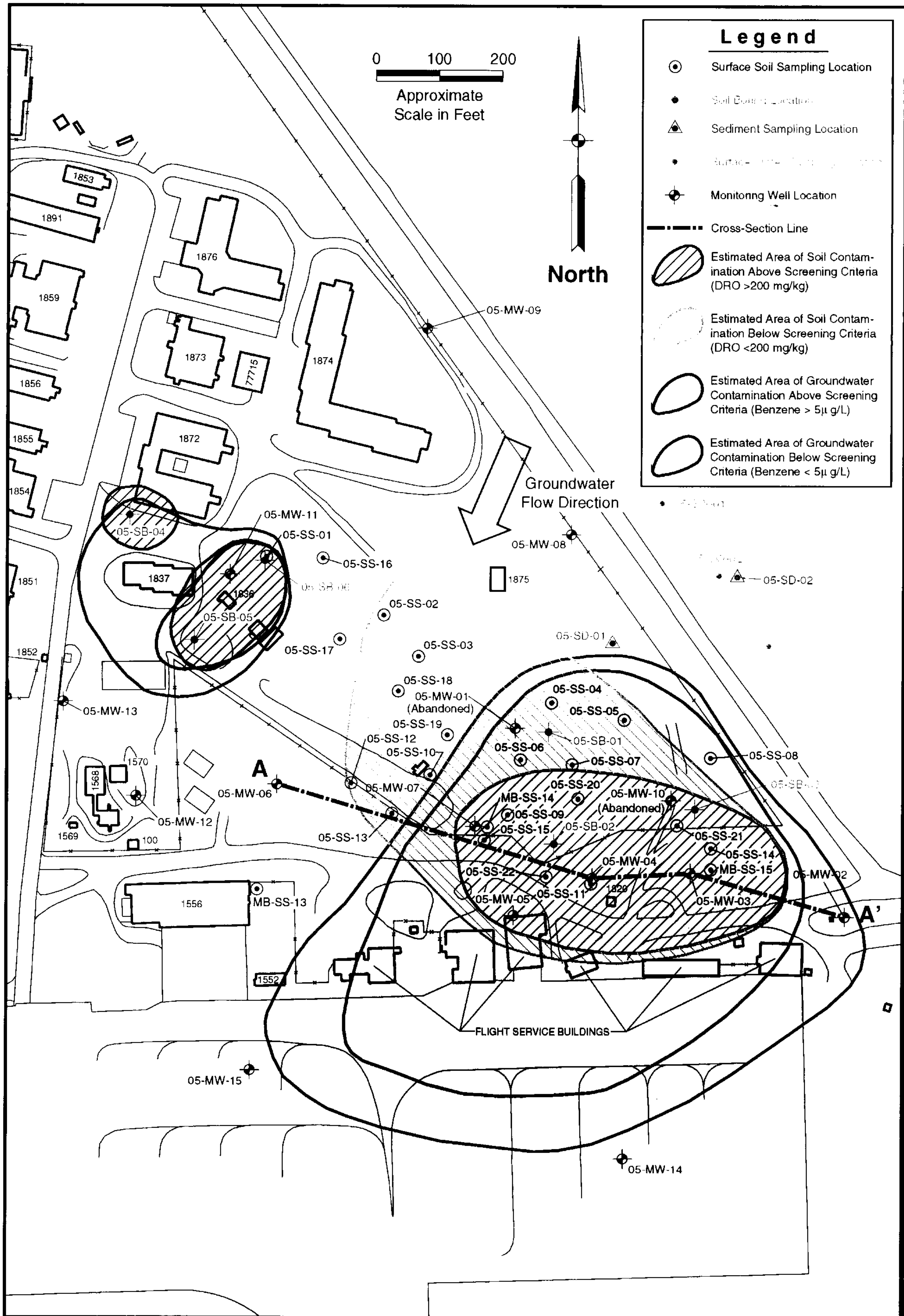
Legend
Surface Soil Sampling Location
Sediment Sampling Location
Monitoring Well Location
Cross-Section Line
Estimated Area of Soil Contamination Above Screening Criteria (DRO >200 mg/kg)
Estimated Area of Soil Contamination Below Screening Criteria (DRO <200 mg/kg)
Estimated Area of Groundwater Contamination Above Screening Criteria (Benzene > 5µ g/L)
Estimated Area of Groundwater Contamination Below Screening Criteria (Benzene < 5µ g/L)
0 100 200
Approximate Scale in Feet
North
Groundwater Flow Direction
FLIGHT SERVICE BUILDINGS
A
A'
05-MW-01 (Abandoned)
05-MW-10 (Abandoned)
05-MW-02
05-MW-03
05-MW-04
05-MW-05
05-MW-06
05-MW-07
05-MW-08
05-MW-09
05-MW-11
05-MW-12
05-MW-13
05-MW-14
05-MW-15
05-SS-01
05-SS-02
05-SS-03
05-SS-04
05-SS-05
05-SS-06
05-SS-07
05-SS-08
05-SS-09
05-SS-10
05-SS-11
05-SS-12
05-SS-13
05-SS-14
05-SS-15
05-SS-16
05-SS-17
05-SS-18
05-SS-19
05-SS-20
05-SS-21
05-SS-22
MB-SS-13
MB-SS-14
MB-SS-15
05-SB-01
05-SB-02
05-SB-04
05-SB-05
05-SD-01
05-SD-02
1853
1891
1859
1876
1873
77715
1874
1856
1855
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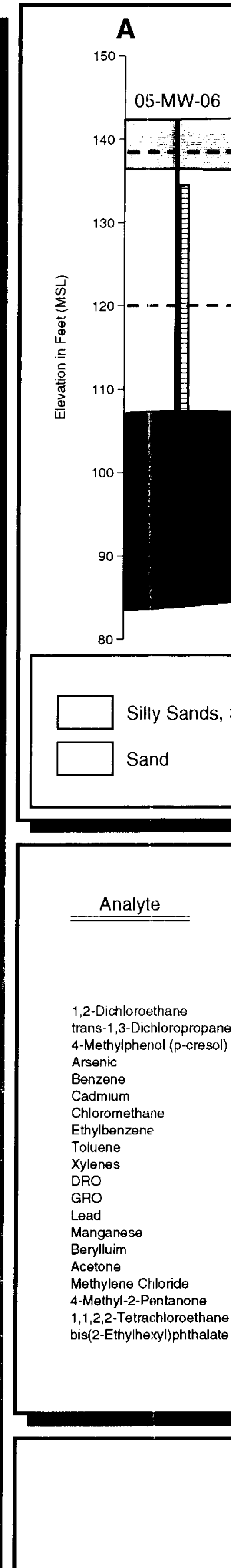
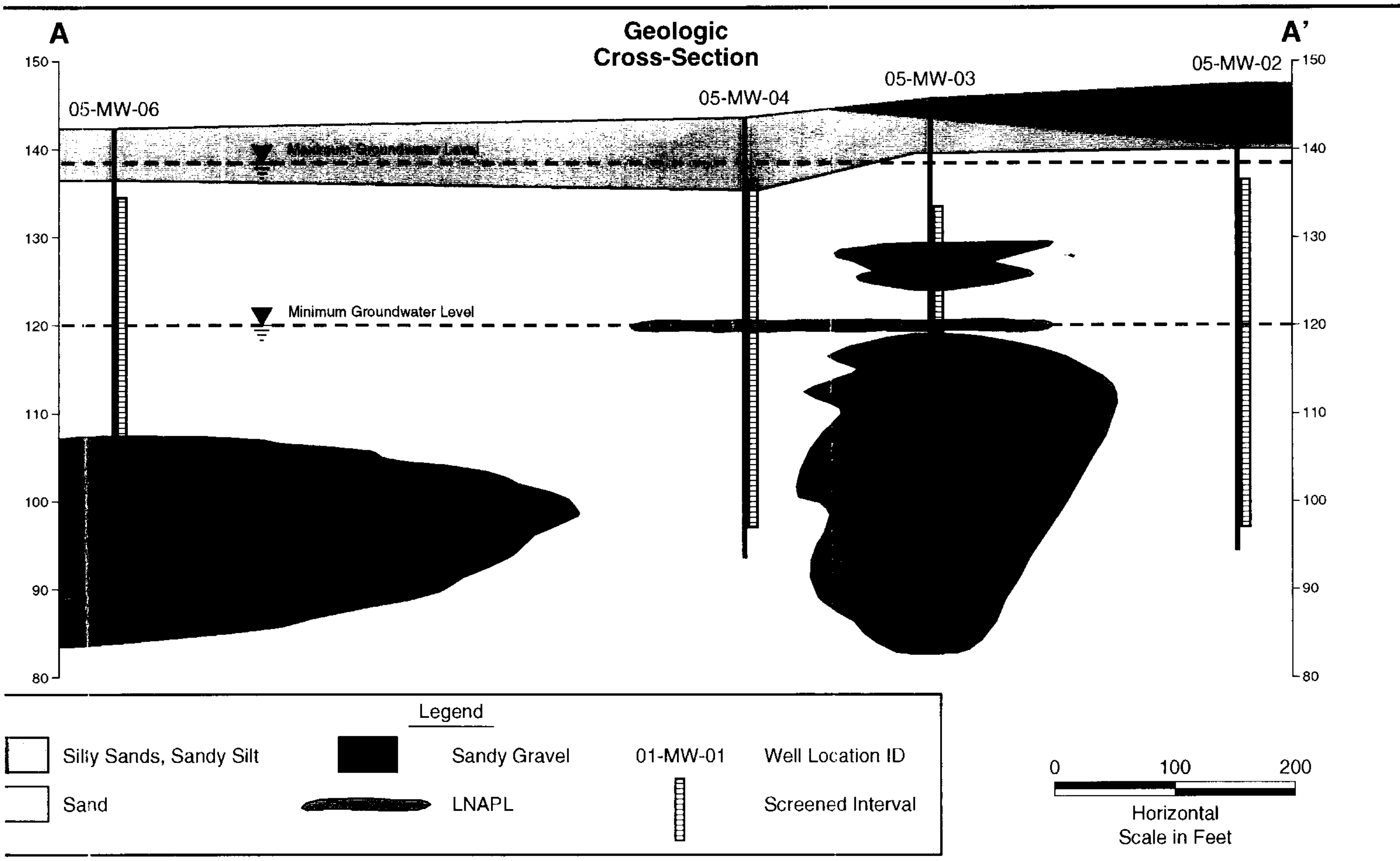
1837
1836
1875
1851
1852
1570
1568
1569
100
1556
1552
1820


A
05-MW-06
150
140
130
120
110
100
90
80
Elevation in Feet (MSL)
Silty Sands,
Sand
Analyte
1,2-Dichloroethane
trans-1,3-Dichloropropane
4-Methylphenol (p-cresol)
Arsenic
Benzene
Cadmium
Chloromethane
Ethylbenzene
Toluene
Xylenes
DRO
GRO
Lead
Manganese
Beryllium
Acetone
Methylene Chloride
4-Methyl-2-Pentanone
1,1,2,2-Tetrachloroethane
bis(2-Ethylhexyl)phthalate



Compounds Exceeding Screening Criteria

Analyte	Soil Screening Criteria (µg/kg)	Soil Range of Detections (µg/kg)	Groundwater Screening Criteria (µg/L)	Groundwater Range of Detections (µg/L)
1,2-Dichloroethane			5 M	0.43 - 59.2
trans-1,3-Dichloropropane			0.077 RC	0.158
4-Methylphenol (p-cresol)			180 RN	13 - 660
Arsenic	24,000 RN	4,000 - 71,000		
Benzene	500 AK	160 - 310,000	5 M	10 - 63,000
Cadmium			5 M	4.3 - 12.6
Chloromethane			1.4 RC	0.350 - 222
Ethylbenzene	15,000 AK	16 - 350,000	700 M	0.32 - 1,800
Toluene	15,000 AK	73 - $1.4x10^6$	1,000 M	0.04 - 160,000
Xylenes	15,000 AK	25 - $1.5x10^6$	10,000 M	0.61 - 270,000
DRO	200,000 AK	$2.7x10^4$ - $1.6x10^7$		
GRO	100,000 AK	$5.3x10^4$ - $5.5x10^7$		
Lead	400,000 EL	3,010 - 480,000		
Manganese	390,000 RN	130,000 - 650,000		
Berylluim	150 RC	170 - 390		
Acetone			3,700 RN	5.23 - 24,000
Methylene Chloride			5 M	3.60 - 398
4-Methyl-2-Pentanone			2,900 RN	2.81 - 3,800
1,1,2,2-Tetrachloroethane			0.052 RC	0.220
bis(2-Ethylhexyl)phthalate			6 M	3.51 - 880

Key:
AK - State of Alaska Cleanup Standard
EL - EPA Lead Directive
M - Maximum Contaminant Level
RC - EPA Region III Risk-Based Concentration, Carcinogenic
RN - EPA Region III Risk-Based Concentration, Non-Carcinogenic

Galena Airport - POL Area

Conceptual Diagram and Summary of Compounds Exceeding Screening Criteria

A1181-5 03/19/96

Figure 3.3-1 Conceptual Diagram for the POL Tank Farm (ST005)

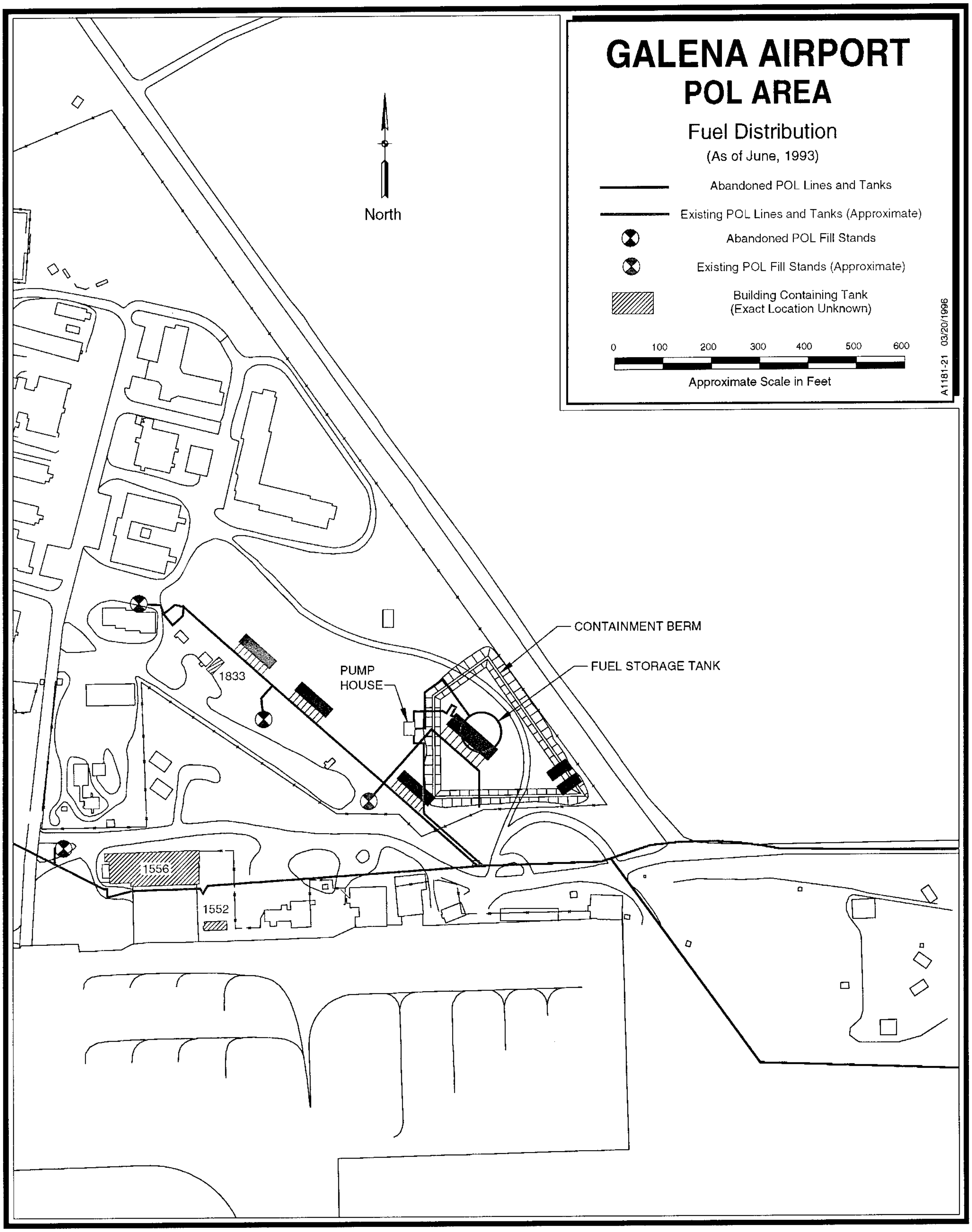


Figure 3.3-2. Fuel Distribution and Storage Features at the POL Tank Farm (ST005)

Leaks were detected at the POL area through inventory control and annual pressure testing of the transfer pipeline before loading fuels. Several of the following spills occurred in the area over the years:

- The MOGAS fillstand lost an estimated 200 to 500 gal. in 1985 (spill/leak #4);
- Valve pit #2 was the location of periodic small equipment leaks; and
- Ten to 15 gal. of AVGAS sludge were allowed to weather on the ground following tank cleaning every three years (prior to the early 1980s).

The results of previous investigations are summarized in Table 3.3-1.

3.3.3 Treatability Study (TS) Activities and Findings

During the summer of 1993, a Phase II pilot-scale remediation system was installed in the southeastern portion of the POL Tank Farm to assess the effectiveness of soil vapor extraction (SVE) technology in conjunction with air and air/steam sparging of the groundwater. Figure 3.3-3 shows the layout of the two test cells, which includes two equipment sheds and a network of air and steam injection wells, vapor extraction wells, groundwater monitoring wells, soil gas monitoring probes, and soil boring locations. Figure 1.1-1 shows the location of the study. The VOC removal rates averaged 380 kg/day in the West Cell and 50 kg/day in the East Cell.

Light nonaqueous phase liquid (LNAPL) hydrocarbons were found floating on the groundwater table in several monitoring wells in the southern portion of the POL Tank Farm. The seasonal rise and fall of the water table has produced a "smear zone" of affected soil between approximately 8 and 25 ft bgl. Soils in this zone are exposed to LNAPL at some time in each seasonal cycle. As the water table rises in the spring, hydrocarbons in the soil become dissolved in the groundwater. At times of low water table in the fall and winter, most of the affected soils are in the vadose zone, allowing LNAPL to drain down. LNAPL thickness generally increases during the fall as the water table drops, as shown in Figure 3.3-4. An estimated area of LNAPL is shown in the conceptual diagram (Figure 3.3-1).

LNAPL has been found in measurable thickness in wells 05-MW-03, -04, -05, -07, and -10, shown in Figure 3.3-1, as well as all six of the TS monitoring wells. The area encompassed by these wells is approximately 300 ft east to west by 175 ft north to south. The southern limit of LNAPL in the POL area is not fully defined, and may lie beneath the air services buildings immediately to the south of the site. On the basis of the approximate area of the LNAPL and an estimated maximum thickness of 6 in., approximately 75,000 gal. of free product are thought to be present on the groundwater table at this location.

Toxicity Characteristic Leaching Procedure (TCLP) analysis of recovered LNAPL found that benzene and methylethyl ketone (MEK) exceeded regulatory limits. Benzene was measured at 2,260 mg/L, compared with the TCLP limit of 0.5 mg/L. MEK was present at a concentration of 690 mg/L, compared with the TCLP limit of 200 mg/L. The lead content of the LNAPL was 4.93 mg/L, close to the regulatory limit of 5 mg/L. A flash point of 76.0°F was determined for the LNAPL; however, this sample was collected from a drum used to accumulate LNAPL recovered from the skimming tests. Loss of volatiles from this drum is likely to have provided an anomalously high flash point measurement. Detailed results of the LNAPL analysis are included in Appendix F.

Because the apparent LNAPL thickness in monitoring wells does not generally represent the true thickness in the formation, limited bail-down testing was performed to determine true LNAPL

Table 3.3-1
Summary of Previous Investigations and Findings—POL Tank Farm

Activities		Analyses Performed	Maximum Level of Contamination	Comments
1985[a]	Records search.			
1986-87[b]	Installed 6 groundwater monitoring wells, sampled groundwater and soils from the well borings, drilled 30 soil borings (not including well borings).	Purgeable halocarbons, purgeable aromatics, and dissolved lead—waters; volatile organics and lead—soils; and TPH—all samples.	**Groundwater:** TPH 280 mg/L Benzene 45,900 µg/L Toluene 64,300 µg/L Ethylbenzene 6,400 µg/L Xylene <5000 µg/L Lead 0.07 mg/L **Soil:** TPH 8.6 mg/kg Benzene 1000 µg/kg Toluene 7,600 µg/kg Ethylbenzene 78 µg/kg Xylene 520 µg/kg Lead 84 mg/kg	A detection of 110,000 mg/kg TPH in a 1986 test boring was reported to be suspect.
1988[b]	Conducted soil gas survey.	BTX.	BTX 10,000 ppmV	The highest concentration of BTX in soil gas was found in the southeastern POL area.
1989[b]	Collected several rounds of groundwater samples from the six wells installed in 1986.	TPH, dissolved lead, and purgeable aromatics.	TPH 280 mg/L Lead 0.14 mg/L Benzene 27,000 µg/L Toluene µg/L Ethylbenzene 1,400 µg/L Xylenes µg/L	Sampling was conducted in September, November, and December. Measurable free product was found in one well in the southeastern POL area.
1990[b]	Collected several rounds of groundwater samples from the six wells installed in 1986.	TPH, dissolved lead, and purgeable aromatics.	TPH 13600 mg/L Benzene 71,000 µg/L Toluene 71,000 µg/L	Sampling was conducted in March, June, and July. Measurable free product was found in two wells in the southeastern POL area.

Notes: [a]USAF, 1985. [b]USAF, 1989a, 1991.

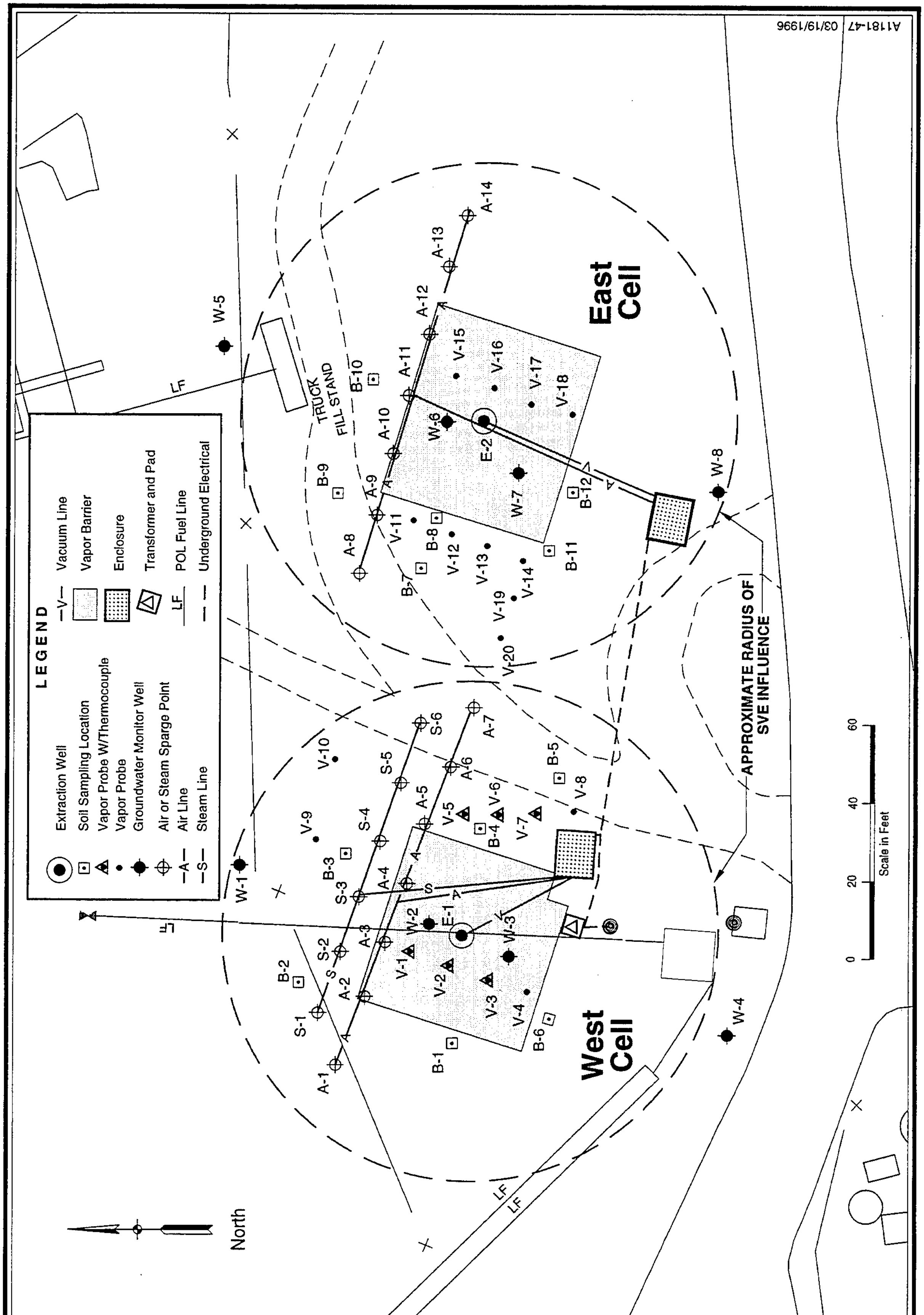
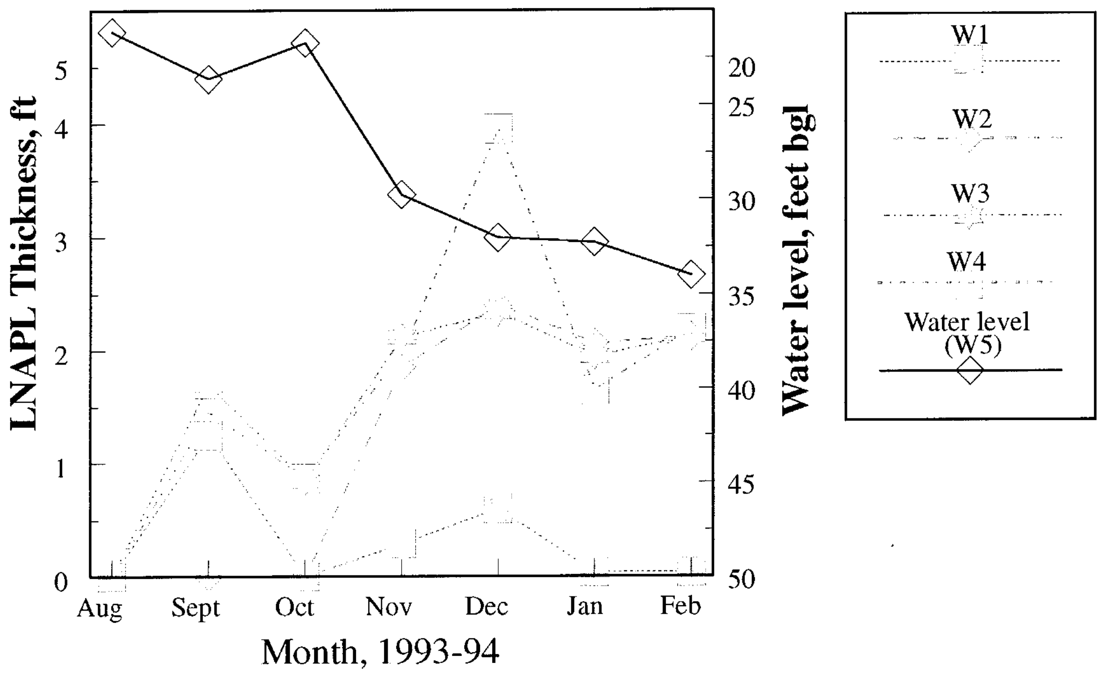
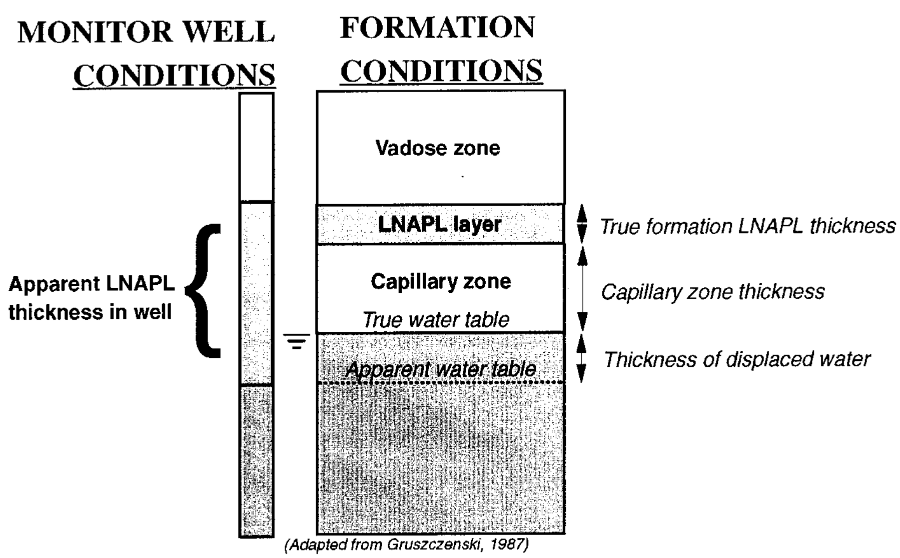


Figure 3.3-3. Layout of the Phase II Pilot Scale System at the POL Tank Farm (ST005)

Changes in Water Level and LNAPL Thickness Over Time

1993 - 1994





Note: During late 1993 the water table dropped by nearly 10 ft. (top figure). As the water table dropped, the apparent LNAPL thickness in SVE TS wells increased from near zero in August 1993 to a maximum of nearly 4 ft in December 1993. True formation LNAPL thickness (bottom figure), which was not determined in these wells, is generally much less than the apparent thickness.

Figure 3.3-4 Changes in Water Level and LNAPL Thickness

thickness at the POL Tank Farm (see Figure 3.3-4). Appendix F gives a detailed description of the bail-down testing and the results.

Interpretation of bail-down test results was complicated by the fact that the high transmissivity of the aquifer allowed water level recovery in the wells to occur over a period of minutes, whereas product recovery was very slow, occurring over a period of days. Since the regional water table elevation also varies significantly over a period of days (on the order of 1 ft/week) because of changes in the elevation of the Yukon River, the localized effects of the bail-down testing and product recovery are obscured. The product thickness in the formation ranged from 0.03 to 0.4 ft. Additional bail-down tests were conducted in April 1994, when groundwater levels were near their seasonal low. Test results for five POL area wells indicated a product thickness in the formation ranging from 0.16 to 0.54 ft.

Hydrocarbon skimming tests conducted in July 1993 in conjunction with the bail-down testing recovered only small volumes of LNAPL from three wells (see Appendix F). These tests were conducted in two 6-in. recovery wells (05-RW-01 and -02) and one monitoring well (05-MW-10). The rate of LNAPL recovery into the wells was much slower than had been anticipated, so only intermittent recovery pumping was possible. Calculated maximum annual recovery rates for these wells ranged from 100 to 190 gal. Higher rates of product recovery may be possible during periods of lower water table elevation, such as late fall or early spring (prior to breakup). Skimming tests conducted in April 1994 recovered over 4 gal. of product in under eight hours of operation at one well.

3.3.4 RI Activities and Findings

During the 1992 through 1995 field seasons, preexisting monitoring wells were sampled; nine new wells were installed and sampled; five soil borings were drilled and sampled; and surface soil, water, sediment, and soil gas samples were collected to characterize contamination at the POL Tank Farm. Field screening was conducted to define contaminant plumes and direct the 1993 RI sampling effort. The conceptual diagram (Figure 3.3-1) shows the POL Tank Farm RI sampling locations referred to in the following sections. Analytical data for soil and water samples are presented in Appendix A and summarized in the Attachment to Section 3.3, located at the end of this section.

The results of the RI suggest that fuel transport, handling, and storage activities at this site resulted in the contamination of soil and groundwater. A soil gas survey conducted at the site identified several areas of potential VOC contamination. A discussion of the 1993 soil gas survey results is included in the *Remedial Investigation Soil Gas Maps Report* (Appendix G).

No discrete sources could be distinguished in the southeast POL Tank Farm using the soil gas results. It appears that the horizontal and vertical movements of the water table may have obscured any individual source areas. Data from 31 soil gas samples, presented in Figure 3.3-5, indicate that two lobes of elevated soil gas concentrations extend southwest from the POL Tank Farm past the air services buildings. The area between these lobes includes portions of the TS site where soil borings encountered ice lenses. These areas of permafrost may be blocking contaminant migration or interfering with soil gas measurements. Soil gas data collected by the 11 CEOS in 1993 (not shown in Figure 3.3-5) show similar distribution patterns. The soil gas results shown in Figure 3.3-5 indicate two smaller areas of hydrocarbon contamination in the southern part of the POL Tank Farm. One area is just west of Building 1556 (the fire station), and the second is north of the Tanana Air Services building. The source of organic vapors detected in these areas is uncertain. The low levels of organic

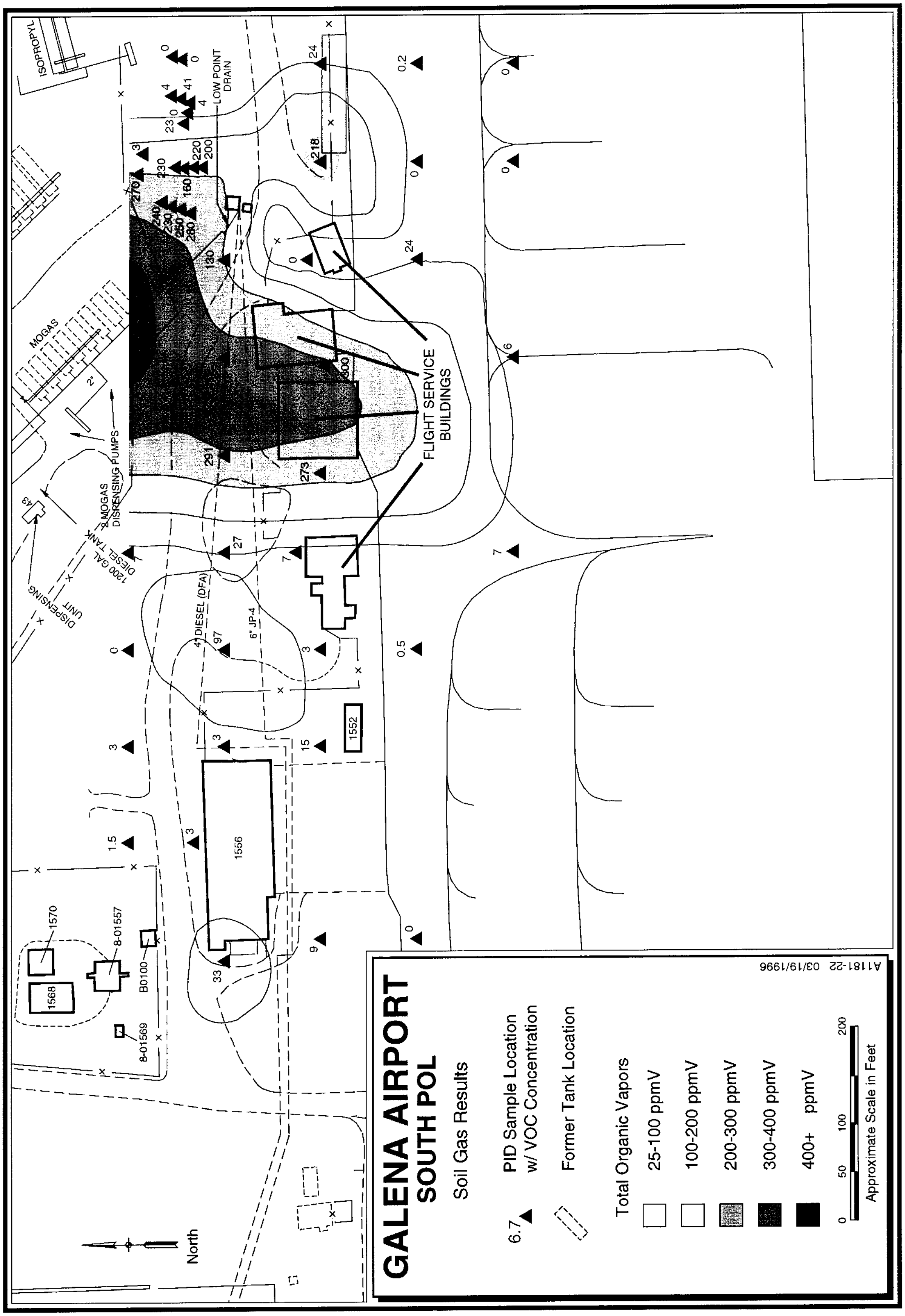


Figure 3.3-5. Soil Gas Survey Results for the Southern POL Tank Farm Area (ST005)

vapors detected in the soil gas near Building 1556 may be related to a diesel fillstand that was formerly located approximately 100 ft west of the sampling point. A JP-4 and diesel pipeline crosses the area just north of the area of elevated soil gas hydrocarbons detected near the Tanana Air Services building and could be a source for elevated VOCs. However, no releases from the pipelines have been reported in this area.

The results of the 1993 soil gas survey also revealed two major areas of potential VOC contamination in the northwest part of the POL Tank Farm, shown in Figure 3.3-6. One of the anomalies centers on the MOGAS and AVGAS valve rack and extends downgradient (southwest). The other area of elevated organic vapor concentrations in the soil gas corresponds to the former location of abandoned fuel tanks and fillstands that were removed prior to construction of Building 1872, a dormitory, in the early 1970s. Personnel with the 11 CEOS who were involved in the construction of Building 1872 reported the presence of hydrocarbon saturated soils in the area excavated for construction.

During the 1995 field season, additional soil gas samples were collected at the northwest POL Tank Farm to further characterize the extreme northern edge of the site. One of the 1993 soil gas locations, which yielded 180 ppmV VOCs, was suspected of being the result of a localized surface spill according to the rest of the site data. This sample was collected from the middle of a roadway and, because of refusal, was collected at 2 ft bgl. Other soil gas samples collected at the northwest POL area in 1993 were collected at 5 ft bgl. This location was resampled at a depth of 5 ft bgl in 1995 and a measurement of 7.4 ppmV VOCs was recorded. Several other soil gas locations were also sampled in this area in 1995 (at 5 ft bgl) to confirm that no contamination was present to the north of Building 1872. The results of this soil gas survey are shown in Figure 3.3-6.

The analytical results of soil sampling conducted at the POL Tank Farm are summarized in the attachment to Section 3.3. Soil samples from this site contained fuel-related compounds such as DRO, GRO, and BTEX. Much of the subsurface soil contamination appeared to be related to a "smear zone" because of LNAPL in the groundwater in the southeastern portion of the site. Surface soil contamination by DRO, GRO, and BTEX compounds was identified at a few "hot spots," mostly within the diked area. One surface soil sample (05-SS-11) collected near a transfer line outside of the diked area contained 3,700 mg/kg DRO. It is likely that these surface hot spots represent localized spills or surface leaks.

A soil boring (05-SB-04) that was drilled on the basis of the 1993 soil gas survey confirmed the presence of fuel compounds in excess of State of Alaska cleanup levels in subsurface soils near the dormitory (Building 1872). Surface and near-surface samples from this boring (0 to 2 and 2.5 to 4.5 ft) were not contaminated, and may have been collected in clean fill material placed during construction of the dormitory. These data may also indicate a subsurface source or movement of the fuel via groundwater. Soil borings 05-SB-05 and -06, drilled near the former MOGAS fillstand and the valve rack, respectively, were found to contain levels of fuel-related compounds that do not exceed screening criteria. The highest concentrations of these compounds occur at depths between 4 and 10 ft, and may be the result of small amounts of leakage over time.

Arsenic concentrations exceed the screening criterion and UTL in surface soils near the valve rack. This high concentration of arsenic was noted in the shallowest sample collected from 05-SB-06 and a surface soil sample (05-SS-01) collected at this same location in 1992. There is no known source of arsenic in this area. In 1993, additional surface soil samples were collected to assess the significance of arsenic and lead within

Figure 3.3-6. Soil Gas Survey Results for the Northwest POL Tank Farm (ST005)

the main base triangle. Six of these samples (05-SS-17 through -22) were collected throughout the POL Tank Farm (see Figure 3.3-1). Although individual samples were found to contain arsenic in excess of the UTL of 15 mg/kg, statistical analysis showed that, on average, arsenic concentrations in surface soils at the POL Tank Farm were not significantly higher than background values. Lead, however, was determined to be significantly higher, on the average, in POL Tank Farm surface soils than in background surface soils. None of the subsurface soil samples contained lead in excess of the background UTL. Only one surface soil sample (05-SS-01) exceeded the lead screening criterion of 400 mg/kg.

The contaminants found in groundwater samples from the POL Tank Farm consist primarily of BTEX compounds. Free product was measured in several of the monitoring wells located in the southeast portion of this site (05-MW-03, -04, -05, -07, and -10). Benzene was also detected above the MCL in monitoring well 05-MW-11, located to the northwest of the tank farm near a valve rack, but dropped from 29 to 10 µg/L from 1992 to 1994. Groundwater concentrations of BTEX contaminants varied significantly with time in monitoring wells that were sampled in the fall of 1992, spring of 1993, and fall of 1994. Of these wells, only one (05-MW-04) contained free product at the time of all sampling events. Samples from this well showed more consistent BTEX levels, possibly reflecting chemical equilibrium with the LNAPL. Since the presence of LNAPL is seasonal, the concentrations of related compounds may also be.

Although bis(2-ethylhexyl)phthalate is a common laboratory contaminant, it occurs in samples from several monitoring wells in the POL area in concentrations exceeding the blank values and the screening criteria. The highest concentrations of this common plasticizer have been noted in samples from wells containing free product. Neither the source of the bis(2-ethylhexyl)-phthalate nor its relationship to the free product is known.

1,2-dichloroethane (1,2-DCA) and other chlorinated solvents also occurred in excess of the screening criteria in groundwater samples from the POL Tank Farm. The concentration and type of chlorinated solvents detected in groundwater samples varied over time, but these compounds were usually detected in wells that contained free product or high concentrations of dissolved fuel constituents. 1,2-DCA may be originating from MOGAS leaks and spills, as it is added to gasoline to scavenge lead (U.S. Department of Health and Human Services, 1992). 2-methylphenol (o-cresol) and 4-methylphenol (p-cresol) were also detected, sometimes above the screening criteria, in those wells that contain high concentrations of BTEX compounds. Although MEK exceeded the TCLP limit in the LNAPL sample from the POL Tank Farm, no water samples from this site were found to contain MEK in excess of the screening criterion.

During the 1993 field season, three downgradient monitoring wells (05-MW-13, -14, and -15) were installed—on the basis of the field screening results—to monitor the movement of contaminant plumes. Groundwater samples collected from these monitoring wells showed some evidence of fuel-related contamination by 1994. None of the BTEX compounds detected in the downgradient wells in 1993 were distinguishable from detections in blank samples. In 1994, toluene was detected in 05-MW-13 and -15 at concentrations just above the SQL, but at several orders of magnitude below screening criterion. DRO were detected above the SQL in 05-MW-13 in both 1993 and 1994, and GRO were detected above the SQL in 05-MW-14 in 1994. No free product has shown up in these wells. Cadmium was present at 0.0126 mg/L, above the MCL and UTL, in the 1993 sample from 05-MW-15. It is not known whether any of these detections are related to fuel-handling activities at the POL Tank Farm; the flight service buildings and aircraft are also potential sources.

3.3.5 Conclusions

It appears that surface and subsurface spills and leaks from several sources have contributed to the soil and groundwater contamination at the POL Tank Farm over time. Fuels that leaked to the soil have percolated downward and have accumulated on top of the water table. These LNAPL hydrocarbons are further distributed in the soil by the seasonal fluctuations of the groundwater table. Following are the main findings of the investigation conducted at the POL Tank Farm:

- An estimated 30,000-75,000 gal. of LNAPL hydrocarbons are present in subsurface soils and groundwater in the southern portion of the site.
- The true formation thickness of the LNAPL is not well defined and appears to change seasonally.
- Fuel contamination is present in the northwestern portion of the site, most likely as the result of leaks and spills from POL tanks previously located in this area.
- Fuel contamination appears to be migrating slowly to the south/southwest with prevailing groundwater flow; contamination from the southern portion of the POL has moved south (downgradient) and extends beneath the flight services buildings.
- LNAPL appears to be moving much more slowly than the rate of groundwater movement; attenuation on soil particles during the seasonal rise and fall of the water table and possibly permafrost lenses are slowing migration.

3.3.6 Recommendations

Several response actions are currently being conducted or are planned for the future. In the southeast area, where free product is present on the groundwater, free-phase product recovery is being conducted to eliminate the source of continuing contamination to the groundwater. In addition, several SVE wells in the southeast area and one in the northwest area were installed during 1995 and an SVE system will be operational in 1996. Free product has not been observed at the northwest POL area.

In addition to product recovery and SVE, intrinsic remediation coupled with point-of-compliance groundwater monitoring will be conducted at the POL Tank Farm. Baseline groundwater sampling will be conducted in conjunction with the startup of the SVE system in 1996, and point-of-compliance monitoring will begin in 1997.

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ATTACHMENT TO SECTION 3.3

POL TANK FARM
DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

POL Tank Farm 1992 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth											
			05-MW-01 10-12 ft.	05-MW-02 7-9 ft.	05-MW-03 8-12 ft.	05-MW-04 8-10 ft.	05-MW-05 5-7 ft.	05-MW-06 7-9 ft.	05-SB-01 2-4 ft.	05-SB-01 5-7 ft.	05-SB-01 8-10 ft.	05-SB-02 2-4 ft.	05-SB-02 5-7 ft.	05-SB-02 8-10 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (13)	ND (11)	ND (12)	8,200 (4,900)	55,000 (6,100)	13 B (12)	17,000 (4,700)	ND (4,900)	53 (13)	15,000 (5,000)	14,000 (5,200)	28,000 (5,000)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	27 (26)	ND (23)	ND (24)	7,600 (2,500)	6,200 (30)	ND (25)	3,400 (590)	ND (26)	38 (27)	1,800 (590)	16,000 (2,600)	5,200 (630)
Benzene	SW8240 (µg/kg)	500 AK	ND (130)	ND (5.8)	31 J (120)	160,000 (32,000)	76,000 (7,700)	ND (6.2)	ND (3,000)	20 (6.5)	92 (6.8)	100,000 (30,000)	200,000 (32,000)	310,000 (32,000)
Ethylbenzene		15,000 AK-BTEX	79 J (130)	ND (5.8)	ND (120)	100,000 (32,000)	83,000 (7,700)	ND (6.2)	14,000 (3,000)	170 (6.5)	130 (6.8)	74,000 (30,000)	120,000 (32,000)	350,000 (32,000)
Toluene		15,000 AK-BTEX	340 (130)	ND (5.8)	49 J (120)	640,000 (32,000)	360,000 (7,700)	0.32 JB (6.2)	20,000 (3,000)	2,100 (130)	520 (40)	710,000 (30,000)	620,000 (32,000)	1,400,000 (32,000)
Total Xylenes		15,000 AK-BTEX	350 (130)	ND (5.8)	43 J (120)	480,000 (32,000)	ND (7,700)	ND (6.2)	120,000 (3,000)	1,100 (6.5)	600 (6.8)	1,500,000 (30,000)	490,000 (32,000)	1,200,000 (32,000)
Benzo(a)pyrene	SW8270 (µg/kg)	88 RC	ND (430)	ND (390)	ND (410)	ND (12,000)	ND (1,500)	ND (410)	ND (12,000)	ND (430)	ND (450)	ND (12,000)	ND (12,000)	ND (12,000)
Beryllium	SW6010 (mg/kg)	0.15 RC	0.24 (0.19)	0.19 (0.12)	ND (0.19)	0.21 (0.18)	0.49 (0.21)	0.19 (0.16)	0.21 (0.18)	0.20 (0.19)	ND (0.20)	0.18 (0.18)	0.33 (0.18)	ND (0.17)
Manganese		390 RN	440 (0.97)	270 (0.83)	290 (0.93)	430 (0.89)	460 (1.0)	240 (0.82)	650 (0.88)	430 (0.96)	430 (1.0)	400 (0.88)	600 (0.91)	280 (0.82)
Arsenic	SW7060 (mg/kg)	23 RN	12 (0.77)	6.4 (0.66)	8.1 (0.69)	8.8 (0.70)	8.7 (0.82)	6.2 (0.64)	8.8 (0.65)	11 (0.78)	9.5 (0.80)	5.2 (0.35)	11 (0.72)	5.1 (0.39)
Lead	SW7421 (mg/kg)	400 EL	6.8 (0.58)	6.9 (0.49)	6.2 (0.51)	24 (1.3)	12 (1.2)	5.4 (0.48)	17 (0.97)	12 (1.2)	6.9 (0.60)	19 (1.0)	12 (1.1)	5.7 (0.59)

POL Tank Farm 1992 Soil Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth											
			05-SB-02 10-12 ft.	05-SB-03 5-7 ft.	05-SB-03 7-9 ft.	05-SD-01 0-0.5 ft.	05-SD-02 0-0.5 ft.	05-SS-01 0-0.5 ft.	05-SS-02 0-0.5 ft.	05-SS-03 0-0.5 ft.	05-SS-04 0-0.5 ft.	05-SS-05 0-0.5 ft.	05-SS-06 0-0.5 ft.	05-SS-07 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	11,000 (4,500)	22 B (13)	17 B (10)	11 B (11)	15 B (14)	13 B (11)	ND (12)	ND (13)	ND (14)	15 B (12)	ND (11)	22 B (11)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	2,100 (570)	43 (27)	21 B (21)	ND (22)	49 (29)	35 (23)	29 (25)	32 (26)	ND (29)	ND (24)	ND (22)	480 (110)
Benzene	SW8240 (µg/kg)	500 AK	8,300 (570)	160 (6.7)	410 (100)	ND (5.5)	ND (7.1)	ND (5.8)	ND (6.1)	ND (6.6)	ND (7.2)	ND (6.1)	ND (5.6)	ND (270)
Ethylbenzene		15,000 AK-BTEX	28,000 (2,900)	5.3 J (6.7)	16 (5.2)	ND (5.5)	ND (7.1)	ND (5.8)	ND (6.1)	ND (6.6)	ND (7.2)	ND (6.1)	ND (5.6)	ND (270)
Toluene		15,000 AK-BTEX	68,000 (2,900)	73 (6.7)	700 (100)	ND (5.5)	ND (7.1)	ND (5.8)	ND (6.1)	ND (6.6)	ND (7.2)	ND (6.1)	0.18 JB (5.6)	ND (270)
Total Xylenes		15,000 AK-BTEX	110,000 (2,900)	ND (6.7)	25 (5.2)	ND (5.5)	ND (7.1)	ND (5.8)	ND (6.1)	ND (6.6)	ND (7.2)	ND (6.1)	ND (5.6)	ND (270)
Benzo(a)pyrene	SW8270 (µg/kg)	88 RC	ND (11,000)	ND (450)	ND (350)	ND (360)	ND (410)	78 J (390)	ND (410)	ND (440)	ND (480)	ND (400)	4.4 J (370)	ND (1,100)
Beryllium	SW6010 (mg/kg)	0.15 RC	ND (0.15)	0.23 (0.19)	ND (0.14)	0.20 (0.15)	0.39 (0.18)	0.26 (0.17)	0.24 (0.18)	0.27 (0.19)	0.31 (0.21)	0.23 (0.17)	0.18 (0.23)	0.23 (0.16)
Manganese		390 RN	300 (0.75)	430 (0.93)	140 (0.70)	230 (0.75)	380 (0.90)	400 (0.84)	380 (0.92)	510 (0.95)	470 (1.0)	170 (0.83)	320 (0.81)	210 (0.78)
Arsenic	SW7060 (mg/kg)	23 RN	5.8 (0.63)	14 (0.83)	6.8 (0.57)	7.1 (0.61)	9.6 (0.84)	71 (7.2)	5.6 (0.39)	12 (0.74)	9.7 (0.81)	4.5 (0.34)	7.4 (0.60)	6.3 (0.59)
Lead	SW7421 (mg/kg)	400 EL	3.6 (0.24)	8.4 (1.2)	5.6 (0.43)	9.2 (0.91)	13 (1.3)	480 (27)	9.3 (1.2)	15 (1.1)	15 (1.2)	25 (2.5)	5.4 (0.45)	25 (2.2)

POL Tank Farm 1992 Soil Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth							
			05-SS-08 0-0.5 ft.	05-SS-09 0-0.5 ft.	05-SS-10 0-0.5 ft.	05-SS-11 0-0.5 ft.	05-SS-12 0-0.5 ft.	05-SS-13 0-0.5 ft.	05-SS-14 0-0.5 ft.	05-SS-15 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (12)	44,000 (4,700)	14 B (11)	18 B (11)	13 B (10)	12 B (10)	ND (10)	18 B (9.8)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	ND (20)	4,400 (24)	40 (22)	3,700 (570)	87 (20)	23 B (20)	27 (20)	540 (40)
Benzene	SW8240 (µg/kg)	500 AK	ND (5.1)	ND (30,000)	ND (5.6)	11 J (110)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
Ethylbenzene		15,000 AK-BTEX	ND (5.1)	ND (30,000)	ND (5.6)	ND (110)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
Toluene		15,000 AK-BTEX	ND (5.1)	7,400 J (30,000)	ND (5.6)	30 J (110)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
Total Xylenes		15,000 AK-BTEX	ND (5.1)	1,200,000 (30,000)	ND (5.6)	42 J (110)	ND (5.1)	ND (5.1)	ND (5.1)	ND (5.1)
Benzo(a)pyrene	SW8270 (µg/kg)	88 RC	19 J (340)	100 J (1,200)	97 J (370)	ND (1,100)	ND (340)	20 J (340)	ND (340)	ND (1,000)
Beryllium	SW6010 (mg/kg)	0.15 RC	0.24 (0.14)	0.31 (0.17)	0.26 (0.14)	0.35 (0.15)	0.19 (0.14)	ND (0.15)	0.17 (0.14)	ND (0.15)
Manganese		390 RN	280 (0.72)	270 (0.85)	260 (0.72)	370 (0.77)	320 (0.71)	210 (0.75)	130 (0.65)	250 (0.77)
Arsenic	SW7060 (mg/kg)	23 RN	6.1 (0.57)	10 (0.64)	17 (1.2)	12 (1.2)	7.7 (0.57)	5.2 (0.56)	4.0 (0.31)	6.0 (0.56)
Lead	SW7421 (mg/kg)	400 EL	6.3 (0.86)	240 (19)	27 (2.2)	140 (9.2)	24 (2.1)	12 (0.84)	4.8 (0.46)	52 (4.2)

POL Tank Farm 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth								
			05-SB-04 0-2 ft.	05-SB-04 2.5-4.5 ft.	05-SB-04 5-7 ft.	05-SB-04 7.5-9.5 ft.	05-SB-05 0-2 ft.	05-SB-05 4-6 ft.	05-SB-05 10-12 ft.	05-SB-05 14-16 ft.	05-SB-06 0-2 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (10)	ND (10)	420 (10)	5,800 (10)	10 J (10)	13 (10)	1 J (10)	3 J (10)	ND (10)
Diesel Range Organics	AK DRO (mg/kg)	200 AK	5 JB (20)	46 B (20)	1,300 (20)	2,600 (20)	1 JB (20)	70 B (20)	2 JB (20)	8 JB (20)	190 (20)
Benzene	SW8240 (µg/kg)	500 AK	ND (5.00)	0.700 J (5.00)	1,100 (1,000)	340,000 (6,000)	7.10 (5.00)	160 (100)	4.10 J (5.00)	13.0 (8.00)	ND (6.00)
Ethylbenzene		15,000 AK-BTEX	0.700 J (5.00)	ND (5.00)	10,000 (1,000)	91,000 (6,000)	22.0 (5.00)	1,100 (100)	1.50 J (5.00)	ND (8.00)	ND (6.00)
Toluene		15,000 AK-BTEX	·ND (5.00)	0.600 J (5.00)	33,000 (1,000)	430,000 (6,000)	74.0 (5.00)	ND (100)	ND (5.00)	ND (8.00)	1.50 J (6.00)
Total Xylenes [a]		15,000 AK-BTEX	2.50 J (20.0)	ND (20.0)	167,000 (3,000)	700,000 (26,000)	208 (20.0)	5,900 (400)	4.30 J (20.0)	ND (30.0)	ND (20.0)
Benzo(a)pyrene	SW8270 (µg/kg)	88 RC	36.2 (13.1)	38.0 (13.2)	ND (42.5)	ND (398)	ND (13.1)	ND (17.1)	ND (16.1)	ND (17.2)	ND (14.2)
Beryllium	SW6010 (mg/kg)	0.15 RC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese		390 RN	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/kg)	23 RN	4.02 (0.0780)	4.16 (0.0812)	6.95 (0.175)	9.81 (0.163)	4.02 (0.0682)	7.11 (0.203)	8.29 (0.159)	7.09 (0.103)	33.7 (0.879)
Lead	SW7421 (mg/kg)	400 EL	3.58 (0.00919)	7.04 (0.192)	10.9 (0.206)	9.09 (0.193)	3.01 (0.0800)	6.67 (0.240)	5.00 (0.0934)	5.46 (0.122)	45.2 (1.04)

POL Tank Farm 1993 Soil Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth									
			05-SB-06 4-6 ft.	05-SB-06 8-10 ft.	05-SB-06 12-14 ft.	05-SS-16 0-0.5 ft.	05-SS-17 0-0.5 ft.	05-SS-18 0-0.5 ft.	05-SS-19 0-0.5 ft.	05-SS-20 0-0.5 ft.	05-SS-21 0-0.5 ft.	05-SS-22 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	3 J (10)	7 J (10)	6 J (10)	NA	NA	NA	NA	NA	NA	NA
Diesel Range Organics	AKDRO (mg/kg)	200 AK	29 B (20)	16 JB (20)	8 JB (20)	NA	NA	NA	NA	NA	NA	NA
Benzene	SW8240 (µg/kg)	500 AK	ND (100)	380 (100)	26.0 (6.00)	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene		15,000 AK-BTEX	420 (100)	650 (100)	58.0 (6.00)	NA	NA	NA	NA	NA	NA	NA
Toluene		15,000 AK-BTEX	ND (100)	ND (100)	3.40 J (6.00)	NA	NA	NA	NA	NA	NA	NA
Total Xylenes		15,000 AK-BTEX	330 (400)	1,000 (400)	1.90 J (20.0)	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	SW8270 (µg/kg)	88 RC	ND (15.7)	ND (16.8)	18.3 (16.6)	NA	NA	NA	NA	NA	NA	NA
Beryllium	SW6010 (mg/kg)	0.15 RC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese		390 RN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/kg)	23 RN	5.41 (0.0929)	11.2 (0.187)	10.7 (0.199)	6.76 (0.117)	10.5 (0.152)	7.35 (0.124)	9.74 (0.132)	5.75 (0.126)	9.59 (0.153)	5.65 (0.144)
Lead	SW7421 (mg/kg)	400 EL	11.8 (0.219)	9.00 (0.221)	7.62 (0.234)	4.60 (0.147)	287 (7.65)	105 (2.88)	26.6 (0.820)	7.37 (0.227)	16.4 (0.771)	69.7 (2.65)

[a]Total xylenes are the sum of m&p-xylenes and o-xylene.

POL Tank Farm 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID							
			05-MW-01	05-MW-02	05-MW-03	05-MW-04	05-MW-05	05-MW-06	05-MW-07	05-MW-08
Gasoline Range Organics	SW8020mod (µg/L)	NA	560 (100)	110 (100)	270,000 (200,000)	270,000 (200,000)	3,000,000 (2,000,000)	ND (100)	500,000 (100,000)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	870 (200)	ND (200)	12,000 (1,900)	9,500 (1,000)	11,000 (2,000)	ND (200)	71,000 (9,800)	ND (210)
Chloromethane	SW8010 (µg/L)	1.4 RC	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)	ND (1.0)	ND (0.50)
Dibromochloromethane		0.13 RC	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.40)	ND (0.20)	ND (0.40)	ND (0.20)
1,2-Dichloroethane		5 M	1.5 (0.15)	ND (0.15)	ND (0.15)	7.2 P (0.15)	ND (0.30)	ND (0.15)	37 (0.30)	ND (0.15)
1,1-Dichloroethene		7 M	ND (0.70)	ND (0.70)	ND (0.70)	ND (0.70)	ND (1.4)	ND (0.70)	ND (1.4)	ND (0.70)
trans-1,3-Dichloropropene		0.13 RC	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.30)	ND (0.15)	ND (0.30)	ND (0.15)
Methylene Chloride		5 M	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	2.7 B (0.80)	ND (0.40)	ND (0.80)	ND (0.40)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.30)	ND (0.30)	ND (0.30)	ND (2.5)	ND (0.60)	ND (0.30)	ND (0.60)	ND (0.30)
Trichloroethene		5 M	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.40)	ND (0.20)	ND (0.40)	ND (0.20)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)
Benzene	SW8020 (µg/L)	5 M	24 (0.30)	10 (0.30)	36,000 (600)	45,000 (600)	63,000 (6,000)	ND (0.30)	35,000 (600)	ND (0.30)
Ethylbenzene		700 M	0.32 (0.20)	0.90 (0.20)	1,400 (400)	1,300 (400)	ND (4,000)	ND (0.20)	830 (400)	ND (0.20)
Toluene		1,000 M	0.41 B (0.20)	16 (0.20)	33,000 (400)	31,000 (400)	160,000 (4,000)	ND (0.20)	31,000 (400)	ND (0.2)
Total Xylenes		10,000 M	ND (0.30)	2.4 (0.30)	4,500 (600)	4,200 (600)	270,000 (6,000)	ND (0.30)	4,900 (600)	ND (0.30)

POL Tank Farm 1992 Water Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID							
			05-MW-01	05-MW-02	05-MW-03	05-MW-04	05-MW-05	05-MW-06	05-MW-07	05-MW-08
Acetone	SW8240 (µg/L)	3,700 RN	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	0.88 JB (10)	5.7 JB (9.7)	16 B (9.9)	3.9 JB (10)	110 (9.8)	1.7 JB (10)	880 (100)	1.6 JB (10)
2-Methlyphenol (o-cresol)		1,800 RBC	ND (10)	ND (9.7)	8.9 J (9.9)	150 (10)	160 (9.8)	ND (10)	570 (100)	ND (10)
4-Methylphenol (p-cresol)		180 RN	ND (10)	ND (9.7)	13 (9.9)	140 (10)	290 (49)	ND (10)	200 (100)	ND (10)
Naphthalene		1,500 RN	ND (10)	ND (9.7)	130 (9.9)	130 (10)	270 (49)	ND (10)	430 (100)	ND (10)
Barium	SW6010 (mg/L)	2 M	0.33 (0.010)	0.16 (0.010)	0.65 (0.010)	1.0 (0.010)	1.2 (0.010)	0.19 (0.010)	0.68 (0.010)	0.17 (0.010)
Cadmium		0.005 M	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Arsenic	SW7060 (mg/L)	0.05 M	0.0047 (0.0040)	ND (0.0040)	0.0050 (0.0040)	0.021 (0.0040)	0.028 (0.0040)	ND (0.0040)	0.0047 (0.0040)	ND (0.0040)

POL Tank Farm 1992 Water Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID						
			05-MW-09	05-MW-10	05-MW-11	05-MW-12	05-SW-01	05-SW-02	05-SW-03
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (100)	270,000 (10,000)	ND (2,500)	ND (100)	ND (100)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)	130,000 (19,000)	8,100 (960)	910 (200)	ND (200)	ND (200)	ND (190)
Chloromethane	SW8010 (µg/L)	1.4 RC	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Dibromochloromethane		0.13 RC	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
1,2-Dichloroethane		5 M	ND (0.15)	6.8 (0.15)	0.43 (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
1,1-Dichloroethene		7 M	ND (0.70)	ND (0.70)	ND (0.70)	ND (0.70)	ND (0.70)	ND (0.70)	ND (0.70)
trans-1,3-Dichloropropene		0.13 RC	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Methylene Chloride		5 M	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Trichloroethene		5 M	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (2,000)	3,800 (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)
Benzene	SW8020 (µg/L)	5 M	ND (0.30)	54,000 (1,500)	29 (7.5)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Ethylbenzene		700 M	ND (0.20)	1,800 (1,000)	ND (5.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Toluene		1,000 M	ND (0.20)	48,000 (1,000)	220 (5.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Total Xylenes		10,000 M	ND (0.30)	6,700 (1,500)	8.5 (7.5)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)

POL Tank Farm 1992 Water Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID						
			05-MW-09	05-MW-10	05-MW-11	05-MW-12	05-SW-01	05-SW-02	05-SW-03
Acetone	SW8240 (µg/L)	3,700 RN	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	SW8270 (mg/L)	6 M	3.4 JB (9.7)	ND (83)	ND (9.6)	ND (10)	1.8 JB (9.9)	1.2 JB (10)	ND (9.6)
2-Methlyphenol (o-cresol)		1,800 RN	ND (9.7)	1,700 (83)	ND (9.6)	ND (10)	ND (9.9)	ND (10)	ND (9.6)
4-Methylphenol (p-cresol)		180 RN	ND (9.7)	660 (83)	ND (9.6)	ND (10)	ND (9.9)	ND (10)	ND (9.6)
Naphthalene		1,500 RN	ND (9.7)	880 (210)	ND (9.6)	ND (10)	ND (9.9)	ND (10)	ND (9.6)
Barium	SW6010 (mg/L)	2 M	0.11 (0.010)	0.56 (0.010)	0.26 (0.010)	0.18 (0.010)	0.076 (0.010)	0.070 (0.010)	0.070 (0.010)
Cadmium		0.005 M	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)	ND (0.0050)
Arsenic	SW7060 (mg/L)	0.05 M	ND (0.0040)	ND (0.0040)	0.0081 (0.0040)	ND (0.0040)	0.0074 (0.0040)	0.0040 (0.0040)	ND (0.0040)

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Analyte	Method (units)	Screening Criteria	Location ID								
			05-MW-01	05-MW-02	05-MW-03	05-MW-04	05-MW-05	05-MW-06	05-MW-13	05-MW-14	05-MW-15
Gasoline Range Organics	AKGRO (µg/L)	NA	690 (100)	42 JB (100)	11,000 (100)	170,000 (100)	42,000 (100)	42 JB (100)	26 JB (100)	17 JB (100)	49 JB (100)
Diesel Range Organics	AKDRO (µg/L)	NA	11 JB (200)	6 JB (200)	110 J (200)	1,500 (200)	770 (200)	4 JB (200)	320 (200)	7 JB (200)	36 JB (200)
Chloromethane	SW8010 (µg/L)	1.4 RC	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.172)	ND (0.0151)	0.350 (0.172)
Dibromochloromethane		0.13 RC	ND (0.0820)	ND (0.0820)	ND (0.170)	0.0957 (0.0820)	ND (0.0820)	ND (0.0820)	ND (0.114)	ND (0.0820)	ND (0.114)
1,2-Dichloroethane		5 M	3.17 (0.0820)	ND (0.0820)	0.0148 J (0.0540)	ND (0.0820)	14.5 (0.0540)	ND (0.0540)	ND (0.0800)	ND (0.0823)	ND (0.0800)
1,1-Dichloroethene		7 M	ND (0.110)	ND (0.110)	ND (0.100)	ND (0.110)	ND (0.112)	ND (0.110)	ND (0.0501)	ND (0.112)	ND (0.0501)
trans-1,3-Dichloropropene		0.13 RC	ND (0.0720)	ND (0.0720)	0.00560 JB (0.0570)	0.158 (0.0720)	ND (0.0719)	ND (0.0720)	ND (0.117)	ND (0.0719)	ND (0.117)
Methylene Chloride		5 M	0.000900 PBJ (0.220)	ND (0.220)	ND (0.220)	0.162 B (0.0840)	0.149 PJB (0.220)	ND (0.220)	0.838 TB (0.0562)	0.214 B (0.0842)	0.404 TB (0.0562)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.140)	ND (0.140)	0.220 (0.100)	ND (0.140)	ND (0.144)	ND (0.140)	ND (0.129)	ND (0.144)	ND (0.129)
Trichloroethene		5 M	ND (0.0730)	ND (0.0730)	0.00370 JB (0.110)	0.00540 J (0.0730)	0.0105 J (0.110)	ND (0.0730)	ND (0.103)	ND (0.0732)	ND (0.103)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,460)	ND (1,460)	ND (1,460)

POL Tank Farm 1993 Water Data
(Continued)

Analyte	Method (units)	Screening Criteria	Location ID								
			05-MW-01	05-MW-02	05-MW-03	05-MW-04	05-MW-05	05-MW-06	05-MW-13	05-MW-14	05-MW-15
Benzene	SW8020 (µg/L)	5 M	256 (0.700)	ND (0.0700)	2,950 (17.5)	33,200 (140)	17,300 (70.0)	ND (0.100)	0.607 B (0.0519)	0.0309 JB (0.0832)	0.0240 JB (0.0519)
Ethylbenzene		700 M	1.37 (0.0680)	ND (0.0680)	117 (17.0)	615 (136)	336 (6.80)	ND (0.0680)	ND (0.0199)	ND (0.0813)	ND (0.0436)
Toluene		1,000 M	0.271 PB (0.0480)	ND (0.0480)	1,530 (12.0)	10,200 (96.0)	3,900 (4.80)	0.0724 B (0.0480)	0.162 B (0.0647)	0.0233 JB (0.0813)	0.0732 B (0.0647)
Total Xylenes		10,000 M	0.569 B (0.0850)	ND (0.150)	368 (21.2)	1,570 (170)	923 (8.50)	0.0458 JB (0.0850)	0.173 B (0.127)	0.0268 JB (0.0811)	0.0373 JB (0.127)
Acetone	SW8240 (µg/L)	3,700 RN	NA	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	ND (1.84)	ND (1.84)	R	17.6 B (1.85)	R	ND (1.84)	ND (1.85)	3.22 B (0.581)	ND (1.79)
2-Methylphenol (o-cresol)		1,800 RN	ND (0.541)	ND (0.541)	21.4 (0.315)	58.0 (0.544)	29.6 (0.308)	ND (0.541)	ND (0.539)	ND (0.310)	ND (0.524)
4-Methylphenol (p-cresol)		180 RN	ND (0.592)	ND (0.0592)	24.8 F (0.467)	58.0 F (0.595)	35.3 F (0.458)	ND (0.592)	ND (0.581)	ND (0.459)	ND (0.564)
Naphthalene		1,500 RN	ND (0.745)	ND (0.745)	6.26 (0.487)	32.5 (0.749)	36.9 (0.479)	ND (0.745)	ND (0.736)	ND (0.478)	ND (0.715)
Barium	SW6010 mg/L	2 M	0.548 (0.000530)	0.368 (0.000530)	0.597 (0.000530)	0.942 (0.000530)	0.888 (0.000530)	0.328 (0.000530)	0.239 (0.000530)	0.237 (0.000530)	0.293 (0.000530)
Cadmium		0.005 M	0.00206 B (0.00172)	<0.00172	<0.00172	0.00201 B (0.00172)	0.00179 B (0.00172)	<0.00172	0.00193 B (0.00172)	0.00430 (0.00172)	0.0126 (0.00172)
Arsenic	SW7060 (mg/L)	0.05 M	0.0255 (0.000657)	0.0108 (0.000657)	0.00370 (0.000657)	0.0294 (0.000657)	0.0335 (0.000657)	0.0137 (0.000657)	0.000800 (0.000657)	<0.000984	<0.000657

POL Tank Farm 1994 Water Data

Analyte	Method (units)	Screening Criteria	Location ID 05-MW-01[b]	05-MW-02	05-MW-03	05-MW-04	05-MW-05	05-MW-06	05-MW-07	05-MW-10[b]	05-MW-11	05-MW-13	05-MW-14	05-MW-15
Gasoline Range Organics	AK101 (µg/L)	NA	NA	ND (50)	17,000 (50)	110,000 (50)	130,000 (50)	ND (50)	97,000 (50)	NA	1,200 (50)	13 J (50)	76 (50)	10 J (50)
Diesel Range Organics	AK102 (µg/L)	NA	NA	40 J (100)	2,100 (100)	13,000 (100)	6,900 (100)	53 J (100)	8,700 (100)	NA	1,200 (100)	140 (100)	ND (100)	28 J (100)
Acetone	SW8260 (µg/L)	3,700 RN	< 20	5.01 B (2.09)	14.4 (2.09)	745 (522)	54.2 (31.4)	2.49 B (2.09)	56.4 (31.4)	24,000	7.94 (2.09)	5.23 (2.09)	2.43 B (2.09)	5.23 (2.09)
Benzene		5 M	86	0.0300 BJ (0.0307)	4,530 (3.07)	27,200 (30.7)	41,000 (30.7)	0.0700 B (0.0307)	24,400 (15.4)	17,000	10.4 (0.0307)	0.100 B (0.0307)	0.0400 B (0.0307)	0.0400 B (0.0307)
Chloromethane		1.4 RC	< 4	0.240 B (0.155)	ND (0.155)	222 (38.8)	2.85 (2.32)	ND (0.155)	ND (2.32)	< 100	ND (0.155)	1.22 (0.155)	0.170 B (0.155)	ND (0.155)
Dibromochloromethane		0.13 RC	< 0.4	ND (0.0283)	ND (0.0283)	ND (7.08)	ND (0.424)	ND (0.0283)	ND (0.424)	< 10	ND (0.0283)	ND (0.0283)	ND (0.0283)	ND (0.0283)
1,2-Dichloroethane		5 M	< 1	0.710 (0.0791)	0.840 (0.0791)	ND (19.8)	35.1 (1.19)	ND (0.0791)	59.2 (1.19)	< 25	0.450 (0.0791)	1.17 (0.0791)	ND (0.0791)	0.560 (0.0791)
1,1-Dichloroethene		7 M	< 0.4	ND (0.0806)	ND (0.0806)	17.5 J (20.2)	ND (1.21)	ND (0.0806)	ND (1.21)	< 10	ND (0.0806)	ND (0.0806)	ND (0.0806)	ND (0.0806)
trans-1,3-Dichloropropene		0.077 RC	< 1	ND (0.0829)	ND (0.0829)	ND (20.7)	ND (1.24)	ND (0.0829)	ND (1.24)	< 25	ND (0.0829)	ND (0.0829)	ND (0.0829)	ND (0.0829)
Ethylbenzene		700 M	< 1	ND (0.110)	330 (3.30)	810 (27.5)	741 (1.65)	ND (0.110)	649 (1.65)	1,200	0.0900 J (0.110)	0.0100 J (0.110)	ND (0.110)	ND (0.110)
Methylene chloride		5 M	< 4	0.210 B (0.151)	0.930 B (0.151)	398 (37.8)	20.2 (2.26)	0.160 B (0.151)	3.60 (2.26)	< 100	0.130 BJ (0.151)	0.230 B (0.151)	0.230 B (0.151)	0.190 B (0.151)
4-Methyl-2-Pentanone (MIBK)		2,900 RN	< 20	ND (0.501)	2.81 (0.501)	ND (125)	46.2 (7.52)	ND (0.501)	ND (7.52)	< 500	2.21 (0.501)	ND (0.501)	ND (0.501)	ND (0.501)
1,1,2,2-Tetrachloroethane		0.052 RC	< 1	ND (0.170)	ND (0.170)	ND (42.5)	ND (2.55)	ND (0.170)	ND (2.55)	< 25	ND (0.170)	ND (0.170)	ND (0.170)	ND (0.170)
Toluene		1,000 M	< 1	ND (0.0336)	2,200 (3.36)	13,400 (33.6)	19,100 (33.6)	0.0500 (0.0336)	20,200 (16.8)	21,000	2.64 (0.0336)	0.0400 (0.0336)	0.0300 JB (0.0336)	0.0700 (0.0336)
Trichloroethene		5 M	< 1	ND (0.0439)	ND (0.0439)	ND (11.0)	4.50 (0.658)	ND (0.0439)	ND (0.658)	< 25	ND (0.0439)	ND (0.0439)	ND (0.0439)	ND (0.0439)
Total Xylenes [c]		10,000 M	< 1	ND (0.489)	1,100 (14.7)	2,250 (122)	2,560 (93.1)	ND (0.489)	3,090 (93.0)	5,300	0.610 (0.489)	ND (0.489)	ND (0.489)	ND (0.489)

POL Tank Farm 1994 Water Data
(Continued)

Analyte	Method (units)	Screening Criteria	Location ID											
			05-MW-01[b]	05-MW-02	05-MW-03	05-MW-04	05-MW-05	05-MW-06	05-MW-07	05-MW-10[b]	05-MW-11	05-MW-13	05-MW-14	05-MW-15
bis(2-Ethylhexyl)phthalate	SW8270 (μg/L)	6 M	< 10	ND (2.63)	ND (1.49)	3.51 (2.60)	14.1 (2.65)	ND (0.908)	2.97 (2.58)	< 39	ND (2.63)	ND (1.48)	ND (2.60)	ND (2.65)
2-Methylphenol(o-cresol)		1,800 RN	< 10	ND (0.311)	35.9 (0.636)	302 (1.54)	219 (1.57)	ND (0.450)	415 (3.05)	320	ND (0.311)	ND (0.630)	ND (0.308)	ND (0.314)
4-Methylphenol(p-cresol)[a]		180 RN	< 10	ND (0.361)	16.0 F (0.436)	252 F (1.79)	128 F (0.364)	ND (0.417)	201 F (3.54)	100	ND (0.361)	ND (0.434)	ND (0.357)	ND (0.364)
Naphthalene		1,500 RN	< 10	ND (0.764)	32.5 (0.634)	64.4 (0.756)	143 (0.771)	ND (0.678)	126 (0.749)	110	ND (0.764)	ND (0.628)	ND (0.756	ND (0.771)
Barium	SW6010 (mg/L)	2 M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium		0.005 M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/L)	0.05 M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[a] - 4-Methylphenol and 3-methylphenol coeluted during this analysis.
[b] - This sample was analyzed by a different laboratory.
[c] - Total xylenes are the sum of m&p-xylenes and o-xylene.

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3.4 West Unit (ST009)

The West Unit is made up of seven separate source areas that, because of their proximity and some degree of overlap, will be treated as one management zone. The individual source areas consist of the following:

- The Waste Accumulation Area (SS006);
- Million Gallon Hill;
- The Power Plant UST No. 49;
- The JP-4 Fillstands;
- Building 1845;
- Building 1700 (Refueling Vehicle Maintenance Building); and
- Building 1850.

The West Unit is located in the western half of the Galena Airport main base "triangle." Figure 1.1-1 shows the location of the West Unit and the seven source areas within it. The purpose of the investigation at the West Unit was to confirm the presence of contamination in soil and groundwater, to define the nature and extent of contamination, and to collect sufficient data to support the baseline risk assessment.

The area of the West Unit contained within the dike road, in general, has been graded and filled with gravel and sand. Vegetation is sparse and consists of grass and shrubs in the manicured areas around the buildings and grasses, willows, and alders in the drainage ditches. To the west of Million Gallon Hill, outside of the dike road, native soils and vegetation prevail. Vegetation here is generally much thicker than within the dike, and includes wooded areas of birch and black spruce. Standing water sometimes occurs to the west of Million Gallon Hill, especially in the spring following breakup.

The subsurface conditions at the West Unit were defined through direct sampling during the drilling of monitoring wells and soil borings and the monitoring of water levels throughout the site. Stratigraphy at the West Unit is similar to that of the base in general (see Section 2). A layer of gravelly sand fill material overlies floodplain deposits consisting of silty sands and sandy silts of varying thickness. The silts and sands are underlain by channel deposits of sands or gravelly sands. Permafrost has not been encountered during drilling the West Unit.

Groundwater at the site flows south and west under unconfined conditions. Seasonal variation in groundwater elevation is high, as described in Section 2. Some of the shallow monitoring wells installed in the West Unit are dry during the fall and winter months, when groundwater elevations are at their lowest.

The conceptual diagram for the West Unit is presented as Figure 3.4-1. This diagram provides a plan view, a geologic cross section, and a table that lists the range of detected concentrations for analytes that have exceeded their respective screening criteria. The plan view shows the location of all analytical data points (surface soil samples, surface water samples, soil borings, sediment samples, and monitoring well locations). The extent of soil and groundwater contamination (exceedance of screening criteria) is shown as an overlay to the plan view. The area of groundwater contamination is defined by samples where benzene was detected above 5 µg/L; the area of soil contamination is defined by samples where DRO exceeded 200 mg/kg. Areas where these compounds were detected, but were below the screening criteria, are also shown in Figure 3.4-1. The plan view and the lithologic cross section can be used in conjunction to provide a three-dimensional visualization of site characteristics and contaminants. The areal extent of another type of groundwater contamination, defined by the presence of TCE, is shown in Figure 3.4-2.

The following sections describe the history and past waste handling procedures, investigation results, conclusions, and recommendations for

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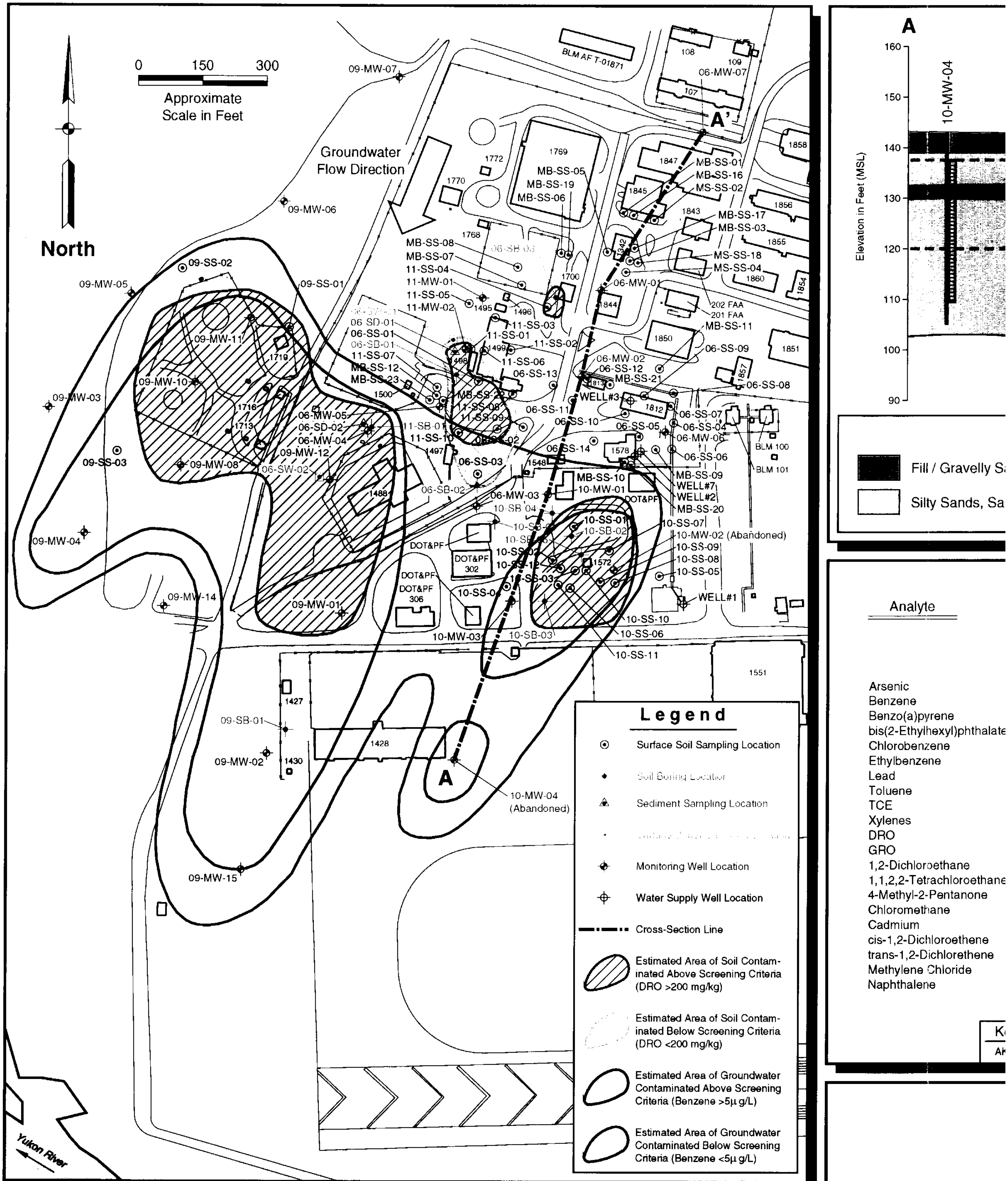
North
0 150 300
Approximate Scale in Feet
Groundwater Flow Direction
Legend
Surface Soil Sampling Location
Soil Boring Location
Sediment Sampling Location
Monitoring Well Location
Water Supply Well Location
Cross-Section Line
Estimated Area of Soil Contaminated Above Screening Criteria (DRO >200 mg/kg)
Estimated Area of Soil Contaminated Below Screening Criteria (DRO <200 mg/kg)
Estimated Area of Groundwater Contaminated Above Screening Criteria (Benzene >5µ g/L)
Estimated Area of Groundwater Contaminated Below Screening Criteria (Benzene <5µ g/L)
A
A'
Yukon River
10-MW-04 (Abandoned)
10-MW-02 (Abandoned)
WELL#1
WELL#2
WELL#3
WELL#7
BLM AF T-01871
DOT&PF
DOT&PF 302
DOT&PF 306
BLM 100
BLM 101
202 FAA
201 FAA
09-MW-01
09-MW-02
09-MW-03
09-MW-04
09-MW-05
09-MW-06
09-MW-07
09-MW-08
09-MW-10
09-MW-11
09-MW-12
09-MW-14
09-MW-15
09-SS-01
09-SS-02
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06-MW-04
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06-MW-06
06-MW-07
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06-SS-06
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06-SS-09
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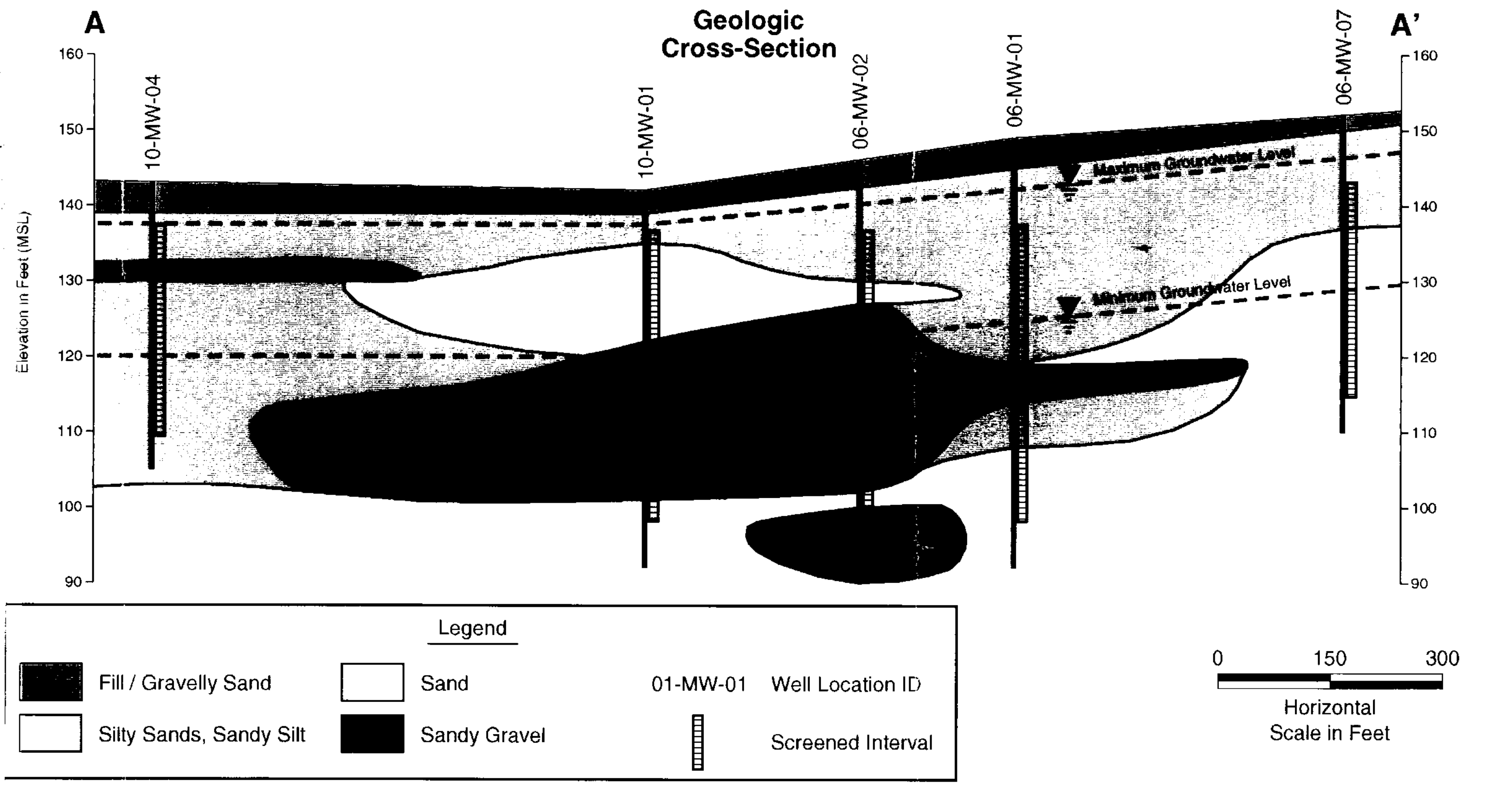
11-SS-06
11-SS-07
11-SS-08
11-SS-09
11-SS-10
11-SB-01
11-MW-01
11-MW-02
MB-SS-01
MB-SS-03
MB-SS-05
MB-SS-06
MB-SS-07
MB-SS-08
MB-SS-09
MB-SS-10
MB-SS-11
MB-SS-12
MB-SS-16
MB-SS-17
MB-SS-19
MB-SS-20
MB-SS-21
MB-SS-22
MB-SS-23
MS-SS-02
MS-SS-04
MS-SS-18
A
160
150
140
130
120
110
100
90
Elevation in Feet (MSL)
10-MW-04
Fill / Gravelly S
Silty Sands, Sa
Analyte
Arsenic
Benzene
Benzo(a)pyrene
bis(2-Ethylhexyl)phthalate
Chlorobenzene
Ethylbenzene
Lead
Toluene
TCE
Xylenes
DRO
GRO
1,2-Dichloroethane
1,1,2,2-Tetrachloroethane
4-Methyl-2-Pentanone
Chloromethane
Cadmium
cis-1,2-Dichloroethene
trans-1,2-Dichlorethene
Methylene Chloride
Naphthalene



Compounds Exceeding Screening Criteria

Analyte	Soil: Screening Criteria (µg/kg)	Soil: Range of Detections (µg/kg)	Groundwater: Screening Criteria (µg/L)	Groundwater: Range of Detections (µg/L)
Arsenic			50 M	3.2 - 60
Benzene	500 AK	16 - 68,000	5 M	0.18 - 12,000
Benzo(a)pyrene	390 RC	7.6 - 520		
bis(2-Ethylhexyl)phthalate			6 M	1.17 - 184
Chlorobenzene			100 M	0.07 - 280
Ethylbenzene	15,000 AK	3,000 - 100,000	700 M	0.30 - 2,100
Lead	400,000 EL	3,200 - 2,080,000	15 M	8.3 - 20
Toluene	15,000 AK	11 - 480,000	1,000 M	0.04 - 15,000
TCE			5 M	0.18 - 13,000
Xylenes	15,000 AK	11 - 1.4×10^6		
DRO	200,000 AK	29,000 - 4.7×10^7		
GRO	100,000 AK	41,000 - 1.2×10^7		
1,2-Dichloroethane			5 M	0.11 - 0.52
1,1,2,2-Tetrachloroethane			0.052 RC	0.79
4-Methyl-2-Pentanone			2,900 RN	6,200 - 7,600
Chloromethane			1.4 RC	14 - 48
Cadmium			5 M	6.51
cis-1,2-Dichloroethene			70 M	0.52 - 2,600
trans-1,2-Dichlorethene			100 M	143 - 185
Methylene Chloride			5 M	22 - 60
Naphthalene			1,500 RN	49 - 2,570

Key:
AK - State of Alaska Cleanup Standard   EL - EPA Lead Directive   M - Maximum Contaminant Level   RC - EPA Region III Risk-Based Concentration, Carcinogenic

Galena Airport - West Unit

Conceptual Diagram and Summary of Compounds Exceeding Screening Criteria

A1181-6 03/19/96

Figure 3.4-1. Conceptual Diagram for the West Unit (ST009)

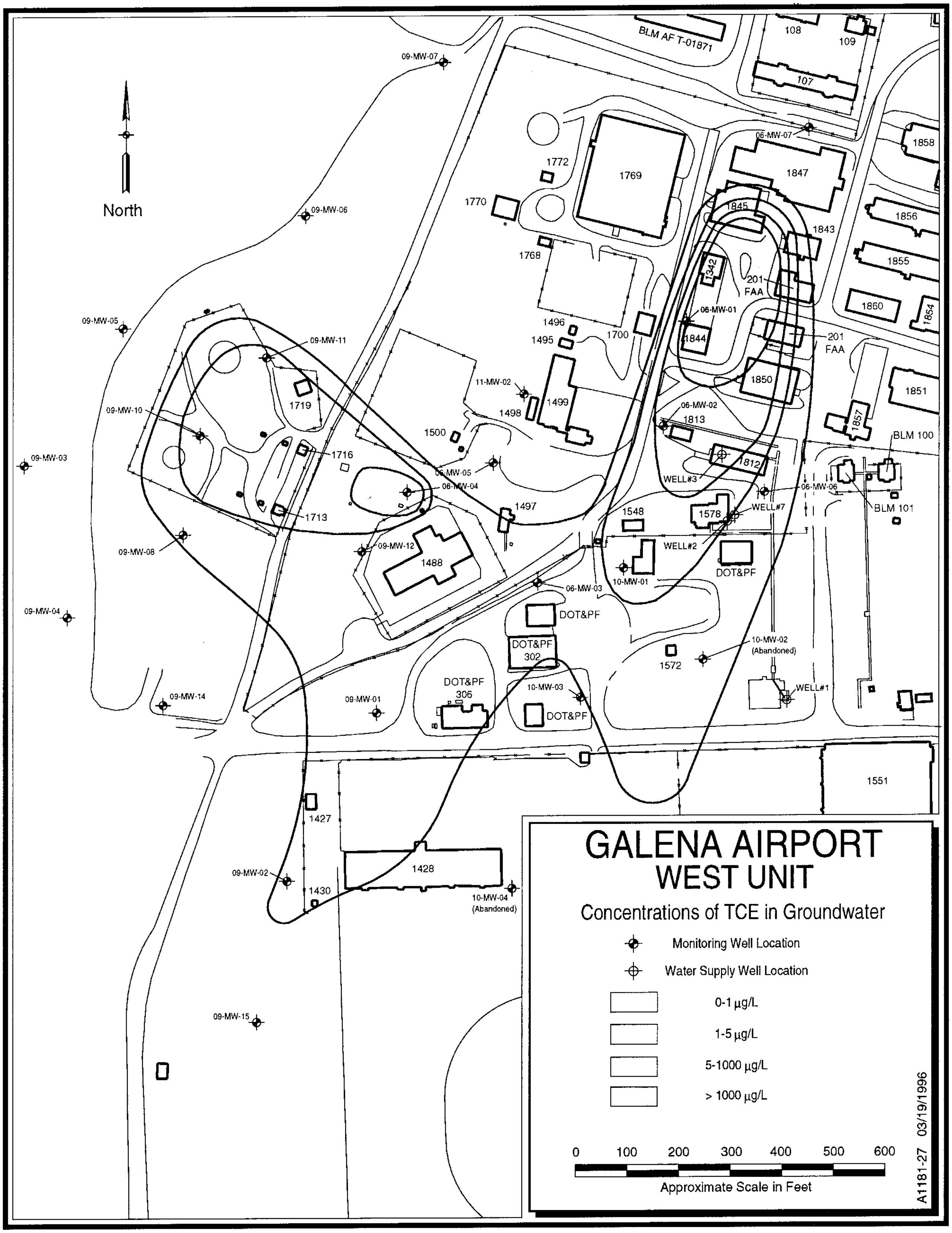


Figure 3.4-2. Approximate Concentration Contours of TCE in Groundwater at the West Unit (ST009)

each of the source areas in the West Unit. A summary of the activities and findings of previous investigations conducted at the West Unit source areas is presented in Table 3.4-1. All of the West Unit analytical data for 1992 through 1994 are presented in Appendix A and summarized in the Attachment to Section 3.4, located at the end of this section.

3.4.1 Waste Accumulation Area (SS006)

Until 1984, when the State of Alaska discontinued permits for road oiling, the bulk of the liquid wastes were accumulated and applied to the local roads for dust control. In recent years, liquid wastes have been stored at the Waste Accumulation Area prior to shipment off base for disposal. Waste lube oil, antifreeze, solvent, oily rags, and other miscellaneous wastes were stored in drums near the power plant. These drummed wastes were originally stored on the ground until a bermed concrete pad was constructed to control drum leakage. During a 1985 site visit, it was noted that part of the concrete berm was broken, and wastes were draining to the ground (USAF, 1985). As excess drums accumulated, waste storage also occurred outside the bermed area in a cordoned-off zone.

RI Activities and Findings

During the 1992 to 1994 field seasons, a preexisting monitoring well was sampled; a new well was installed and sampled; two soil borings were completed; and surface soil, water, and sediment samples were collected and analyzed to characterize contamination at the Waste Accumulation Area.

The analytical results for soil samples collected at the Waste Accumulation Area are summarized in the attachment to Section 3.4. Because of the nature of the source, soil contamination originating at the Waste Accumulation Area is likely to be most pronounced in surface soils and sediments and shallow soil-boring samples. This observation is generally supported by the data. Contaminants detected above the screening criteria at soil sampling locations in the Waste Accumulation Area include DRO, lead, and pesticides. Pesticide contamination is discussed separately (see Section 3.9). A surface soil sample collected from within the Waste Accumulation Area proper contained 1,600-mg/kg DRO. Another surface soil sample, 06-SS-01, collected near the south side of the steam plant was found to contain 890 mg/kg of DRO. This sample was collected near an area of soil staining that was observable in air photos.

During 1993, 14 surface soil samples were collected in the vicinity of the Waste Accumulation Area for arsenic and lead analyses only. These samples were collected to help determine whether, on average, these metals were higher at the West Unit than at the Galena Ambient Location. Statistical analysis of the data from these samples and others collected within the West Unit showed that the average arsenic concentrations at the West Unit is not significantly higher than the range of values anticipated for background. On average, lead concentrations at the West Unit were found to be significantly higher than those expected from background sources. Two samples, 06-SS-07 and -08, exceeded the lead screening criteria of 400 mg/kg. These samples were collected north of the water treatment facility.

In addition to the DRO and lead contamination, some of the surface soil samples collected during the 1992 field season contained low levels of PNAs that did not exceed the screening criteria. These low-level detections may be the result of the application of asphalt to parts of the West Unit during the summer of 1992.

Analytical results for water samples collected at the Waste Accumulation Area in 1992 and 1993 are summarized in the attachment to Section 3.4. Contamination in groundwater at the Waste Accumulation Area consists mainly of low levels of benzene. Benzene has not been detected above the MCL of 5 μg/L in either monitoring well

Table 3.4-1
Summary of Previous Investigations and Findings—West Unit

Site		Activities	Analyses Performed	Maximum Level of Contamination		Comments
Waste Accumulation Area (SS006)	1985[a]	Records search.				
	1986[b]	Installed and sampled 2 groundwater monitor wells, sampled 4 soil borings and surface soils in identified stained areas.	TPH, purgeable aromatic hydrocarbons, purgeable halocarbons, PCBs (surface soils only).	**Groundwater:** Chloroform 1,1,1-TCA **Soil:** TPH 1,1-DCE Methylene chloride Tetrachloroethene Trichloroethene Chloroform 1,2-DCA Toluene Ethylbenzene	 0.06 µg/L 0.8 µg/L 680 mg/kg 3700 µg/kg 62 µg/kg 830 µg/kg 410 µg/kg 450 µg/kg 198 µg/kg 13000 µg/kg 1100 µg/kg	The majority of contamination was found at or near the ground surface.
	1987[b]	Collected groundwater samples from the 2 wells installed in 1986 and sampled 4 soil borings.	Purgeable aromatic hydrocarbons and halocarbons.	**Groundwater:** Benzene Toluene **Soil:** Trichloroethene Toluene	 0.7 µg/L 2.1 µg/L 23 µg/kg 81 µg/kg	
	1989-90[b]	Collected groundwater samples from the 2 wells installed in 1986, collected surface soil samples.	Purgeable aromatic hydrocarbons and halocarbons (waters); TPH and lead (soils).	**Groundwater:** 1,1,1-TCA **Soil:** TPH Lead	 0.8 µg/L 59500 mg/kg 29.3 mg/kg	Low levels of lead contamination may exist in surface soils in the immediate vicinity of the waste area.
Million Gallon Hill	1985[a]	Records search.				
	1991[c]	Drilled and sampled 6 soil borings, installed and sampled 8 groundwater monitoring wells.	TPH, purgeable hydrocarbons.	**Groundwater:** TPH **Soil:** TPH Benzene Toluene Ethylbenzene Total xylenes	 1210 µg/L 16700 mg/kg 14.3 mg/kg 71 mg/kg 32 mg/kg 126 mg/kg	Tracer testing indicated leakage of USTs #37 and #38.

Table 3.4-1
(Continued)

Site	Activities		Analyses Performed	Maximum Level of Contamination		Comments
Power Plant UST No. 49	1985 [a]	Records search.				
	1991 [c]	Drilled, sampled, and analyzed 2 boreholes, installed and analyzed 2 groundwater monitoring wells.	TPH, purgeable hydrocarbons.	**Groundwater:** TPH Benzene Toluene Ethylbenzene Total xylenes **Soil:** TPH Benzene Toluene Ethylbenzene Total xylenes	 1210 µg/L <0.200 µg/L <0.200 µg/L <0.200 µg/L <0.600 µg/L 43300 mg/kg 0.740 mg/kg 12 mg/kg 37 mg/kg 356 mg/kg	Tracer testing indicated leakage of UST #49.
JP-4 Fillstands	1991 [d]	Drilled, sampled, and analyzed 8 boreholes.	Pesticides and PCBs, fuel identification and quantification, volatile organics, semivolatile organics, metals.	DDT DDE DDD Dieldrin Heptachlor Endosulfan I Jet Fuel BTEX Trichloroethene Naphthalene 2-Methylnaphthalene	184 µg/kg 941 µg/kg 34.8 µg/kg 48.6 µg/kg 12.1 µg/kg 58.7 µg/kg 16,400 mg/kg 20,900 µg/kg 18 µg/kg 1200 µg/kg 2600 µg/kg	
Building 1845	No previous investigations.					
Building 1700	No previous investigations.					
Building 1850	No previous investigations.					

Notes: [a] USAF, 1985. [b] USAF, 1989a, 1991. [c] USAF, 1992. [d] USACE, 1991.

06-MW-08 or 06-MW-05. The maximum detection of GRO is 1000 µg/L in 06-MW-05. DRO have not been detected above the SQL in either of these wells.

The presence of numerous aboveground potential sources of contamination in this area makes it difficult to predict the origin and extent of contamination. There is some surface soil contamination associated with the storage of wastes at this site. However, isolated areas of shallow soil contamination pose minimal threat to groundwater quality.

Recommendations

The baseline risk assessment conducted for the West Unit (USAF, 1996) indicates that there is no significant risk due to contamination from the source areas within the West Unit. The Air Force recommends no further response action (NFRA) for this source area.

3.4.2 Million Gallon Hill

Sludge from the periodic cleaning of the large bulk fuel (POL) tanks at Million Gallon Hill (USTs No. 37 and No. 38) has been placed in drums for off-base disposal in recent years. In earlier years it is presumed the sludge was allowed to weather on the ground. Occasionally, water from these tanks needed to be drained and the drained water-fuel mixture was taken to a waste fuel tank (USAF, 1985). Leaks and small spills may have resulted in further contamination of soils around and beneath tank areas; a tracer study indicated that the USTs at Million Gallon Hill may have been leaking (USAF, 1992).

RI Activities and Findings

Field investigations at the Million Gallon Hill source area included the sampling of all preexisting groundwater monitoring wells, the installation and sampling of eight new wells, the completion of one soil boring, and the collection and analysis of surface soil samples. Field screening activities were also conducted at this source area to help direct the RI sampling efforts.

Figure 3.4-3 shows the results of a soil gas survey conducted downgradient of Million Gallon Hill. The concentrations of VOCs detected were generally low, with 31 out of 33 points surveyed yielding concentrations less than 20-ppmV volatile organics. Soil gas concentrations were low even in areas where free product has been measured in the groundwater. This may be the result of contamination by fuel with a low percentage of volatile constituents, such as weathered diesel (Appendix G). The center of the soil gas plume defined by the Million Gallon Hill survey is located near the northwest corner of the CAC hangar, where the two highest concentrations of VOCs, 98 and 404 ppmV, were detected. Using direct-push technology (DPT) groundwater screening samples were collected for field infrared (IR) and gas chromatography (GC) analysis. The results of these analyses are shown in Table 3.4-2. Samples collected from within the plume defined by the soil gas survey were found to contain no or very low levels of TPH using the field IR method. Samples analyzed in the mobile GC laboratory were found to contain from 0.6- to 7.5-µg/L chlorinated solvents. No contaminants were detected in two samples taken downgradient of the plume defined by the soil gas survey.

The results of soil sampling at the Million Gallon Hill source area are summarized in the attachment to Section 3.4. Evidence of fuel contamination was found in the boring for monitoring well 09-MW-01, where DRO were present at 230 mg/kg. A surface soil sample collected just north of the tank farm fence (09-SS-01) also exceeded State of Alaska cleanup levels with 320-mg/kg DRO. This surface detection may be the result of runoff from within the tank farm, since it was collected near an erosion gully.

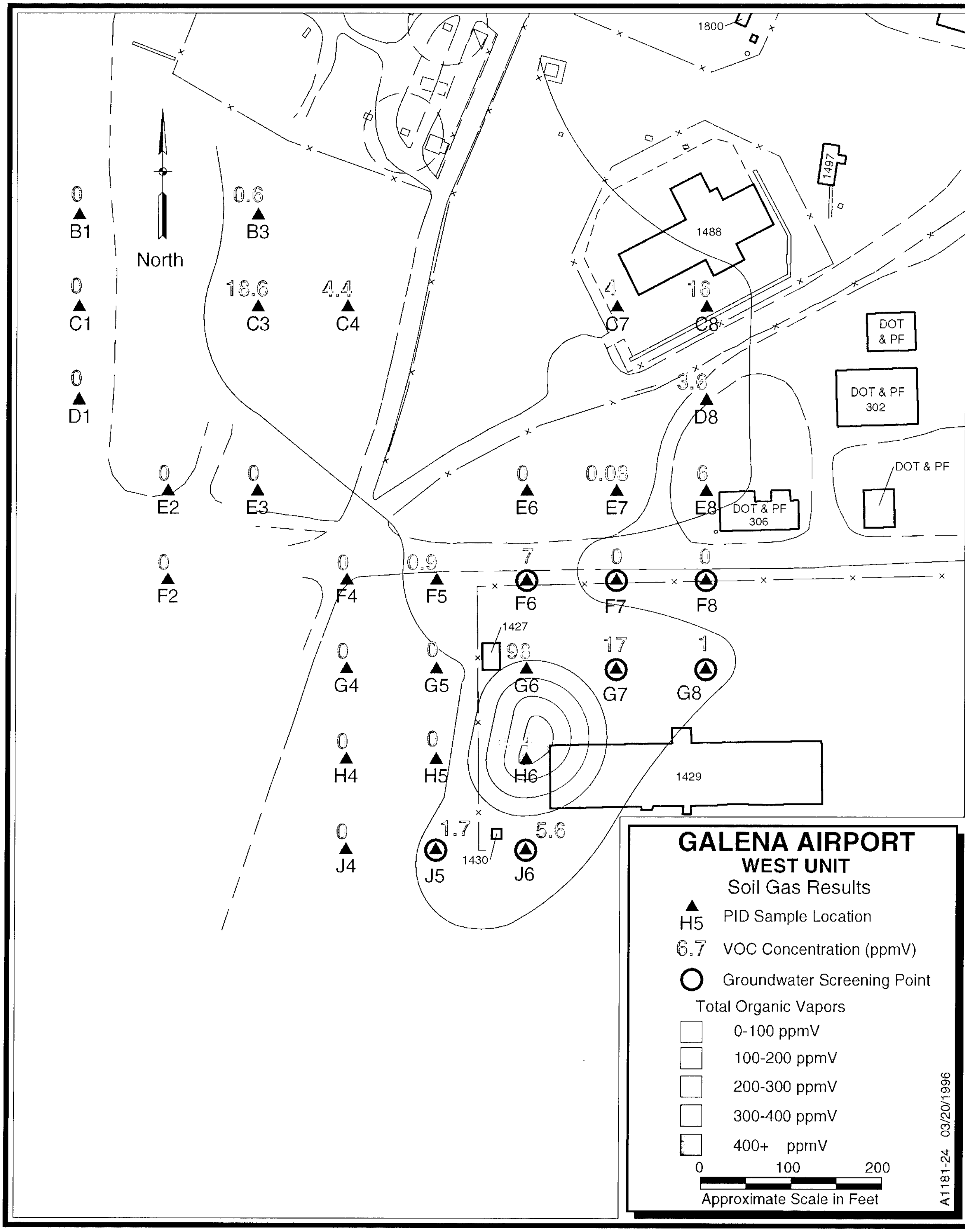


Figure 3.4-3. Soil Gas Results for the Million Gallon Hill Source Area

Table 3.4-2
Million Gallon Hill
Groundwater Field Screening Results

Point	F-6	F-7	F-8	F-10	G-7	G-8	J-5	J-6
Field IR Analysis (mg/L)								
AH	ND	ND	ND	ND	ND	ND	ND	ND
TPH	0.1	0.2	0.2	0.1	ND	ND	ND	ND
GC Confirmation (µg/L)—detected compounds								
Chloroform	NA	NA	NA	NA	ND	0.06	ND	ND
1,1,1-Trichloro-ethane	NA	NA	NA	NA	0.84	0.14	0.05	0.03
Trichloroethene	NA	NA	NA	NA	0.18	0.06	ND	ND
cis-1,2-Dichloro-ethene	NA	NA	NA	NA	7.5	ND	ND	ND

Notes: NA = Not analyzed. ND = Not detected.

On the basis of the results of the soil gas survey, a soil boring (09-SB-01) was drilled inside the fence at the west end of the CAC hangar. Samples from this boring contained low levels of GRO and DRO that did not exceed State of Alaska cleanup criteria. Only lead was present at concentrations above the screening criteria in the sample collected from the 0- to 2-ft interval. Several PNAs were also detected in this sample. Concentrations of most contaminants were highest in the shallowest sample (0 to 2 ft) and generally decreased sharply with depth, suggesting a surface source with limited vertical migration. Figure 3.4-4 shows the concentrations of DRO and GRO versus depth. Fuel tanks for the F-15s were previously located at the northwest corner of the CAC hangar. It appears likely that a small surface spill from these tanks is the source of low-level fuel contamination in this area.

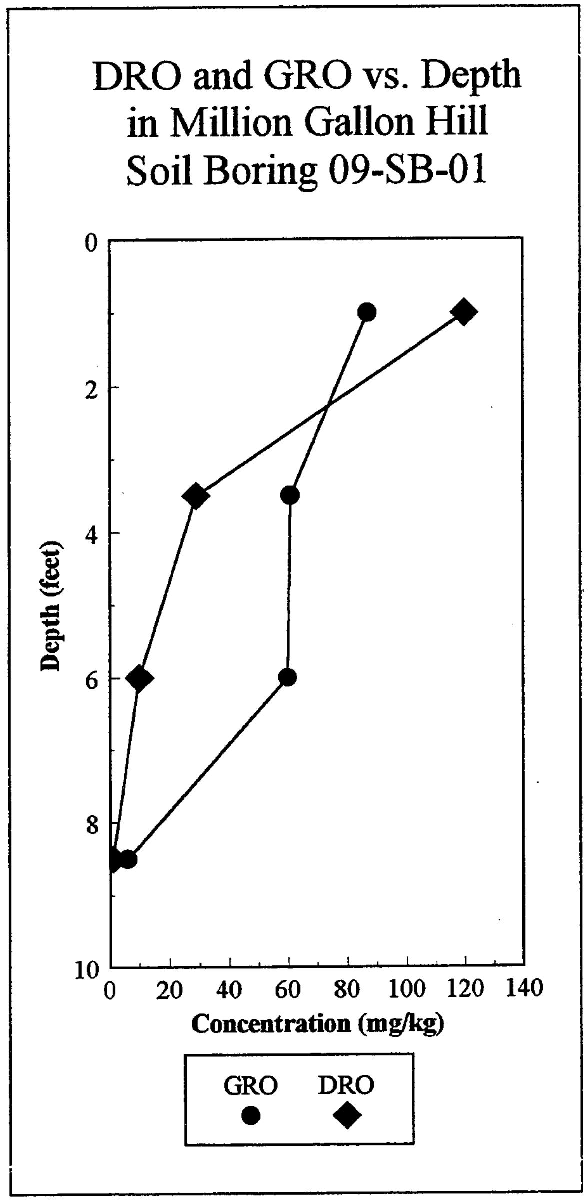


Figure 3.4-4. Concentrations of DRO and GRO vs. Depth in Soil Boring 09-SB-01 at the Million Gallon Hill Source Area

The analytical results for groundwater from Million Gallon Hill are summarized in the attachment to Section 3.4. Benzene, DRO, GRO, and other fuel-related compounds have been detected in 06-MW-04 and 09-MW-08, -10, -11, and -12. All of these wells are located within or immediately south and east of the Million Gallon Hill impoundment. The area of contamination to the south of Million Gallon Hill may be due to downgradient migration of fuels leaked from the storage tanks. The contamination to the east appears to be from a pipe that drains water from the two USTs at Million Gallon Hill. This pipe runs underneath the dike road east of Million Gallon Hill and drains to a 55-gal. drum on the other side. Two of the Million Gallon Hill wells, 09-MW-08 (to the south) and 09-MW-12 (to the east), contain free product that is very dark brown in color. Monitoring wells 09-MW-10, -11, and -12 also contain other BTEX compounds above the screening criteria.

Further to the south of Million Gallon Hill, three wells were found to contain benzene above the 5-µg/L MCL. Groundwater samples from 09-MW-01 were found to contain approximately 100-µg/L benzene in 1992, 1993, and 1994. Samples collected in 1992 from 09-MW-02 and 09-MW-04 did not contain benzene above the MCL, but 1993 and 1994 samples from these wells did contain benzene in excess of the MCL. Concentrations of TCE have also been detected in groundwater from the Million Gallon Hill area. Only the 1994 groundwater sample from 06-MW-04 exceeds the 5-µg/L MCL, with 12.3-µg/L TCE. Figure 3.4-2 shows the distribution of TCE in groundwater at Million Gallon Hill. The groundwater monitoring wells that flank Million Gallon Hill to the north and west do not contain any fuel- or solvent-related contaminants above the screening criteria.

Arsenic and lead concentrations slightly exceed the MCLs (0.05 and 0.015 mg/L, respectively) in a few groundwater samples from Million Gallon Hill. Arsenic was detected in a sample from 09-MW-12 at 0.060 mg/L. Lead was detected in 09-MW-03 at 0.018 mg/L in a 1992 sample; it was not detected above the concentration found in method blanks in 1993. Lead was also detected in a sample from 09-MW-10 at a concentration of 0.020 mg/L.

Monitoring well 09-MW-15 was placed downgradient of the plume identified by field screening activities. A groundwater sample collected from this well in September 1993 was found to contain benzene at 5.49 µg/L, just above the MCL of 5 µg/L. A sample collected in September 1994 from this well contained only 0.680-µg/L benzene.

Recommendations

Although the baseline risk assessment (USAF, 1996) indicates that there is no significant risk to human health or the environment as a result of contamination at the West Unit, several response actions are currently being conducted or are planned for the Million Gallon Hill source area. Free-phase product recovery is being conducted to eliminate the source of continuing contamination to the groundwater. In addition, several bioventing wells were installed during 1995 and a bioventing system will be operational in 1996.

In addition to product recovery and bioventing, intrinsic remediation coupled with point-of-compliance groundwater monitoring will be conducted at the Million Gallon Hill source area. Baseline groundwater sampling will be conducted in conjunction with the startup of the bioventing system in 1996, and point-of-compliance monitoring will begin in 1997.

3.4.3 Power Plant UST No. 49

As with the USTs at Million Gallon Hill, sludge from the periodic cleaning of the Power Plant UST No. 49 has been placed in drums for off-base disposal in recent years. It is presumed that the sludge was once allowed to weather on the ground. Occasionally, water from UST No. 49 was drained, and the resultant water-fuel mixture may also have been drained to the ground (USAF, 1985). Leaks and small spills may have resulted in further contamination of soils around and beneath tank areas; a tracer study indicated that USTs No. 49 may be leaking (USAF, 1992). Aerial photographs taken in 1974 show that drums were stored along the south side of the power plant, near an area of stained soil.

Two monitoring wells were installed near the Power Plant UST No. 49 source area in 1991 to determine the effect of possible UST leakage on groundwater (USAF, 1992). Analysis of samples from the downgradient well (11-MW-02) showed 1210-μg/L TPH, but no detectable BTEX. No contamination was detected in the upgradient well (11-MW-01). During this investigation, soil samples were collected from the two monitoring well boreholes, as well as from two soil borings located to the west of the power plant. Samples from both of these borings contained elevated levels of TPH (see Table 3.4-1) to a depth of 10 ft.

RI Activities and Findings

During RI activities at this source area, two preexisting groundwater monitoring wells were sampled, a soil boring was drilled and sampled, and surface soil samples were collected to define and characterize contamination.

A sediment sample (06-SD-01) collected from a drainage ditch west of the steam plant in 1992 was found to contain 47,000-mg/kg DRO and 12,000-mg/kg GRO. A surface soil sample (11-SS-01) collected west of the steam plant contained 1,100-mg/kg DRO. The 6.5- to 9-ft interval of a soil boring drilled off of the southwest corner of the building contained 5,900-mg/kg DRO. These findings correspond with the results of the previous investigation (USAF, 1992) and the results of the Waste Accumulation Area investigation (Section 3.4.1). It appears that the area to the south and west of the steam plant was the site of one or more surface or shallow subsurface spills or leaks.

Surface soil samples were collected throughout the main base triangle in 1993 to assess the significance of average arsenic and lead concentration relative to background. Two surface soil samples, 11-SS-02 and -03, were collected in the vicinity of the Power Plant UST No. 49 source area. Statistical analysis of these data, combined with arsenic and lead data for other West Unit surface soils, resulted in the conclusion that, on average, arsenic is not significantly higher in West Unit soils than in background soils. Although lead was not found above half the screening criteria at this source area, it was found to be significantly higher in West Unit soils than background soils.

No new monitoring wells were installed at this source area during the field activities conducted from 1992 to 1994. However, both existing wells, 11-MW-01 and -02, were resampled in 1992. No fuel- or solvent-related compounds were detected in groundwater samples from 11-MW-01. DRO were detected in 11-MW-02, the southernmost of the two wells, at 760 μg/kg. Toluene and total xylenes were detected at very low levels (approximately four and five orders of magnitude below MCLs, respectively). Lead was detected at a concentration of 0.018 mg/L in a sample from 11-MW-02, exceeding the MCL of 0.015 mg/L. A surface water sample collected from the drainage ditch west of the power plant contained 5,900 mg/kg DRO.

The RI work conducted from 1992 to 1994 has not revealed elevated levels of any BTEX compounds in groundwater at the Power Plant UST No. 49 source area. The presence of fuel-related soil contamination to the south and west of the power plant may be the result of past waste management practices, such as allowing sludge from the tanks to weather on the ground (USAF, 1985). Leaks and spills from drums that were stored near the power plant may have also contributed to the apparent contamination.

Recommendations

No significant contamination was detected in groundwater from the Power Plant UST No. 49 monitoring wells during 1992 RI activities. Additionally, the baseline risk assessment conducted for the West Unit (USAF, 1996) indicates that there is no significant risk due to contamination from the source areas within the West Unit. All four USTs, including No. 49, are scheduled for removal in 1996 under the 611 CES Compliance Program

3.4.4 JP-4 Fillstands

The JP-4 Fillstands source area is located in the south-central part of the West Unit, just to the north of one of the main east-west roadways within the Galena Airport. Two fuel islands, diesel to the east and JP-4 to the west, are located within the JP-4 Fillstands source area. Approximately 100 ft east of the fuel islands is a JP-4 separator building (Building 1572) and a buried 2,000-gal. waste fuel tank. A floor drain in the fuel/water separator building is connected to the waste fuel tank by a drain pipe. An underground diesel fuel pipeline extends WNW to ESE across the site approximately 100 ft north of the fuel island. The pipeline, originating from Diesel Tank No. 37 on Million Gallon Hill, supplies diesel to the fillstands. The depths of the pipelines are not known. The location of fuel distribution lines and other potential contaminant sources at the JP-4 Fillstands source area is shown in Figure 3.4-5.

Excavation for a new vehicle maintenance facility began in 1993 at the JP-4 Fillstands source area, and construction was completed in 1994. Figure 3.4-5 shows the approximate location of the new facility. Investigations were conducted by the Corps of Engineers to help characterize the soils for construction design and potential contamination. During February 1991, samples from eight soil borings, collected from the surface and at 5-ft intervals to a depth of 25 ft, were submitted for chemical analysis. The analytical data from the Corps of Engineers investigation indicate the presence of jet fuel above action levels at up to 25 ft bgl (see Table 3.4-1). The static water level was reported to be at 23 to 24 ft bgl during the February 1991 investigation, and it is therefore likely that groundwater has been affected by the fuels contamination. The highest concentration of jet fuel, 16,400 ppm, was encountered at the surface approximately 100 ft south of the fillstands. Subsurface soil samples collected south (downgradient) of the fuel-water separator were found to be contaminated with fuel-related compounds.

Three of the samples collected during the preconstruction sampling for the new vehicle maintenance facility were also analyzed for pesticides. One of these samples was reported to contain 220,000-µg/kg 4,4'-DDE. Analysis of an additional 10 samples collected near the southwest corner of the planned facility yielded results reported to be from ND (not detected) to 150-ppm (150,000-µg/kg) DDT (USACE, 1993). As a result of these data, approximately 625 yd^3 of soil designated as pesticide contaminated has been stockpiled just to the east of the JP-4 Fillstands source area. Results of subsequent sampling and analysis of the stockpiled soils showed that the mean concentrations of 4,4'-DDD, -DDE, and -DDT do not exceed the EPA Region III industrial RBCs. It is anticipated that the stockpiled soil may be used as fill in areas designated as industrial. Pesticide data from the JP-4 Fillstands source area are presented in more detail in Section 3.9.

RI Activities and Findings

Field investigation activities conducted at the JP-4 Fillstands source area included the installation and sampling of four monitoring wells, completion of five soil borings, and the collection and analysis of surface soil samples. Field screening activities were also conducted to direct the RI sampling efforts.

A soil gas survey was conducted at the JP-4 Fillstands source area to help determine the source and extent of contamination. The results of the survey are shown in Figure 3.4-6. The highest concentrations of organic vapors are located within an area defined approximately by the pipeline to the north, the fillstands to the west, Building 1572 to the east, and extending downgradient to the road on the south. Three DPT groundwater samples were collected from a depth of 24 ft bgl downgradient (south) of the main east-west roadway. The samples were analyzed using both field IR methods and the mobile GC laboratory. The results for TPH and aromatic hydrocarbons (AH) by IR were nondetect. GC analyses yielded

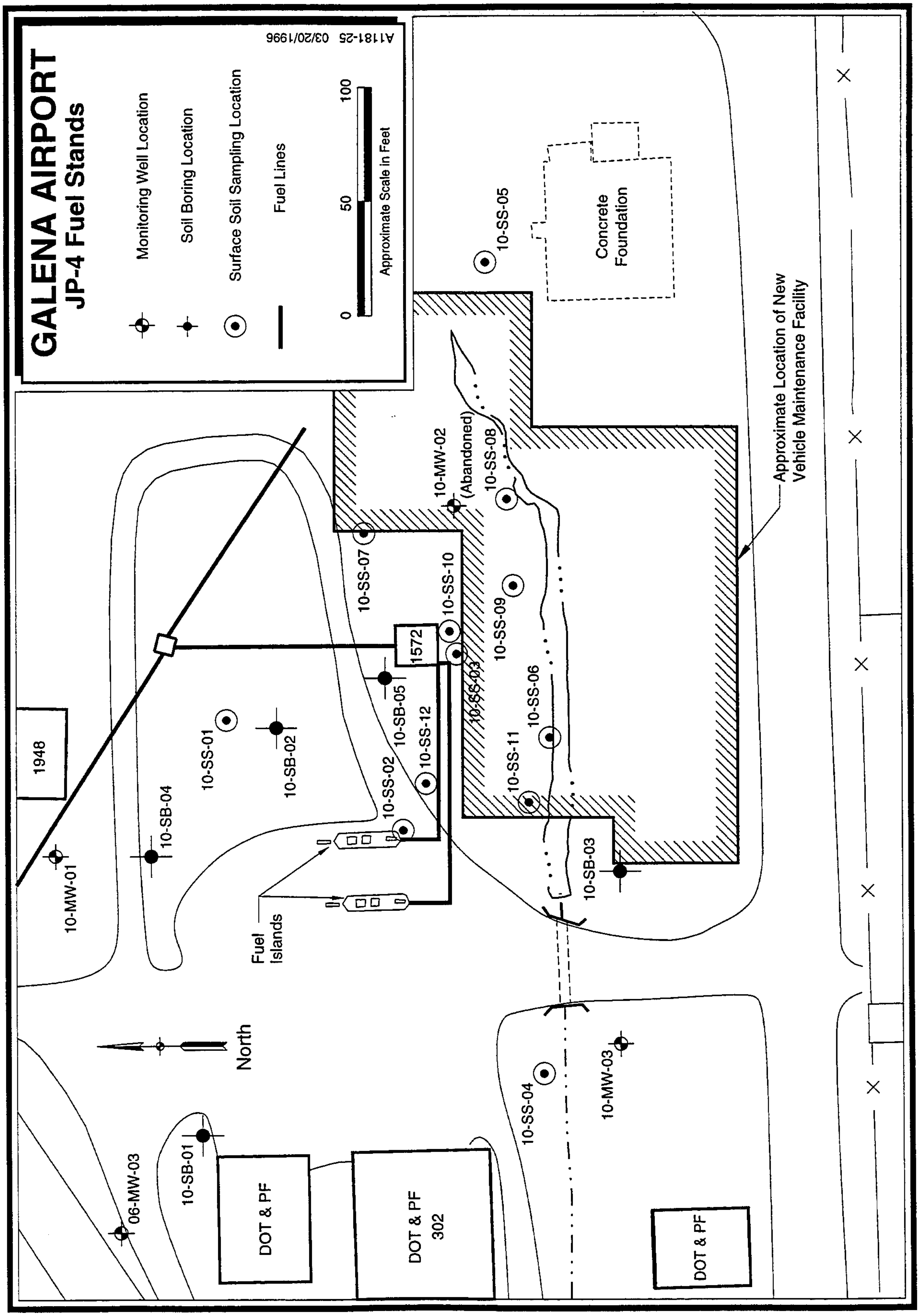


Figure 3.4-5. Location of Fuel Distribution Features and the New Vehicle Maintenance Facility at the JP-4 Fillstands Source Area

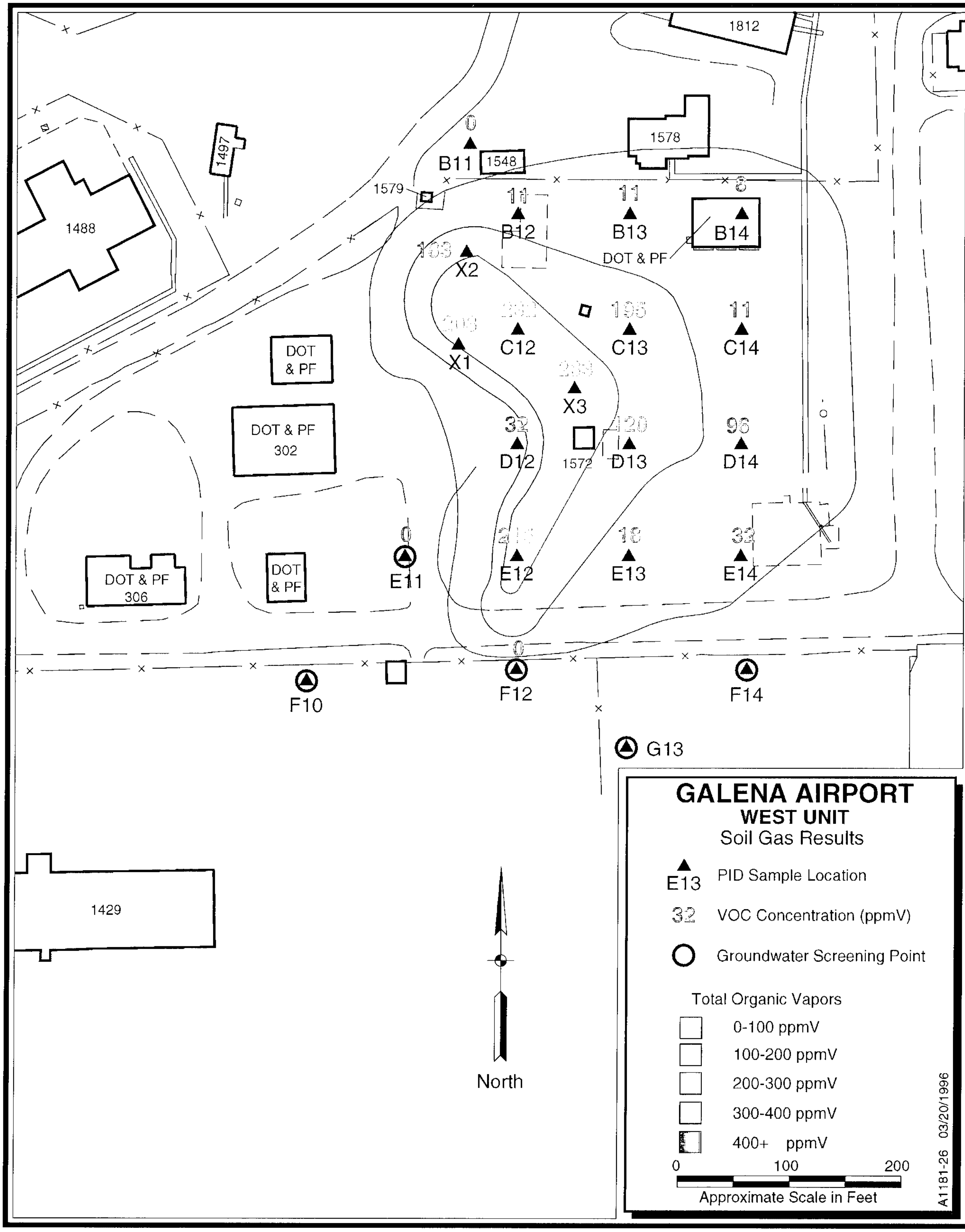


Figure 3.4-6. Soil Gas Survey Results for the JP-4 Fillstands Source Area

detections of TCE, 1,2-DCE, 1,1,1-TCA, and benzene. The results of the confirmation analyses are shown in Table 3.4-3.

Table 3.4-3
JP-4 Fillstands
Groundwater Field Screening Results

Point	E-11	F-10	F-12	F-14	G-13
Field IR Analysis (mg/L)					
AH	ND	ND	ND	ND	ND
TPH	ND	0.1	ND	ND	ND
GC Confirmation (µg/L)—detected compounds					
1,1,1-Trichloroethane	NA	NA	ND	0.025	ND
Trichloroethene	NA	NA	0.37	0.67	0.08
cis-1,2-Dichloro-ethene	NA	NA	3.4	4.2	2.6
Benzene	NA	NA	5.6	ND	ND

The soil analytical results for the JP-4 Fillstand source area are summarized in the attachment to Section 3.4. Soil samples from throughout the source area were found to contain fuel-related compounds at various depths in concentrations above the screening criteria. A surface soil sample collected at 10-SS-01 was found to contain 5,200-mg/kg DRO and 1,400-mg/kg GRO, well above State of Alaska cleanup levels. The shallowest sample (1 to 3 ft) collected from a nearby soil boring, 10-SB-02, contained GRO, DRO, and BTEX compounds above the Alaska cleanup levels. A sample collected from 4 to 6 ft within this same borehole contained significantly lower concentrations of these constituents, none of which exceeded the screening criteria. These data suggest a surface source.

Subsurface soil samples collected at 10-SB-03 (4 to 5.5 ft) and 10-MW-02 (4 to 6 ft), from the southern (downgradient) edge of the source area contain GRO, DRO, and/or BTEX, above State of Alaska cleanup criteria. It appears that the fluctuation of contaminated groundwater may be the source of the fuel constituents in these subsurface soils.

Two soil borings were drilled in the fillstand area during 1993 to document the lateral and vertical extent of contamination delineated by the soil gas survey. Samples from all depths of 10-SB-05, the soil boring placed off of the northwest corner of Building 1572, contained DRO, GRO, and BTEX above the State of Alaska cleanup criteria, suggesting that contamination at this location is coming from the JP-4 separator or the associated lines or tank. Although 10-SB-04 was placed near a soil gas point that yielded greater than 200-ppmV VOCs, the soil samples from this boring contained very little evidence of fuel contamination. It is possible that the elevated VOCs at this location are the result of groundwater contamination that has migrated slightly upgradient of the source during spring flooding.

Several PNA compounds, including benzo(a)pyrene at 500 µg/kg, were detected in one surface soil sample. The field sampling log book notes that this sample, 10-SS-04, was collected at the base of a treated telephone pole, which may be a source of the PNAs. PNAs were not detected in significant concentrations at any other locations within the JP-4 Fillstands source area.

Additional surface soil samples were collected at the JP-4 Fillstands source area for the purpose of characterizing arsenic and lead concentrations in the main base triangle. The six soil samples collected in this area (10-SS-07 through -12) were analyzed for arsenic and lead and the means of the results for these and other samples from the West Unit were compared with background values to determine significance. In the West Unit, average arsenic concentrations were not determined to be significantly higher than background, whereas average lead concentrations were. Neither arsenic nor lead exceed the screening criteria in soils from the JP-4 Fillstand source area.

JP-4 Fillstand groundwater analytical results are summarized in the attachment to Section 3.4. Monitoring wells 10-MW-01, -02, and -03 were installed in 1992 and sampled in September/October 1992 and June 1993. Monitoring well 10-MW-02 was abandoned in the fall of 1993 to make way for construction of the new vehicle maintenance facility. Monitoring wells 10-MW-01 and -03 were again sampled in September 1994. All rounds of groundwater samples from 10-MW-02 and-03 contained benzene above the MCLs. From 1992 to 1993, the benzene concentration in groundwater at 10-MW-02 decreased by half (310 μg/L to 153 μg/L). Benzene in samples from 10-MW-03 increased from 27.0 to 88.1 μg/L, then stayed approximately the same in 1994 (82.9 μg/L). Bis(2-ethylhexyl)phthalate was found in concentrations well above the MCL in the 1993 sample from 10-MW-01, but not in the 1992 or 1994 samples. Lead exceeded the MCL (0.015 mg/L) in the 1992 sample from 10-MW-03, but was not found in concentrations exceeding the MCLs in 1993 samples.

A monitoring well, 10-MW-04, was installed downgradient of the JP-4 Fillstand source area, near the southeast corner of the CAC hangar. The location of this monitoring well was chosen, using the results of the soil gas survey and calculated groundwater flow direction, to be outside of the contaminant plume. However, a groundwater sample collected from this well in September 1993 contained 35.8 μg/L of benzene, above the MCL of 5 μg/L. This compound may be from a source other than the JP-4 Fillstand source area and could reflect a localized spill or leak near this area; however, there are no reports of releases in this area. This well was damaged by a snow plow and was not resampled in 1994. The well was deemed unusable and abandoned in 1995.

It appears that fuel handling and transport activities at the JP-4 Fillstands source area have resulted in the contamination of soil and groundwater. The analytical results support the presence of multiple surface and subsurface sources of fuel contamination within the investigation area.

Recommendations

A portion of the JP-4 Fillstands source area was affected by the construction of the new vehicle maintenance facility, which occurred during the fall of 1993 and spring of 1994. A total of 7,613 yd^3 of soil were excavated to prepare the site for construction. The remainder of the site area that is contaminated and was not affected by the construction activities has been addressed under the baseline risk assessment with the rest of the West Unit. No significant risks to human health or the environment have been indicated for the West Unit. The Air Force recommends NFRA.

3.4.5 Building 1845

Building 1845, which houses the current vehicle maintenance facility, is a newly defined source area that was discovered during investigations at the Waste Accumulation Area. Solvent contamination in groundwater at the West Unit has been linked to this facility.

It is suspected that past practices such as component washing with solvents and discharge/disposal from floor drains have contributed to the contamination of the groundwater, downgradient of Building 1845. An upgrade of the floor drains was conducted in 1988; however, no information could be found for the floor drains prior to 1988. It is suspected that there may have been a discharge from the sump located near the center of the southern edge of the building. Currently, the contents of this sump are now pumped to a holding tank to await disposal. However, if the sump was damaged prior to the upgrade, it may have provided a point source for contaminant transport to the soil and groundwater. Shop personnel who were asked for information in the summer of 1993 had no knowledge of the previous condition of the sump or floor drains, or of past waste handling procedures.

RI Activities and Findings

The principal component of groundwater contamination at the Building 1845 source area is

TCE. The two monitoring wells installed at this site, 06-MW-01 and -02, were originally installed to characterize groundwater contamination at the Waste Accumulation Area. However, when TCE was first detected in groundwater samples from monitoring well 06-MW-01, Building 1845 was targeted for investigation as a potential source of solvent leaks or spills, although none have been reported. Field screening was conducted during the 1993 field season to help determine the nature and extent of contamination at this source area.

Analytical data for this source area are summarized in the attachment to Section 3.4. Neither of the soil samples collected from the borings for 06-MW-01 and -02 contained any analytes at concentrations exceeding the screening criteria.

Figure 3.4-2 shows the concentration contours for TCE in groundwater at the West Unit. Groundwater samples collected in 1992, 1993, and 1994 from monitoring wells 06-MW-01 and 06-MW-02 were found to contain concentrations of TCE that exceed the 5-µg/L MCL. The level of TCE present in samples from 06-MW-01 decreased from 13,000 to 3,500 µg/L from September 1992 to June 1993, then increased to 7,550 µg/L in September 1994. The concentration of TCE in 06-MW-02 was relatively low in 1992 and 1993 (13 and 9 µg/L, respectively), then increased to 78 µg/L in 1994.

In 1993 and 1994, trans-1,2-dichloroethene was detected in samples from 06-MW-01 above the MCL of 100 µg/L. In 1994, cis-1,2-dichlorothene, which had not been previously analyzed for, was detected in a sample from 06-MW-01 at 2,600 µg/L (MCL = 70 µg/L). Bis(2-ethylhexyl)phthalate was detected in 1992 in a sample from 06-MW-02 at 160 µg/L, although it has not been detected above the MCL of 6 µg/L in any samples since.

A soil gas survey was conducted in the area of Building 1845 to help determine the extent of contamination by TCE and to confirm the source. Figure 3.4-7 illustrates the distribution of VOCs identified during this survey. Results from the initial soil gas samples collected around Building 1845 revealed an area of elevated VOCs near the southwest corner of Building 1700. Additional soil gas samples, collected west of Building 1700 to better define the limits of the plume, showed that an additional source of VOCs is located in the vicinity of Building 1700. The nature of this source and associated contamination is discussed in greater detail in Section 3.4.6. Elevated VOCs are also associated with the area to the south of Building 1845. On the basis of the soil gas anomaly from this area, four shallow DPT groundwater samples were collected. These samples were analyzed with the field GC, and the results are shown in Table 3.4-4. The detection of 4,500 µg/L TCE at B-3 confirms the presence of TCE in groundwater downgradient of Building 1845. Cis-1,2-dichloroethene was also detected in this sample at 5,200 µg/L. No anomalous soil gas concentrations were detected upgradient (north) of Building 1845.

On the basis of the field screening results, a monitoring well was installed north of Building 1847 to document the upgradient extent of contamination. No significant concentrations of organic compounds were detected in samples from this well in 1993 or 1994.

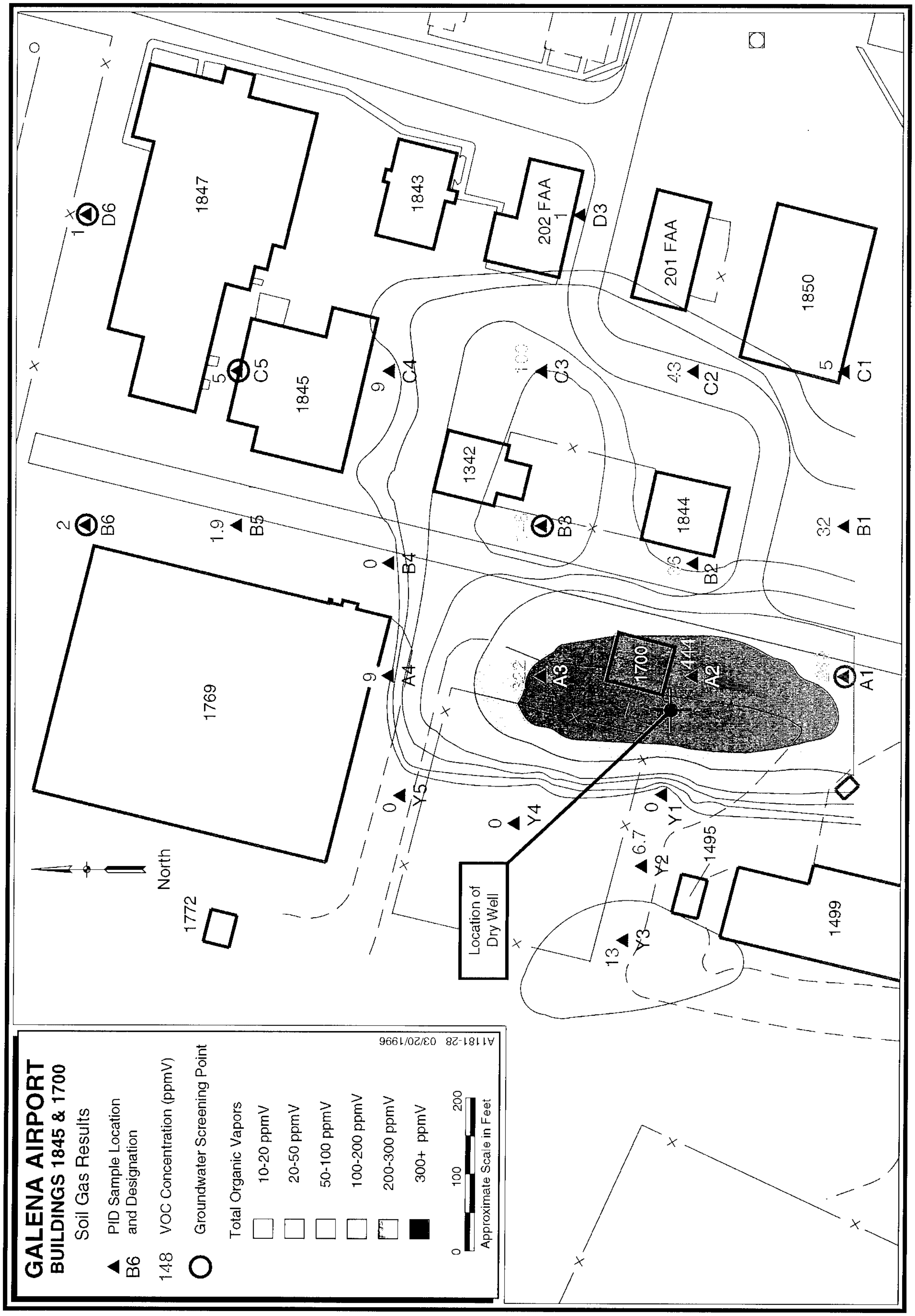


Figure 3.4-7. Soil Gas Survey Results for the Building 1845 and 1700 Source Areas

Table 3.4-4
Building 1845 Groundwater Field Screening Results

Point	A-1	B-3	B-6	C-5	D-6	D-6 QC[a]
Field IR Analysis (mg/L)						
AH		0.3	ND	ND	ND	ND
TPH		ND	ND	ND	ND	ND
Field GC Confirmation (µg/L)—detected compounds						
Chloroform	ND	ND	0.057	ND	1.9	ND
1,1,1-Trichloro-ethane	ND	ND	0.028	ND	5.7	ND
Trichloroethene	ND	4,500	0.11	0.1	214	ND
Tetrachloro-ethene	ND	0.09	ND	ND	0.6	ND
trans-1,2-Di-chloroethene	ND	28	ND	ND	67.5	ND
cis-1,2-Dichloro-ethene	ND	5,200	ND	ND	48.6	ND
Benzene	ND	ND	ND	ND	10.8	ND
Toluene	ND	ND	ND	ND	84	ND
m & p-Xylene	ND	ND	ND	ND	10.7	ND
o-Xylene	ND	ND	ND	ND	15.5	ND

Note: [a]D-6 TCE results appeared high, so an aliquot (D-6 QC) that had been stored at < 4°C for four days was reanalyzed. Data are suspect.

Recommendations

The groundwater at this source area has been addressed, together with the rest of the West Unit, in the baseline risk assessment (USAF, 1996). Although no risk to human health or the environment has been indicated, the groundwater treatment system that exists for the airport supply wells has been upgraded with the addition of an air stripper to remove TCE and other VOCs should contamination of the drinking water supply occur. The air stripper is currently being operated as part of the base water plant's normal treatment procedure. Routine monitoring of the water supply is also recommended (see Section 3.1).

3.4.6 Building 1700, Refueling Vehicle Maintenance Building

Building 1700 is a newly defined source area within the West Unit. Liquid wastes from maintenance activities conducted at Building 1700 were collected in a floor drain that led to an oil-water separator. A 2-in. pipe allowed the oil layer to drain into a buried waste oil tank made from a 55-gal. drum. A 4-in. pipe from the separator emptied the water layer into an underground dry well located 5 ft from the southwest corner of Building 1700. This dry well is constructed from a gravel-filled 55-gal. drum with the bottom removed, allowing the water to drain to the environment.

RI Activities and Findings

The results of a soil gas survey conducted to determine the source of TCE contamination in the northern portion of the West Unit revealed a previously unidentified contaminant plume originating at Building 1700 (see Figure 3.4-7). These elevated hydrocarbon readings appear to be the result of fuel spills or releases associated with maintenance activities in Building 1700.

One soil boring, 06-SB-03, was placed at the southwest corner of Building 1700 to further investigate the nature and vertical extent of the contamination identified by field screening activities. The results, summarized in the attachment to Section 3.4, indicate the presence of fuel-related contaminants. Benzene and total BTEX concentrations gradually increase with depth up to 12 ft bgl. From the surface to approximately 10 ft bgl, the concentrations of BTEX compounds exceed the screening criteria; from approximately 4 to 10 ft bgl, DRO and GRO exceed the screening criteria. At depths of 14 to 16 ft, the contaminant concentrations drop sharply, indicating limited vertical migration. The changes in BTEX, DRO, and GRO concentrations with depth are shown in Figure 3.4-8.

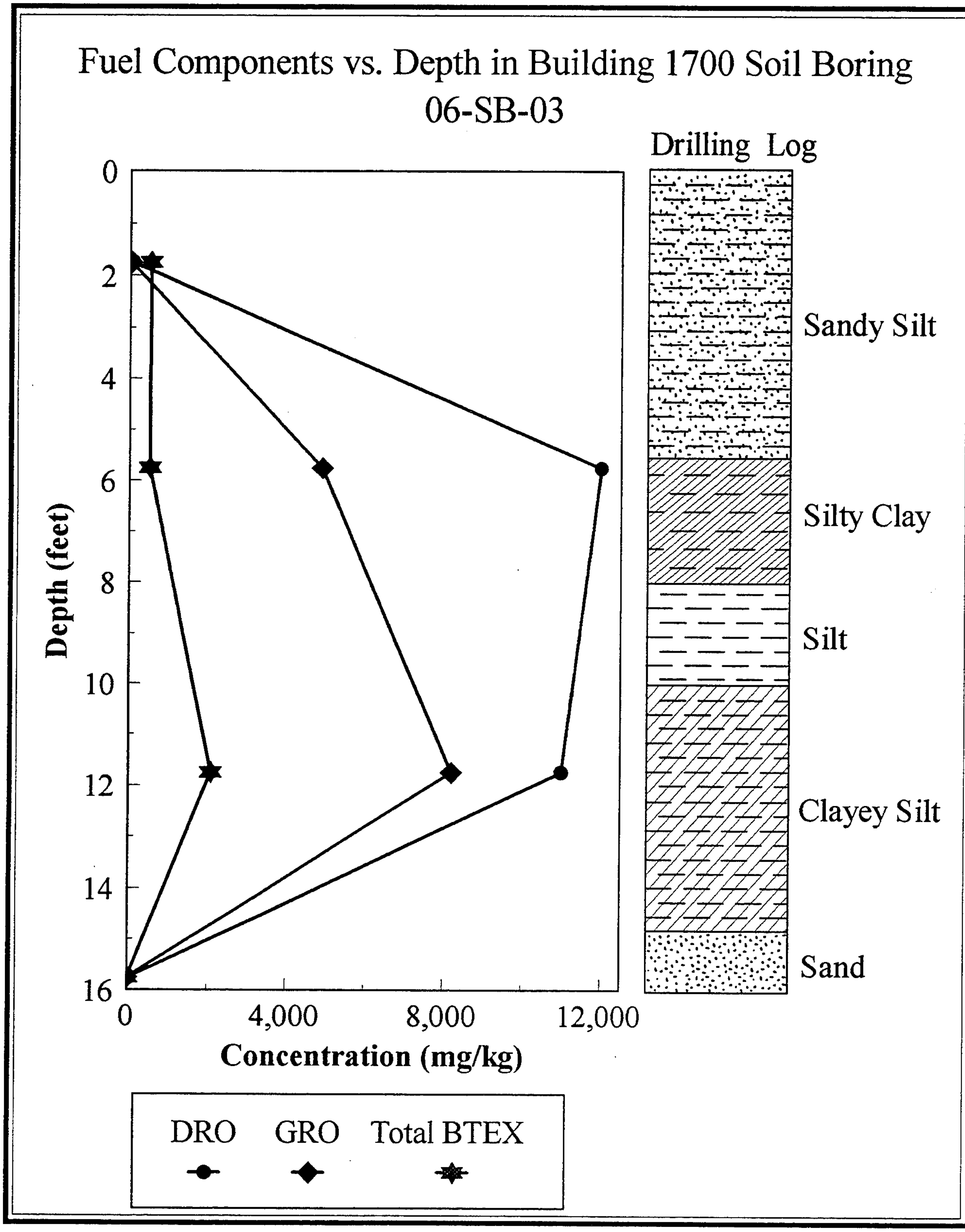


Figure 3.4-8. Concentrations of BTEX, DRO and GRO vs. Depth in Soil Boring 06-SB-03 at the Building 1700 Source Area

The field screening and analytical results at this site indicate the presence of fuel contamination from a subsurface source that is separate from the Building 1845 source area. This contamination probably originates from the dry well and waste oil tank associated with Building 1700.

Recommendations

It is recommended that the floor drains and the dry well be abandoned in place and rendered unuseable so that no additional releases can occur from this facility. Building 1700 should be eliminated as a continuing source area since the baseline risk assessment (USAF, 1996) shows that contaminated soil within the West Unit poses an insignificant risk to human or ecological receptors. The Air Force recommends NFRA for this source area.

3.4.7 Building 1850

Fuel-stained soil was discovered during construction of an aboveground waste oil tank to the south of Building 1850. The origin of this staining is unknown, and it appeared to be weathered. No spills or leaks have been reported at this location.

RI Activities and Findings

Field screening was conducted around the perimeters of Building 1850 and the waste oil tank to define the nature and extent of the apparent contamination. Nine soil gas samples were collected from around the building and analyzed with photoionization detector (PID) and flame ionization detector (FID) portable analyzers. Thirteen soil gas samples were collected from the tank area and analyzed with the PID and a catalytic hydrocarbon (CAT) analyzers. The PID responds only to compounds that contain double bonds (and ethers, aldehydes, and ketones with less sensitivity), and the CAT responds to all combustible compounds. The FID and CAT will generally have comparable responses.

The results of the soil gas survey conducted around Building 1850 are shown in Figure 3.4-9. The area encircled by points 11 through 21 defines the location where the new waste oil tank is located. The CAT analysis shows a high concentration of organic compounds from soil gas points 11 through 28 (78 to 560 ppmV). Significantly lower concentrations of VOCs were detected by the PID. This difference indicates that most of the organic compounds at this source area are saturated, since PIDs detect only unsaturated compounds (i.e., those containing a double bond). The concentration of VOCs in soil gas increases in a southwesterly direction.

Subsurface soil samples were collected at a depth of 5 ft at 11 of the soil gas points. These samples were analyzed using the field IR method for AH and TPH. Table 3.4-5 summarizes the field analytical data. Elevated concentrations of TPH (up to 1,182 mg/kg) were detected in several of the samples from around the waste oil tank. Much lower concentrations of AH were detected in the soil samples. These results are in agreement with the soil gas results; the AH detections correspond to the double-bond compounds detected by the PID.

Table 3.4-5
Building 1850 Soil Field Screening Results

Sampling Location	Field IR Analysis (mg/kg)	
	AH	TPH
11	36	1182
12	2	56
13	ND	6
16	2	3
17	2	211
18	10	210
19	3.2	149
20	1	11
23	7	67
24	30	273
25	47	792

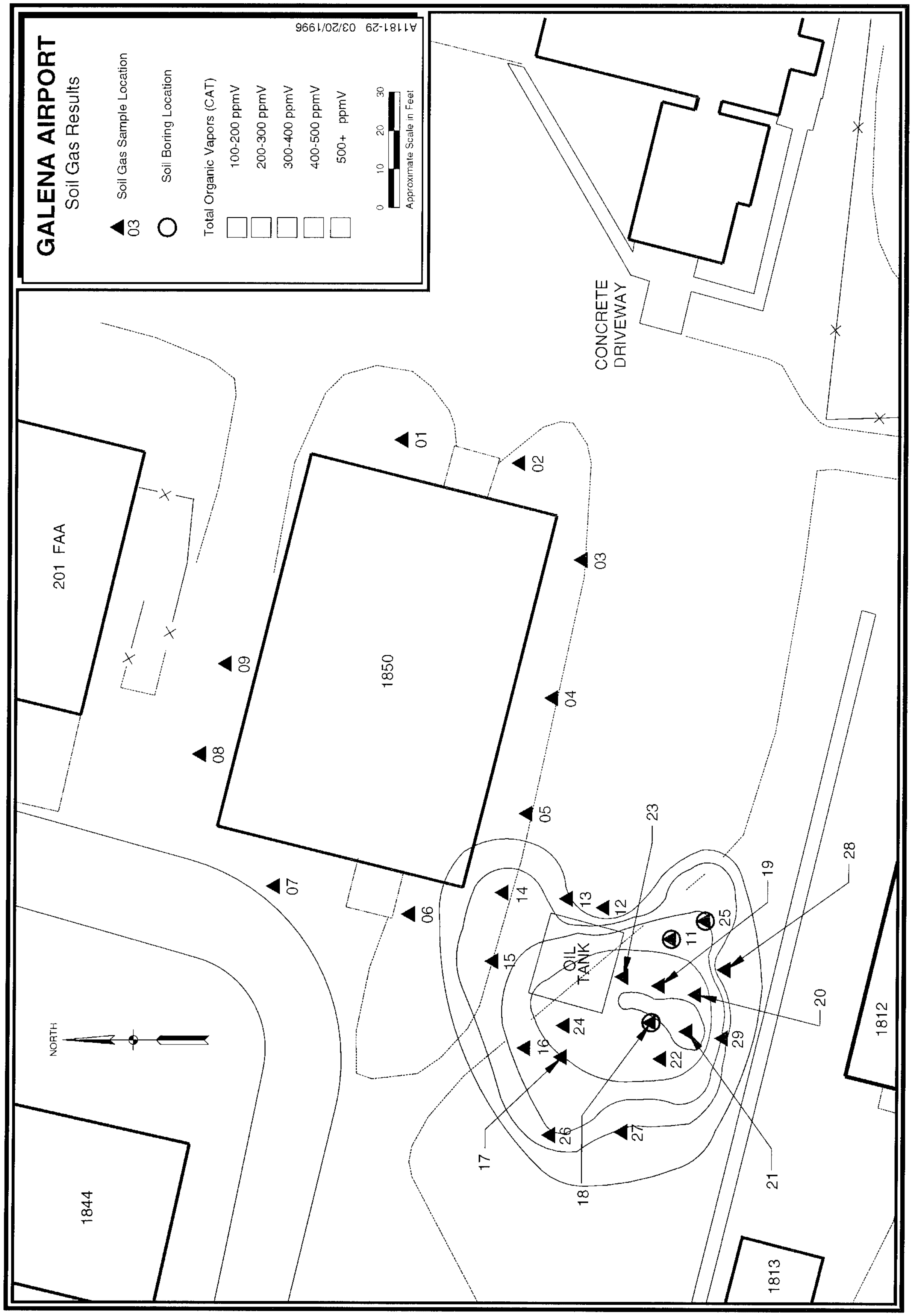


Figure 3.4-9. Soil Gas Survey Results for the Building 1850 Source Area

The area of petroleum contamination at Building 1850 is approximately 30 ft in diameter, as indicated by soil gas concentrations greater than 200 ppmV. The soil gas and AH/TPH data suggest that this spill may be weathered. In newer fuel spills, both saturated and unsaturated hydrocarbon compounds typically occur. Over time, the residual, or saturated, hydrocarbons are left while the unsaturated, or aromatic, hydrocarbons are volatilized or leached away. Neither the nature nor the source of these hydrocarbons is known, and no spills or leaks have been reported for this location.

Recommendations

It is recommended that Building 1850 be eliminated as a source area for the West Unit. The limited area and apparent age of the release suggest that this site will not pose an unacceptable risk to human or ecological receptors. The Air Force recommends NFRA for this source area.

3.4.8 West Unit Summary

Groundwater contamination at the West Unit is of two basic types: chlorinated solvents (primarily TCE) and fuel-related compounds. The highest levels of TCE contamination are located in the northeast portion of the West Unit. Building 1845, the original vehicle maintenance building, is presumed to be the source. Lower levels of TCE contamination also occur in the Million Gallon Hill source area. Groundwater contamination by fuel-related analytes at the West Unit is widespread. Individual plumes of contamination have been identified in the Million Gallon Hill and JP-4 Fillstand source areas. BTEX compounds are the primary contaminants that appear to be attributable to Million Gallon Hill (free product has been observed at some locations); benzene appears to be the primary contaminant in the JP-4 Fillstand area.

Soil contamination at the West Unit (not including pesticides—see Section 3.9) consists primarily of fuel-related compounds. DRO, GRO, and BTEX were present in numerous surface soils and sediments throughout the West Unit, suggesting that spills and leaks have occurred at several locations over a period of time. Past waste management practices, such as allowing sludge from tank cleaning to weather on the ground, may have also contributed to surface contamination at the Million Gallon Hill and Power Plant UST No. 49 source areas. Subsurface soil contamination by fuels occurs at several locations within the West Unit. Subsurface contamination at the JP-4 Fillstand source area appears to be associated with the fuel-water separator building. The fuel contamination has migrated to groundwater and may be spread by both vertical and horizontal movement of the groundwater. Building 1700 is a source area of petroleum contamination, which appears to originate from the drainage of maintenance-related wastes to an underground waste oil tank and dry well. The vertical extent of this contamination appears to be limited. Soil gas and soil samples collected for field TPH analysis confirmed the presence of contamination by organic compounds to the south of Building 1850, another newly defined service area. However, this soil contamination appears to be old, and probably does not represent a source for groundwater contamination.

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ATTACHMENT TO SECTION 3.4

WEST UNIT
DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Waste Accumulation Area 1992 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth										
			06-MW-03 4-7 ft.	06-SB-02 2-4 ft.	06-SB-02 5-7 ft.	06-SS-01 0-0.5 ft.	06-SS-02 0-0.5 ft.	06-SS-03 0-0.5 ft.	06-SS-04 0-0.5 ft.	06-SS-05 0-0.5 ft.	06-SS-06 0-0.5 ft.	11-SB-01 2-4 ft.	11-SB-01 5-7 ft.
Diesel Range Organics	AK DRO (mg/kg)	200 AK	43 (25)	ND (20)	56 (25)	890 (100)	1,600 (210)	130 (20)	23 B (20)	78 (20)	68 (21)	29 (27)	ND (25)
Benzo(a)anthracene	SW8270 (µg/kg)	3,900 RC	25 J (420)	ND (1,000)	ND (420)	ND (350)	130 J (1,100)	360 J (1,000)	760 (340)	21 J (340)	110 J (1,000)	ND (0.45)	ND (0.42)
Benzo(a)pyrene		390 RC	26 J (420)	ND (1,000)	ND (420)	ND (350)	140 J (1,100)	380 J (1,000)	520 (340)	33 J (340)	170 J (1,000)	ND (0.45)	ND (0.42)
Benzo(b)fluoranthene		3,900 RC	25 JF (420)	ND (1,000)	ND (420)	ND (350)	350 JF (1,100)	360 J (1,000)	520 (340)	30 J (340)	81 J (1,000)	ND (0.45)	ND (0.42)
Dibenz(a,h)anthracene		390 RC	ND (420)	ND (1,000)	ND (420)	ND (350)	ND (1,100)	130 J (1,000)	170 J (340)	ND (340)	54 J (1,000)	ND (0.45)	ND (0.42)
Arsenic	SW7060 (mg/kg)	310 RN	7.5 (0.78)	4.2 (0.56)	8.7 (0.85)	4.3 (0.28)	6.3 (0.66)	7.1 (0.59)	2.8 (0.3)	3.2 (0.30)	4.2 (0.29)	12 (0.75)	8.5 (0.78)
Lead	SW7421 (mg/kg)	400 EL	12 (1.1)	5.5 (0.84)	3.2 (1.2)	25 (2.1)	14 (0.99)	17 (0.89)	29 (2.3)	13 (0.90)	9.1 (0.87)	12 (1.1)	11 (1.2)

Waste Accumulation Area 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth							
			06-SS-07 0-0.5 ft.	06-SS-08 0-0.5 ft.	06-SS-09 0-0.5 ft.	06-SS-10 0-0.5 ft.	06-SS-110- 0-0.5 ft.	06-SS-12 0-0.5 ft.	06-SS-130- 0-0.5 ft.	06-SS-14 0-0.5 ft.
Diesel Range Organics	AKDRO (mg/kg)	200 AK	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	SW8270 (μg/kg)	3,900 RC	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene		390 RC	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene		3,900 RC	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene		390 RC	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/kg)	310 RN	5.93 (0.126)	7.28 (0.132)	9.68 (0.130)	4.83 (0.129)	5.70 (0.153)	11.4 (0.143)	10.8 (0.154)	9.07 (0.141)
Lead	SW7421 (mg/kg)	400 EL	469 (17.5)	852 (184)	35.6 (0.904)	30.6 (0.899)	28.7 (1.07)	16.0 S (0.999)	32.9 S (1.07)	11.3 S (0.393)

Waste Accumulation Area 1993 Soil Data (Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth 11-SS-05 0-0.5 ft.	11-SS-06 0-0.5 ft.	11-SS-07 0-0.5 ft.	11-SS-08 0-0.5 ft.	11-SS-09 0-0.5 ft.	11-SS-10 0-0.5 ft.
Diesel Range Organics	AKDRO (mg/kg)	200 AK	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	SW8270 (µg/kg)	3,900 RC	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene		390 RC	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene		3,900 RC	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene		390 RC	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/kg)	310 RN	7.41 (0.146)	249 (6.78)	10.3 (0.168)	4.96 (0.0764)	4.26 (0.0735)	6.29 (0.151)
Lead	SW7421 (mg/kg)	400 EL	20.6 (0.383)	361 (9.24)	12.9 (0.396)	5.19 (0.381)	5.01 (0.324)	30.3 (1.15)

Waste Accumulation Area 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID
			06-MW-03
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)
Benzene	SW8020 (µg/L)	5 M	ND (0.30)

Waste Accumulation Area 1993 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID
			06-MW-03
Gasoline Range Organics	AKGRO (µg/L)	NA	47 JB (100)
Diesel Range Organics	AKDRO (µg/L)	NA	4 JB (200)
Benzene	SW8020 (µg/L)	5 M	3.36 (0.0700)

Waste Accumulation Area 1994 Water Data

Analyte	Method (units)	Screening Criteria	Location ID	
			06-MW-03	06-MW-05
Gasoline Range Organics	AK101 (µg/L)	NA	7 J (50)	1,000 (50)
Diesel Range Organics	AK102 (µg/L)	NA	58 J (100)	49 J (100)
Benzene	SW8260 (µg/L)	5 M	0.330 (0.0307)	0.390 (0.0307)

Million Gallon Hill 1992 Soil Data

Analyte	Method (Units)	Sceening Critera	Location ID/Depth										
			06-MW-04 4-6 ft.	06-SD-02 0-0.5 ft.	09-MW-01 2-3 ft.	09-MW-02 2.5-4.5 ft.	09-MW-03 2.5-4 ft.	09-MW-04 3-3.5 ft.	09-MW-05 2.5-4 ft.	09-MW-06 4-7 ft.	09-SS-01 0-0.5 ft.	09-SS-02 0-0.5 ft.	09-SS-03 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	54 (13)	16 B (12)	ND (12)	ND (12)	ND (11)	ND (13)	ND (13)	ND (13)	ND (13)	ND (14)	ND (13)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	37 (26)	42 (25)	230 (120)	ND (24)	ND (20)	55 (25)	ND (26)	31 (26)	320 (45)	85 (30)	48 (28)
Benzo(a)pyrene	SW8270 (µg/kg)	390 RC	ND (1,300)	ND (350)	360 J (390)	ND (390)	ND (350)	ND (1300)	ND (440)	ND (420)	ND (380)	ND (500)	51 J (460)
Benzo(b)fluoranthene		3,900 RC	ND (1,300)	ND (350)	470 (390)	ND (390)	ND (350)	ND (1,300)	ND (440)	ND (420)	ND (380)	ND (50)	390 JF (460)
Dibenzo(a,h)anthracene		390 RC	ND (1,300)	ND (350)	57 J (390)	ND (390)	ND (350)	ND (1,300)	ND (440)	ND (420)	ND (380)	ND (500)	ND (460)
Manganese	SW6010 (mg/kg)	5,100 RN	500 (0.87)	360 (0.92)	210 (0.81)	410 (0.99)	200 (0.84)	370 (0.88)	500 (1.1)	340 (1.2)	330 (0.83)	240 (1.2)	500 (1.1)
Arsenic	SW060 (mg/kg)	310 RN	12 (0.85)	8.7 (0.72)	6.5 (0.71)	11 (1.4)	5.0 (0.34)	7.8 (1.6)	14 (0.88)	8.3 (0.90)	6.7 (0.65)	6.3 (0.55)	15 (1.8)
Lead	SW7421 (mg/kg)	400 EL	9.2 (1.3)	10 (1.1)	15 (1.1)	9.1 (1.0)	3.3 (0.25)	15 (1.2)	8.8 (1.3)	7.2 (0.67)	9.4 (0.48)	7.6 (0.82)	17 (1.3)

Million Gallon Hill 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth			
			09-SB-01 0-2 ft.	09-SB-01 2.5-4.5 ft.	09-SB-01 5-7 ft.	09-SB-01 7.5-9.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	87 (10)	61 (10)	60 (10)	6 J (10)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	120 B (20)	29 B (20)	10 JB (20)	1 JB (20)
Benzo(a)pyrene	SW8270 (µg/kg)	390 RC	321 (18.8)	39.7 (20.7)	18.3 J (22.0)	ND (20.2)
Benzo(b)fluoranthene		3900 RC	717 F (32.9)	87.5 F (36.3)	20.3 FJ (38.5)	ND (35.4)
Dibenzo(a,h)anthracene		0.39 RC	ND (29.4)	ND (32.4)	ND (34.4)	ND (31.6)
Manganese	SW6010 (mg/kg)	5100 RN	NA	NA	NA	NA
Arsenic	SW7060 (mg/kg)	310 RN	3.99 (0.139)	7.51 (0.135)	9.11 (0.134)	5.71 (0.142)
Lead	SW7421 (mg/kg)	400 EL	2080 (38.7)	10.5 (0.373)	12.2 (0.374)	4.67 (0.395)

Million Gallon Hill 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID							
			06-MW-04	06-SW-02	09-MW-01	09-MW-02	09-MW-03	09-MW-04	09-MW-05	09-MW-06
Gasoline Range Organics	SW8020mod (µg/L)	NA	12,000 (2,500)	1,100 (1,000)	1,500 (100)	ND (100)	ND (100)	110 (100)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	2,900 (200)	22,000 (2,000)	ND (190)	ND (200)	ND (210)	ND (200)	320 (200)	ND (200)
Carbon Tetrachloride	SW8010 (µg/L)	5 M	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	3.0 (0.35)	ND (0.35)	ND (0.35)	ND (0.35)
Chloromethane		1.4 RC	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloroethane		5 M	ND (0.15)	0.42 (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Methylene Chloride		5 M	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Trichloroethene		5 M	0.54 (0.20)	ND (0.20)	0.30 (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)
Benzene	SW8020 (µg/L)	5 M	510 (7.5)	76 (3.0)	110 (3.0)	0.79 (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Ethylbenzene		700 M	250 (5.0)	3.0 (2.0)	16 (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Toluene		1,000 M	320 (5.0)	60 (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	0.39 B (0.20)
Total Xylenes		10,000 M	970 (7.5)	57 (3.0)	9.0 (3.0)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
Chlorobenzene		39 RN	ND (5.5)	ND (2.0)	ND (2.0)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6.0 M	2.5 JB (10)	5.0 JB (9.5)	1.8 JB (9.9)	2.3 JB (11)	1.6 JB (10)	2.1 JB (9.8)	15 B (9.9)	13 B (10)
4-Methylphenol (p-cresol)		180 RN	ND (10)	90 (9.5)	ND (9.9)	ND (11)	ND (10)	ND (9.8)	ND (9.9)	ND (10)
Naphthalene		1,500 RN	160 (10)	49 (9.5)	ND (9.9)	ND (11)	ND (10)	ND (9.8)	0.58 J (9.9)	ND (10)
Barium	SW6010 (mg/L)	2 M	0.99 (0.010)	0.40 (0.010)	0.30 (0.010)	0.22 (0.010)	0.38 (0.010)	0.26 (0.010)	0.28 (0.010)	0.19 (0.010)
Arsenic	SW7060 (mg/L)	0.05 M	0.036 (0.0040)	0.016 (0.0040)	ND (0.0040)	ND (0.0040)	0.0043 (0.0040)	ND (0.0040)	ND (0.0040)	ND (0.0040)
Lead	SW7421 (mg/L)	0.015 M	0.012 (0.0030)	ND (0.0030)	ND (0.0030)	ND (0.0030)	0.018 (0.0030)	ND (0.0030)	0.0050 B (0.0030)	0.0071 B (0.0030)

Million Gallon Hill 1992 Water Data (Continued)

Analyte	Method (Units)	Screening Criteria	Location ID					
			09-MW-07	09-MW-08	09-MW-10	09-MW-11	09-MW-12	09-MW-14
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (100)	160,000 (100,000)	480,000 (50,000)	260,000 (100,000)	660,000 (500,000)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)	95,000 (20,000)	14,000 (2,000)	2,900,000 (39,000)	33,000 (4,000)	ND (200)
Carbon Tetrachloride	SW8010 (µg/L)	5 M	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)
Chloromethane		1.4 RC	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
1,2-Dichloroethane		5 M	ND (0.15)	0.68 (0.15)	5.2 (0.15)	4.4 (0.15)	3.1 (0.15)	ND (0.15)
Methylene Chloride		5 M	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)	ND (0.40)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	0.79 (0.30)	ND (0.30)
Trichloroethene		5 M	ND (0.20)	0.26 (0.20)	1.9 (0.20)	1.5 (0.20)	2.6 (0.20)	ND (0.20)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (2,000)	ND (2,000)	7,600 (2,000)	6,200 (2,000)	ND (2,000)	ND (2,000)
Benzene	SW8020 (µg/L)	5 M	2.5 (0.30)	340 (300)	6,100 (150)	12,000 (300)	2,800 (1,500)	1.2 (0.30)
Ethylbenzene		700 M	0.46 (0.20)	210 (200)	2,100 (100)	420 P (200)	1,000 (1,000)	0.30 (0.20)
Toluene		1,000 M	6.0 (0.20)	ND (200)	7,900 (100)	15,000 (200)	2,300 (1,000)	3.7 (0.20)
Total Xylenes		10,000 M	2.0 (0.30)	810 (300)	9,900 (150)	1,200 P (300)	6,800 (1,500)	1.2 (0.30)
Chlorobenzene		39 RN	ND (0.20)	280 (200)	140 P (100)	ND (200)	ND (1,000)	ND (0.20)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6.0 M	1.1 JB (9.8)	ND (100)	11 JB (99)	1.3 JB (9.8)	ND (99)	ND (10)
4-Methylphenol (p-cresol)		180 RN	ND (9.8)	ND (100)	160 (99)	32 (9.8)	39 J (99)	ND (10)
Naphthalene		1,500 RN	ND (9.8)	1,300 (100)	1,100 (99)	60 (9.8)	560 (99)	ND (10)
Barium	SW6010 (mg/L)	2 M	0.16 (0.010)	0.73 (0.010)	0.65 (0.010)	1.1 (0.010)	0.80 (0.010)	0.13 (0.010)
Arsenic	SW7060 (mg/L)	0.05 M	ND (0.0040)	0.029 (0.0040)	0.013 (0.0040)	0.025 (0.0040)	0.060 (0.0040)	ND (0.0040)
Lead	SW7421 (mg/L)	0.015 M	0.0065 B (0.0030)	ND (0.0030)	0.020 (0.0030)	0.014 (0.0030)	0.0080 B (0.0030)	ND (0.0030)

Million Gallon Hill 1993 Water Data

Analyte	Method (Unit)	Screening Criteria	Location ID							
			06-MW-04	09-MW-01	09-MW-02	09-MW-03	09-MW-04	09-MW-05	09-MW-06	09-MW-15
Gasoline Range Organics	AKGRO (µg/L)	NA	2,200 (100)	470 (100)	120 (100)	37 JB (100)	44 JB (100)	37 JB (100)	38 JB (100)	25 JB (100)
Diesel Range Organics	AKDRO (µg/L)	NA	850 (200)	72 J (200)	10 JB (200)	10 JB (200)	7 JB (200)	1 JB (200)	1 JB (200)	3 JB (200)
Carbon Tetrachloride	SW8010 (µg/L)	5 M	ND (0.110)	ND (0.110)	ND (0.110)	0.0120 PJ (0.110)	ND (0.110)	ND (0.110)	ND (0.110)	ND (0.0854)
Chloromethane		1.4 RC	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.150)	ND (0.151)
1,2-Dichloroethane		5 M	0.605 (0.0540)	0.00220 PJ (0.0540)	ND (0.0540)	ND (0.0540)	ND (0.0540)	ND (0.0540)	ND (0.0540)	ND (0.0823)
Methylene Chloride		5 M	ND (0.220)	ND (0.220)	0.000600 PJB (0.220)	ND (0.220)	ND (0.220)	ND (0.220)	ND (0.220)	0.445 TB (0.0842)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.140)	ND (0.100)	ND (0.100)	ND (0.100)	ND (0.100)	ND (0.100)	ND (0.100)	ND (0.144)
Trichloroethene		5 M	0.0111 J (0.110)	0.313 (0.110)	0.0300 PJ (0. 110)	ND (0.110)	ND (0.110)	ND (0.110)	ND (0.110)	ND (0.732)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)	ND (1,500)
Benzene	SW8020 (µg/L)	5 M	428 (1.75)	95.6 (0.700)	40.0 (0.350)	0.0654 JB (0.070)	8.46 (0.0700)	ND (0.100)	ND (0.100)	5.49 (0.0832)
Ethylbenzene		700 M	27.8 (0.340)	1.95 (0.0680)	0.129 B (0.0680)	ND (0.0680)	ND (0.0680)	0.0490 JB (0.0680)	ND (0.0680)	0.0166 KJB (0.0436)
Toluene		1,000 M	1.16 B (0.240)	0.271 B (0.0480)	0.200 B (0.0480)	0.0865 B (0.0480)	0.0518 B (0.0480)	0.0698 B (0.0480)	0.108 B (0.0480)	0.0907 B (0.0813)
Total Xylenes		10,000 M	149 (2.12)	0.624 PB (0.0850)	0.378 B (0.0850)	0.0398 JB (0.0850)	0.588 B (0.0850)	0.0779 JB (0.0850)	ND (0.0850)	0.0344 JB (0.0811)
Chlorobenzene		39 RN	0.301 P (0.225)	0.0832 P (0.0450)	0.0669 (0.0450)	ND (0.0450)	ND (0.0450)	ND (0.0450)	ND (0.130)	ND (0.0802)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	ND (0.604)	ND (0.577)	ND (0.580)	1.11 B (0.580)	0.257 JB (0.583)	ND (0.611)	ND (0.611)	1.74 JB (1.93)
4-Methylphenol (p-cresol)		180 RN	ND (0.479)	ND (0.458)	ND (0.0460)	ND (0.460)	ND (0.462)	ND (0.484)	ND (0.484)	ND (0.605)
Naphthalene		1,500 RN	18.7 (0.500)	ND (0.478)	ND (0.480)	ND (0.482)	ND (0.505)	ND (0.505)	ND (0.505)	ND (0.767)
Barium	SW6010 (mg/L)	2 M	0.877 (0.000530)	0.894 (0.000530)	0.592 (0.000530)	0.643 (0.000530)	0.676 (0.000530)	0.462 (0.000530)	0.0929 (0.000530)	0.437 (0.000530)
Arsenic	SW7060 (mg/L)	0.05 M	0.0284 (0.000657)	0.0143 (0.000650)	0.0110 (0.000650)	0.0101 (0.000657)	0.0118 (0.000657)	0.0107 (0.000657)	<0.000657	0.00710 (0.000657)
Lead	SW7421 (mg/L)	0.015 M	<0.0011	0.00460 B (0.00110)	0.00650 B (0.00110)	0.00340 B (0.00110)	0.00260 B (0.00110)	<0.00110	0.00330 B (0.00110)	0.00900 S (0.000800)

Million Gallon Hill 1994 Water Data

Analyte	Method (units)	Screening Criteria	Location ID									
			06-MW-04	09-MW-01	09-MW-02	09-MW-03	09-MW-04	09-MW-05	09-MW-06	09-MW-08	09-MW-12	09-MW-15
Gasoline Range Organics	AK101 (µg/L)	NA	5,400 (50)	550 (50)	84 (50)	ND (50)	41 J (50)	13 J (50)	250 (50)	30,000 (50)	180,000 (50)	27 J (50)
Diesel Range Organics	AK102 (µg/L)	NA	3,200 (100)	290 (100)	ND (100)	ND (100)	ND (100)	12 JB (100)	ND (100)	150,000 (200)	910,000 (5,000)	ND (100)
Benzene	SW8260 (µg/L)	5 M	305 (0.154)	114 (0.0614)	24.2 (0.0307)	0.0700 B (0.0307)	16.6 (0.0307)	0.630 (0.0307)	0.180 (0.0307)	273 Z (9.21)	3380 Z (3.07)	0.680 (0.0307)
Carbon tetrachloride		5 M	ND (0.117)	ND (0.117)	ND (0.117)	ND (0.117)	ND (0.117)	ND (0.117)	ND (0.117)	ND Z (35.1)	ND Z (11.7)	ND (0.117)
Chlorobenzene		39 RN	ND (0.112)	ND (0.112)	ND (0.112)	ND (0.112)	ND (0.112)	ND (0.112)	ND (0.112)	ND Z (33.6)	ND Z (11.2)	ND (0.112)
Chloromethane		1.4 RC	0.190 B (0.155)	ND (0.155)	ND (0.155)	ND (0.155)	ND (0.155)	ND (0.155)	ND (0.155)	48.0 Z (46.5)	14.0 ZJ (15.5)	ND (0.155)
1,2-Dichloroethane		5 M	0.700 (0.0791)	ND (0.0791)	ND (0.0791)	ND (0.0791)	0.110 (0.0791)	ND (0.0791)	ND (0.0791)	ND Z (23.7)	ND Z (7.91)	ND (0.0791)
Ethylbenzene		700 M	86.0 (0.110)	13.1 (0.110)	0.0500 J (0.110)	ND (0.110)	ND (0.110)	0.0800 J (0.110)	ND (0.110)	69.0 Z (33.0)	361 Z (11.0)	ND (0.110)
Methylene chloride		5 M	0.880 B (0.151)	0.160 B (0.151)	0.170 B (0.151)	0.370 B (0.151)	0.400 B (0.151)	0.360 B (0.151)	0.310 B (0.151)	60.0 Z (45.3)	22.0 Z (15.1)	0.360 B (0.151)
4-Methyl-2-Pentanone(MIBK)		2,900 RN	ND (0.501)	ND (0.501)	ND (0.501)	ND (0.501)	ND (0.501)	ND (0.501)	ND (0.501)	ND Z (150)	ND Z (50.1)	ND (0.501)
1,1,2,2-Tetrachloroethane		0.052 RC	ND (0.170)	ND (0.170)	ND (0.170)	ND (0.170)	ND (0.170)	ND (0.170)	ND (0.170)	ND Z (51.0)	ND Z (17.0)	ND (0.170)
Toluene		1,000 M	27.3 (0.0336)	0.240 (0.0336)	0.0600 (0.0336)	0.0400 (0.0336)	0.0300 BJ (0.0336)	0.0400 (0.0336)	0.0400 (0.0336)	15.0 Z (10.1)	1,290 Z (3.36)	0.0400 (0.0336)
Trichloroethene		5 M	12.3 (0.0439)	0.540 (0.0439)	0.180 (0.0439)	ND (0.0439)	ND (0.0439)	ND (0.0439)	ND (0.0439)	ND Z (13.2)	ND Z (4.39)	ND (0.0439)
Total Xylenes [b]		10,000 M	422 (1.47)	4.08 (0.489)	ND (0.489)	ND (0.489)	0.120 J (0.489)	0.0700 J (0.489)	ND (0.489)	186 Z (147)	1950 Z (489)	ND (0.489)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	ND (0.816)	ND (0.953)	1.17 (0.944)	2.44 (0.963)	ND (0.824)	4.18 (0.963)	ND (0.963)	ND (0.800)	ND (16.4)	ND (0.935)
4-Methylphenol (p-cresol) [a]		180 RN	3.62 F (0.834)	ND (0.438)	ND (0.433)	ND (0.442)	ND (0.842)	ND (0.442)	ND (0.442)	ND (0.818)	ND (16.8)	ND (0.429)
Naphthalene		1,500 RN	72.8 (0.804)	0.512 J (0.712)	ND (0.705)	ND (0.719)	ND (0.812)	ND (0.719)	ND (0.719)	ND (0.789)	2,570 (16.2)	ND (0.698)
Barium	SW6010 (mg/L)	2 M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/L)	0.5 M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	SW7421 (mg/L)	0.015 M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

[a] 4-Methylphenol and 3-methylphenol coeluted during this analyses
[b]Total xylenes are the sum of m,p-xylene and o-xylene

Power Plant UST 1992 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth			
			06-SD-01 0-0.5 ft.	06-SB-01 6.5-9 ft.	06-SB-01 10-12 ft.	11-SS-01 0-0.5 ft.
Gasoline Range Organics	SW8020mod (mg/kg)	100 AK	12,000 (4,900)	ND (13)	ND (13)	24 B (11)
Diesel Range Organics	SW8015ME (mg/kg)	200 A	47,000 (5,000)	5,900 (1,300)	31 (27)	1,100 (230)
Arsenic	SW7060 (mg/kg)	310 RN	11 (0.73)	8.6 (0.78)	10 (0.72)	32 (3.5)

Power Plant UST No. 49 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Sample ID	
			11-SS-02-01 0-0.5 ft.	11-SS-03-01 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 A	NA	NA
Diesel Range Organics	AKDRO (mg/kg)	200 A	NA	NA
Arsenic	SW7060 (mg/kg)	310 RN	29.0 (0.612)	7.30 (0.158)

Power Plant UST No. 49 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID		
			06-SW-01	11-MW-01	11-MW-02
Gasoline Range Organics	SW8020mod (μg/L)	NA	ND (100)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (μg/L)	52 RBC	5,900 (960)	ND (190)	760 (220)
bis(2-Ethylhexyl)phthalate	SW8270 (μg/L)	6 M	1.1 JB (9.8)	ND (10)	4.4 JB (11)
Lead	SW7421 (mg/L)	0.015 M	ND (0.0030)	ND (0.0030)	0.018 (0.0030)

JP-4 Fillstands 1992 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth							
			10-MW-01 3-6 ft.	10-MW-02 4- 6 ft.	10-MW-03 4-5.5 ft.	10-SB-01 2-4 ft.	10-SB-01 5-7 ft.	10-SB-02 1-3 ft.	10-SB-02 4-6 ft.	10-SB-03 1-2.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	47 (12)	5,000 (1,300)	14 B (14)	ND (11)	ND (13)	200 (56)	78 (13)	91 (11)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	ND (26)	92 (26)	30 (25)	150 (22)	31 (26)	13,000 (2,200)	36 (26)	110 (42)
Benzene	SW8240 (µg/kg)	500 AK	ND (130)	730 J (1,300)	ND (6.9)	ND (5.6)	ND (6.5)	980 J (1,100)	370 (130)	ND (1,100)
Ethylbenzene		15,000 AK-BTEX	ND (130)	9,200 (1,300)	3.1 J (6.9)	ND (5.6)	ND (6.5)	4,600 (1,100)	37 J (130)	ND (1,100)
Toluene		15,000 AK-BTEX	ND (130)	11,000 (1,300)	11 (6.9)	ND (5.6)	1.5 J (6.5)	12,000 (1,100)	89 J (130)	ND (1,100)
Total Xylenes		15,000 AK-BTEX	ND (130)	210,000 (1,300)	330 (6.9)	ND (5.6)	ND (6.5)	24,000 (1,100)	43 J (130)	380 J (1,100)
1,1,2,2-Tetrachloroethane		14,000 RC	ND (130)	2,600 (1,300)	ND (6.9)	ND (5.6)	ND (6.5)	ND (1,100)	ND (130)	ND (1,100)
Benzo(a)anthracene	SW8310 (µg/kg)	3,900 RC	5.4 (1.7)	27 (1.7)	0.61 J (1.8)	4.4 (1.4)	0.82 J (1.7)	5.4 (1.5)	0.44 J (1.7)	10 (1.4)
Benzo(a)pyrene		390 RC	7.6 (3.0)	7.9 (3.1)	0.90 J (3.2)	11 J (26)	0.77 J (3.0)	7.7 (2.6)	0.89 J (3.1)	0.58 J (2.5)
Dibenzo(a,h)anthracene		390 RC	1.6 J (3.9)	7.7 (4.0)	ND (4.1)	ND (3.3)	ND (3.9)	1.2 J (3.4)	ND (4.0)	3.4 (3.3)
Indeno(1,2,3-cd)pyrene		3,900 RC	11 (5.6)	20 (5.7)	ND (5.9)	2.0 J (4.8)	ND (5.6)	6.8 (4.9)	ND (5.7)	34 (4.7)
Manganese	SW6010 (mg/kg)	5,100 RN	410 (0.88)	500 (0.96)	640 (1.1)	280 (0.75)	560 (0.91)	270 (0.88)	520 (3.6)	190 (0.74)
Arsenic	SW7060 (mg/kg)	310 SN	8.5 (0.81)	17 (1.5)	11 (0.79)	7.6 (0.73)	13 (1.5)	7.7 (0.71)	12 (0.83)	5.2 (0.33)

JP-4 Fillstands 1992 Soil Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth							
			10-SB-03 4-5.5 ft.	10-SB-03 7-8.5 ft.	10-SS-01 0-0.5 ft.	10-SS-02 0-0.5 ft.	10-SS-03 0-0.5 ft.	10-SS-04 0-0.5 ft.	10-SS-05 0-0.5 ft.	10-SS-06 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	11,000 (2,600)	81 (11)	1,400 (460)	ND (10)	ND (10)	ND (11)	ND (11)	ND (11)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	87,000 (620)	ND (26)	5,200 (22)	ND (21)	21 B (20)	78 (22)	38 (22)	94 (22)
Benzene	SW8240 (µg/kg)	500 AK	ND (1,300)	ND (330)	ND (110)	ND (5.3)	ND (5.2)	ND (5.4)	ND (5.6)	ND (5.6)
Ethylbenzene		15,000 AK-BTEX	3,000 (1,300)	ND (330)	34 J (110)	ND (5.3)	ND (5.2)	ND (5.4)	ND (5.6)	ND (5.6)
Toluene		15,000 AK-BTEX	1,600 (1,300)	ND (330)	340 (110)	0.85 JB (5.3)	ND (5.2)	ND (5.4)	ND (5.6)	ND (5.6)
Total Xylenes		15,000 AK-BTEX	6,800 (1,300)	ND (330)	12,000 (110)	11 (5.3)	ND (5.2)	ND (5.4)	ND (5.6)	ND (5.6)
1,1,2,2-Tetrachloroethane		14,000 RC	ND (1,300)	ND (330)	ND (110)	ND (5.3)	ND (5.2)	ND (5.4)	ND (5.6)	ND (5.6)
Benzo(a)anthracene	SW8310 (µg/kg)	3,900 RC	5.5 (1.7)	ND (1.7)	5.9 (4.9)	8.0 (4.6)	16 (4.5)	840 (47)	69 (4.9)	31 (4.9)
Benzo(a)pyrene		390 RC	9.7 (3.1)	0.50 J (3.0)	ND (8.6)	16 (8.2)	40 (8.0)	500 (41)	72 (8.6)	67 (8.6)
Dibenzo(a,h)anthracene		390 RC	4.4 (4.0)	ND (3.9)	4.1 J (11)	5.0 J (11)	5.9 J (10)	170 (54)	9.8 J (11)	24 (11)
Indeno(1,2,3-cd)pyrene		3,900 RC	9.1 (5.7)	ND (5.6)	11 J (16)	61 (15)	49 (15)	800 (77)	18 (16)	110 (16)
Manganese	SW6010 (mg/kg)	5,100 RN	360 (0.92)	340 (0.93)	260 (0.76)	230 (0.63)	210 (0.73)	280 (0.87)	520 (1.6)	520 (1.6)
Arsenic	SW7060 (mg/kg)	310 RC	11 (0.80)	10 (0.81)	6.8 (0.61)	47 (3.7)	23 (1.5)	4.5 (0.29)	6.1 (0.64)	5.6 (0.60)

JP-4 Fillstands 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth													
			10-SB-04 0-2 ft.	10-SB-04 3-5 ft.	10-SB-04 7-9 ft	10-SB-04 10-12 ft.	10-SB-05 0-2 ft.	10-SB-05 3-5 ft.	10-SB-05 8-10 ft.	10-SB-05 11-13 ft.	10-SS-07 0-0.5 ft.	10-SS-08 0-0.5 ft.	10-SS-09 0-0.5 ft.	10-SS-10 0-0.5 ft.	10-SS-11 0-0.5 ft.	10-SS-12 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (10)	1 J (10)	ND (10)	ND (10)	2 J (10)	2,500 (10)	2,200 (10)	4,600 (10)	NA	NA	NA	NA	NA	NA
Diesel Range Organics	AKDRO (mg/kg)	200 AK	57 B (20)	1 JB (20)	ND (20)	1 JB (20)	1,000 (20)	720 (20)	1,800 (20)	4,400 (20)	NA	NA	NA	NA	NA	NA
Benzene	SW8240 (µg/kg)	500 AK	1.00 J (6.00)	16.0 (7.00)	ND (5.00)	ND (6.00)	ND (400)	6,200 (300)	14,000 (1,000)	66,000 (2,000)	NA	NA	NA	NA	NA	NA
Ethylbenzene		15,000 AK-BTEX	ND (6.00)	ND (7.00)	ND (5.00)	ND (6.00)	4,900 (400)	8,200 (300)	29,000 (1,000)	92,000 (2,000)	NA	NA	NA	NA	NA	NA
Toluene		15,000 AK-BTEX	1.70 J (6.00)	ND (7.00)	ND (5.00)	ND (6.00)	ND (400)	36,000 (300)	100,000 (1,000)	370,000 (2,000)	NA	NA	NA	NA	NA	NA
Total Xylenes [a]		15,000 AK-BTEX	ND (20.0)	ND (30.0)	ND (20.0)	ND (20.0)	12,600 (1,000)	36,100 (800)	155,000 (3,000)	450,000 (7,000)	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane		14,000 RC	ND (6.00)	ND (7.00)	ND (5.00)	ND (6.00)	ND (400)	ND (300)	ND (1,000)	ND (2,000)	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	SW8270 (µg/kg)	3,900 RC	ND (17.8)	ND (22.5)	ND (18.1)	ND (18.0)	ND (47.3)	ND (569)	ND (420)	ND (427)	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene		390 RC	10.5 J (13.2)	9.40 J (16.7)	ND (13.5)	ND (13.4)	ND (54.6)	ND (656)	ND (485)	ND (493)	NA	NA	NA	NA	NA	NA
Dibenzo(a,h)anthracene		390 RC	ND (16.3)	ND (20.7)	ND (16.7)	ND (16.6)	ND (855)	ND (1030)	ND (759)	ND (772)	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene		3,900 RC	ND (18.1)	ND (22.9)	ND (18.5)	ND (18.4)	ND (140)	ND (1680)	ND (1240)	ND (1270)	NA	NA	NA	NA	NA	NA
Manganese	SW6010 (mg/kg)	5,100 RN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	SW7060 (mg/kg)	310 RC	4.63 (0.0807)	10.9 (0.193)	3.91 (0.0803)	3.80 (0.0721)	12.0 (0.242)	10.1 (0.146)	3.06 (0.129)	3.18 (0.122)	15.1 (0.300)	5.42 (0.128)	7.74 (0.116)	10.8 (0.223)	6.36 (0.151)	5.13 (0.110)

[a] Total xylenes are the sum of m&p-xylenes and o-xylene.

JP-4 Fillstands 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID		
			10-MW-01	10-MW-02	10-MW-03
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (100)	14,000 (2,500)	380 (200)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)	2,400 (390)	500 (190)
Benzene	SW8020 (µg/L)	5 M	ND (0.30)	310 (7.5)	27 (0.60)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	1.8 JB (10)	1.2 JB (10)	3.9 JB (9.8)
Arsenic	SW7060 (mg/L)	0.05 M	ND (0.0040)	0.039 (0.0040)	ND (0.0040)
Lead	SW7421 (mg/L)	0.015 M	0.0083 (0.0030)	0.0089 (0.0030)	0.020 (0.0030)

JP-4 Fillstands 1993 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID			
			10-MW-01	10-MW-02	10-MW-03	10-MW-04
Gasoline Range Organics	AKGRO (µg/L)	NA	51 JB (100)	3,500 (100)	210 (100)	180 (100)
Diesel Range Organics	AKDRO (µg/L)	NA	13 JB (200)	650 (200)	8 JB (200)	10 JB (200)
Benzene	SW8020 (µg/L)	5 M	0.476 B (0.0830)	153 (1.75)	88.1 (0.395)	35.8 (0.0519)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	184 (2.93)	ND (0.586)	ND (0.574)	ND (1.87)
Arsenic	SW7060 (mg/L)	0.05 M	0.00320 (0.000650)	0.0422 (0.000650)	0.0147 (0.000650)	0.0181 (0.000657)
Lead	SW7421 (mg/L)	0.015 M	<0.00110	0.00140 B (0.00110)	<0.00110	0.00410 SB (0.00110)

JP-4 Fillstands 1994 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID	
			10-MW-01	10-MW-03
Gasoline Range Organics	AK101 (µg/L)	NA	9 J (50)	590 (50)
Diesel Range Organics	AK102 (µg/L)	NA	38 J (100)	42 J (100)
Benzene	SW8260 (µg/L)	5 M	0.300 (0.0307)	82.9 (0.0614)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	ND (0.808)	1.80 (0.917)
Arsenic	SW7060 (mg/L)	0.05 M	NA	NA
Lead	SW7421 (mg/L)	0.015 M	NA	NA

Building 1845 1992 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID		
			06-MW-01	06-MW-02	06-MW-06
Gasoline Range Organics	SW8020mod (µg/L)	NA	14,000 (2,500)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)	ND (200)	3,300 (380)
1,1-Dichloroethene	SW8010 (µg/L)	7 M	ND (350)	ND (0.70)	ND (0.70)
cis-1,2-Dichloroethene		70 M	NA	NA	NA
trans-1,2-Dichloroethene		100 M	ND (120)	ND (0.25)	ND (0.25)
Trichloroethene		5 M	13,000 (100)	13 (0.20)	0.37 (0.20)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	7.5 JB (9.8)	160 (10)	3.1 JB (10)
Cadmium	SW6010 (mg/L)	0.005 M	ND (0.0050)	ND (0.0050)	ND (0.0050)

Building 1845 1993 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID		
			06-MW-01	06-MW-02	06-MW-07
Gasoline Range Organics	AKGRO (µg/L)	NA	1,700 (100)	79 J (100)	45 JB (100)
Diesel Range Organics	AKDRO (µg/L)	NA	8 JB (200)	4 JB (200)	4 JB (200)
1,1-Dichloroethene	SW8010 (µg/L)	7.0 M	ND (10.0)	ND (0.100)	ND (0.501)
cis-1,2-Dichloroethene		70 M	NA	NA	NA
trans-1,2-Dichloroethene		100 M	143 (10.0)	ND (0.100)	ND (0.0448)
Trichloroethene		5 M	3,500 (11.0)	9.14 (0.110)	ND (0.103)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	1.36 B (0.611)	1.21 B (0.62)	ND (1.83)
Cadmium	SW6010 (mg/L)	0.005 M	0.00177 B (0.00170)	0.00651 (0.00170)	0.00286 B (0.00170)

Building 1845 1994 Water Data

Analyte	Method (units)	Screening Criteria	Location ID			
			06-MW-01	06-MW-02	06-MW-06	06-MW-07
Gasoline Range Organics	AK101 (µg/L)	NA	3,800 (50)	38 J (50)	13 J (50)	1 JB (50)
Diesel Range Organics	AK102 (µg/L)	NA	55 J (100)	ND (100)	500 (100)	25 J (100)
1,1-Dichloroethene	SW8260 (µg/L)	7 M	5.65 (0.0806)	0.160 (0.0806)	ND (0.0806)	ND (0.0806)
cis-1,2-Dichloroethene		70 M	2,600 (4.71)	0.520 (0.0785)	ND (0.0785)	ND (0.0785)
trans-1,2-Dichloroethene		100 M	185 (7.86)	ND (0.131)	ND (0.131)	ND (0.131)
Trichloroethene		5 M	7,550 (11.0)	77.7 (0.132)	0.650 (0.0439)	ND (0.0439)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	ND (0.804)	2.24 (0.940)	ND (0.944)	ND (0.792)
Cadmium	SW6010 (mg/L)	0.005 M	NA	NA	NA	NA

Building 1700 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth				
			06-SB-03 0-2 ft.	06-SB-03 4-6 ft.	06-SB-03 8-10 ft.	06-SB-03 14-16 ft.	11-SS-04 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	41 (10)	4,900 (10)	8,200 (10)	1 J (10)	NA
Diesel Range Organics	AKDRO (mg/kg)	200 AK	81 B (20)	12,000 (20)	11,000 (20)	59 B (20)	NA
Benzene	SW8240 (μg/kg)	500 AK	6,600 (2,000)	22,000 (2,000)	68,000 (6,000)	0.800 J (5.00)	NA
Ethylbenzene		15,000 AK-BTEX	35,000 (2,000)	51,000 (2,000)	100,000 (6,000)	1.00 J (5.00)	NA
Toluene		15,000 AK-BTEX	71,000 (2,000)	230,000 (2,000)	480,000 (6,000)	4.10 J (5.00)	NA
Total Xylenes [a]		15,000 AK-BTEX	420,000 (7,000)	220,000 (6,000)	1,440,000 (26,000)	5.10 J (20.0)	NA

[a]Total xylenes are the sum of m&p-xylenes and o-xylene.

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3.5 Control Tower Drum Storage Area, South (SS013)

This section presents the site description, investigation results, conclusions, and recommendations for the former drum storage area located near the present-day control tower (Figure 1.1-1). Part of this site, referred to as SS002, was included in the Stage 1 RI, performed from 1986 to 1988 (USAF, 1989a). Further field screening and groundwater and soil sampling were performed from 1993 to 1995 because, on the basis of a review of aerial photographs, the original investigation did not include the entire area where drums had been stored. The part of the site currently under investigation is SS013 and does not include SS002.

3.5.1 Site Description

The CTDSA is a former storage area where spills and regular dumpings occurred from drum handling during the period from the 1940s to the 1960s. As described in the Phase I Records Search Report (USAF, 1985), the site (Spill/Leak No. 1) is an unpaved area located between the runway and apron that stored a large number of drums (stacked horizontally, about 3 high and 10 wide) containing unused AVGAS, JP-4, JP-1, diesel fuel, solvents, thinners, cooking fuel, and possibly some waste products. Unused drum residues were reportedly dumped on the ground regularly prior to shipping the empty drums off site. Aerial photographs (dating from 1963 to 1971) indicate that the drum holding area extended from the southeastern quadrant of the present-day air services parking ramp to 600 ft east of the control tower (approximately 500 ft south of the dike road).

The site is situated on level-graded gravel fill. Frozen soils were encountered in boreholes from 10 and 30 ft bgl at the eastern and western portion of the site, respectively; however, no permafrost was encountered at the center of the site. Subsurface soils consist of coarse and fine silty sands with traces of natural organic material.

3.5.2 Background

The CTDSA was used to store drums as late as the 1970s, as verified by aerial photographs. The presence of contamination is supported by boring logs from the construction of the control tower that document the presence of fuel odor from soil down to the groundwater level (Norman Burgett, personal communication, October 1992). Sampling was performed during the Stage 1 RI (1986 to 1988), but the area investigated did not include the eastern boundary of the storage area as shown in the aerial photographs. The Stage 1 RI did include an area to the north, where 20,000 to 30,000 gal. of diesel fuel was suspected to have been discharged to the ground from a POL fuel line leak (referred to as Spill/Leak No. 2 [ST003]; USAF, 1985). Contamination at this site has not been substantiated, and it is currently being proposed for NFRAP status.

During the Stage 1 RI, soil samples were collected from 19 borings drilled to the water table (approximately 15 ft bgl) and analyzed for TPH, VOCs, and lead. Low levels of TPH contamination were detected in soils at or near the water table, and BTEX components (< 600-ppb total BTEX) and lead (maximum 59 mg/kg) were also detected in subsurface soil samples.

Three monitoring wells, shown in Figure 3.5-1, were drilled to approximately 30 ft during the Stage 1 RI. Groundwater samples were collected and analyzed for petroleum hydrocarbons, purgeable halocarbons and aromatics, and lead. Groundwater samples from all three wells contained low levels of toluene (0.6 to 5.4 µg/L) and lead (0.003 to 0.008 mg/L). A duplicate groundwater sample from MW-39 was reported to contain 0.063-mg/L lead. Since the original sample was reported to contain only 0.008 mg/L, these data are suspect. Monitoring wells MW-037 and -038 contained 1.1 and 2.4 µg/L of benzene, respectively. From 1 to 3 µg/L of TCE were detected in MW-038 (USAF, 1989a).

Also during the Stage 1 RI, a soil gas survey was conducted with a GC to analyze TPH vapors extracted from probes driven into the ground. The highest values were detected at the center and western boundary of the original CTDSA investigation area, where soil gas concentrations were approximately 10-ppmV TPH.

3.5.3 RI Activities and Findings

Field investigations conducted at the CTDSA from 1993 to 1995 included a soil gas survey and field TPH screening, collection of groundwater samples from two preexisting monitoring wells, and collection of six surface soil samples. All sampling locations are shown in Figure 3.5-1; the analytical results for soil and water samples are presented in Appendix A and are summarized in the attachment to Section 3.5. The results of these investigation activities are discussed in the following paragraphs.

Because the Stage 1 RI did not encompass the entire extent of the former CTDSA, additional field screening was performed in 1993. At 22 locations (in two lines covering the length of the former drum storage area), soil vapor was withdrawn and analyzed with a PID and FID. In addition to the soil gas survey, 14 shallow soil samples (5 ft bgl) were collected from within the CTDSA and analyzed for AH and TPH using the field IR method. Sample locations and soil gas survey results are shown in Figure 3.5-1. Results of AH and TPH analyses are given in Table 3.5-1.

The 1993 soil gas data from the CTDSA show sporadic, high VOC concentrations. The results from the soil TPH/AH screening indicate low to moderate concentrations of hydrocarbons. These data are in agreement with the findings of the Stage 1 RI and may be characteristic of a drum storage area where spills and leaks result in high levels of contamination over a limited areal extent. Hot spots, which may result from these types of releases, were detected at soil gas sample locations A-02, A-08, A-11, B-03, B-09, and B-11 (see Figure 3.5-1). Locations with the highest soil gas concentrations did not have the highest TPH concentrations (see Table 3.5-1); AH detections were all less than or equal to 3 mg/kg.

Table 3.5-1
CTDSA Soil Field Screening Results

Sampling Location	Field IR Analysis (mg/kg)	
	AH	TPH
A-01	2	34
A-02	ND	64
A-05	ND	99
A-06	1	22
A-07	ND	103
A-08	2	27
A-09	2	9
A-10	2	7
A-11	3	11
B-01	2	30
B-03	1	55
B-04	ND	431
B-09	1	40
B-10	2	18

ND = Not detected.

Six surface soil samples were collected at the CTDSA in 1995 to determine the nature of the soil contamination at the site and to provide data for the baseline risk assessment (USAF, 1996). These sample locations, shown in Figure 3.5-1, were chosen from areas of the site that are not being considered for part of a tarmac extension project to be conducted in the near future. Soils that will be covered with pavement will not pose a risk to human health or the environment, as the pavement will eliminate dust and minimize the potential for contaminants to leach into the groundwater.

The surface soil samples were generally made up of gravelly sand fill. No staining or odor was evident in the samples except for the one collected at location 13-SS-06. The soil at this

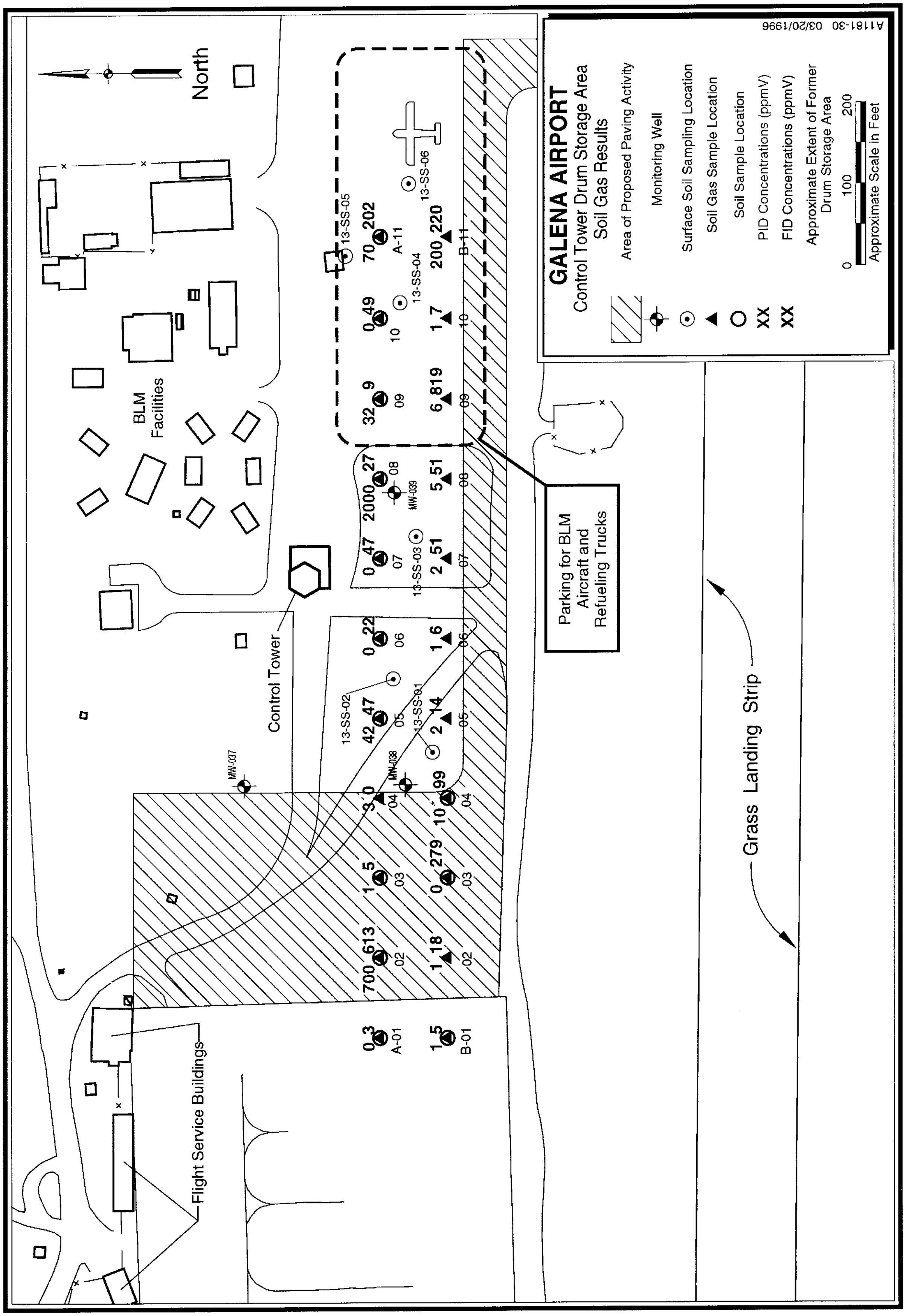

Figure 3.5-1. Soil Gas Survey Results for the Control Tower Drum Storage Area South (SS013)

location consisted of gravelly sand fill overlying dark gray-brown silty clay with red mottling and a faint burn odor.

The analytical results for the soil samples are summarized in the attachment to Section 3.5. The only contaminant that exceeded the screening criteria are DRO, which were detected in five out of the six samples. However, concentrations exceeded the State of Alaska cleanup criterion of 200 mg/kg in only two of the samples. Samples collected at locations 13-SS-02 and -05 contained 220 and 500 mg/kg of DRO, respectively. Qualitative examination of the raw analytical data reveals that the DRO are most likely a result of the presence of motor oil in the surface soil. Other contaminants detected in the surface soils at the CTDSA were benzo(a)pyrene and antimony. Neither of these compounds exceeded the industrial RBCs of 390 µg/kg and 410 mg/kg, respectively. Benzo(a)pyrene was detected in one sample (13-SS-01) at 89.6 µg/kg; it was not detected in any other samples. Antimony was detected in all of the samples collected at the CTDSA. However, it only exceeded the background UTL of 30 mg/kg in three of the samples (13-SS-01, -03, and -06 at 32.0, 30.5, and 49.2 mg/kg, respectively).

Samples were collected from monitoring wells MW-037 and MW-038 during the 1994 field season. MW-039 was damaged beyond repair and a sample could not be retrieved. TCE was detected at 9.3 µg/L at MW-038, above the 5-µg/L MCL, and 0.33 µg/L at MW-037. Very low levels of other organic compounds were detected, but these levels were well below the screening criteria. Selenium was detected at a concentration of 0.06 mg/L, in excess of both the 0.05 MCL and the 0.027 background UTL. However, this concentration is below the SQL, and is similar to levels seen in laboratory and field blanks.

3.5.4 Conclusions

Data from soil and soil gas screening conducted at the CTDSA in 1993 indicate the presence of limited areas of elevated VOC and TPH concentrations. Laboratory confirmation of surface soil sampling conducted at this site in 1995 indicated the presence of DRO, possibly from motor oil, in excess of the screening criteria. However, no staining or odor were noted at the sampling locations where the detections occurred, and the majority of the soil samples contained little or no detectable GRO. These data are consistent with minor surface soil contamination from small leaks and spills. The BLM uses the eastern portion of the site to park aircraft and refueling trucks. Vehicle traffic may also occur at other parts of the site, and small aircraft may taxi through this area as well. Aircraft and vehicle traffic are likely to be sources of DRO at this site.

The Stage 1 RI documented the presence of TCE in groundwater samples from one of the downgradient wells (MW-038). A sample collected from this well in 1994 was found to contain TCE in excess of the 5-µg/L MCL. It appears that small leaks and spills from drum handling activities at this site may have resulted in the presence of TCE in the groundwater.

3.5.5 Recommendations

A portion of the area investigated is slated to be paved over to expand the tarmac near the control tower (see Figure 3.5-1). This action will eliminate soil exposure pathways from the area being paved. The baseline risk assessment was performed using the results of the 1994 groundwater sampling and 1995 soil sampling to determine the potential risks to human or ecological receptors (USAF, 1996). No significant risk to human health or the environment was identified in the risk assessment. An NFRAP decision document will be prepared for the CTDSA.

ATTACHMENT TO SECTION 3.5

CONTROL TOWER DRUM STORAGE AREA, SOUTH
DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Y	Sample analyzed at lowest possible dilution due to extract viscosity and matrix effects.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Control Tower Drum Storage Area 1995 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth (feet)					
			13-SS-01 (0-0.5)	13-SS-02 (0-0.5)	13-SS-03 (0-0.5)	13-SS-04 (0-0.5)	13-SS-05 (0-0.5)	13-SS-06 (0-0.5)
Diesel Range Organics	AK102 (mg/kg)	200 AK	8.4 (4)	220 (4)	5.8 (4)	ND (4)	500 (4)	22 (4)
Benzo(a)pyrene	SW8270 (µg/kg)	390 RC	89.6 (20.9)	ND (20.4)	ND (22.7)	ND (20.6)	ND X (20.8)	ND (23.4)
Antimony	SW6010 (mg/kg)	410 RN	31.0 (5.22)	12.9 (5.38)	30.5 (5.55)	25.4 (4.82)	27.2 (5.22)	49.2 (6.02)

Control Tower Drum Storage Area 1994 Water Data

Analyte	Method Units	Screening Criteria	Location ID	
			MW-037	MW-038
Gasoline Range Organics	AK101 (µg/L)	NA	9 J (50)	10 J (50)
Diesel Range Organics	AK102 (µg/L)	NA	34 J (100)	ND (100)
Trichloroethene	SW8260 (µg/L)	5 M	0.330 (0.0439)	9.28 (0.0439)
Selenium	SW6010 (mg/L)	0.05 M	<0.0891	0.0590 JB (0.0891)

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3.6 Drums, Perimeter Dike (SS007)

Field screening was conducted at the Drums, Perimeter Dike site (perimeter dike, dike road) during the 1993 field season. This investigation is not related to the drum removal being conducted as an interim remedial action (IRA) to the north and west of the installation. However, both potential sources of contamination are considered to be part of SS007.

3.6.1 Site Description

The perimeter dike surrounds the entire Galena Airport facility (see Figure 1.1-1) and ranges in height from just above ground level to about 20 ft above grade. A frequently used road runs along the top of the entire dike, and most sides of the dike are thickly vegetated, predominantly with small willows. To the north of the diked area much of the land is poorly drained and marshy; the land around the rest of the dike is generally well drained. Vegetable gardens used by Galena residents are located between the runway and the south central part of the dike road. Many of the sites that have been studied as part of this RI, as well as other potential source areas, are situated along the dike road.

3.6.2 Background

The perimeter dike was constructed in the 1940s to protect the Galena Airport from annual flooding of the Yukon River. The dike is reported to have been constructed of used 55-gal. drums that had been crushed or filled with sand. If these drums contained waste or waste residue, they may be a potential source of contamination; however, the report that the dike is constructed of drums has not been confirmed. No previous investigations have been conducted at this site.

Another source area associated with Site SS007 is the wooded area surrounding the dikes to the north and west where thousands of drums have been dumped. Drum removal activities being conducted at this source area are not associated with this investigation.

3.6.3 RI Activities and Findings

A literature search of construction documentation and historic accounts of excavation along the dike did not uncover any evidence that substantiates the claim that the dike was constructed of crushed or sand-filled drums. The dike was constructed over 50 years ago and as-built drawings have not been found. The Air Force conducted a visual inspection of the dike in September 1993 to document any signs of drums eroding from the sides of the dike. There was no observable evidence that indicated that drums were used in the construction of the dike. During the drum removal interim action begun by the Air Force in the summer of 1993, several banks of drums were discovered that appear to have been welded together for construction purposes. These units were composed of six topless drums that were welded to a rebar grid. It is possible that these banks of drums were left over from past construction activities and may be related to the construction of the dike. The drums appeared to be empty and free of residual product.

Fifty-seven soil gas samples were collected at the locations shown in Figure 3.6-1. All of these locations were screened with a PID and CAT, and the results are shown in blue (PID) and red (CAT). The PID responds only to compounds that contain double bonds (and ethers, aldehydes, and ketones with less sensitivity), and the CAT responds to all combustible compounds. Soil samples were collected at 10 of the screening locations, where high concentrations of VOCs were detected in soil gas. These soil samples were analyzed for TPH and AH using the field IR method, a modified version of EPA Method 418.1. Whereas the soil gas instruments measure only volatile compounds, the IR method (TPH and AH) measures mostly nonvolatile freon-extractable compounds. The results of these analyses are shown in Table 3.6-1.

Only eight of the soil gas hydrocarbons fell below 20 ppmV on the CAT; most results were greater than 100 ppmV. The maximum hydrocarbon concentration measured by this instrument was 2200 ppmV at location 44; all other hydrocarbon concentrations were below 600 ppmV. Most PID results were below 10 ppmV, or were not detected at all.

Table 3.6-1
Drums, Perimeter Dike
Soil Field Screening Results

Point	Depth (ft)	AH (mg/kg)	TPH (mg/kg)
4	5	1	3
10 A	9	1	9.7
10 B	9	1	3.9
15	5	1	14.9
15	10	8	44.3
22	5	5.3	28
24	5	4	4
29 A	4	8	16
29 B	4	14	21.8
36 A	5	3	25
36 B	5	3	5
41	5	1	15.4
44	3	4.4	12.3
56	3	2	55

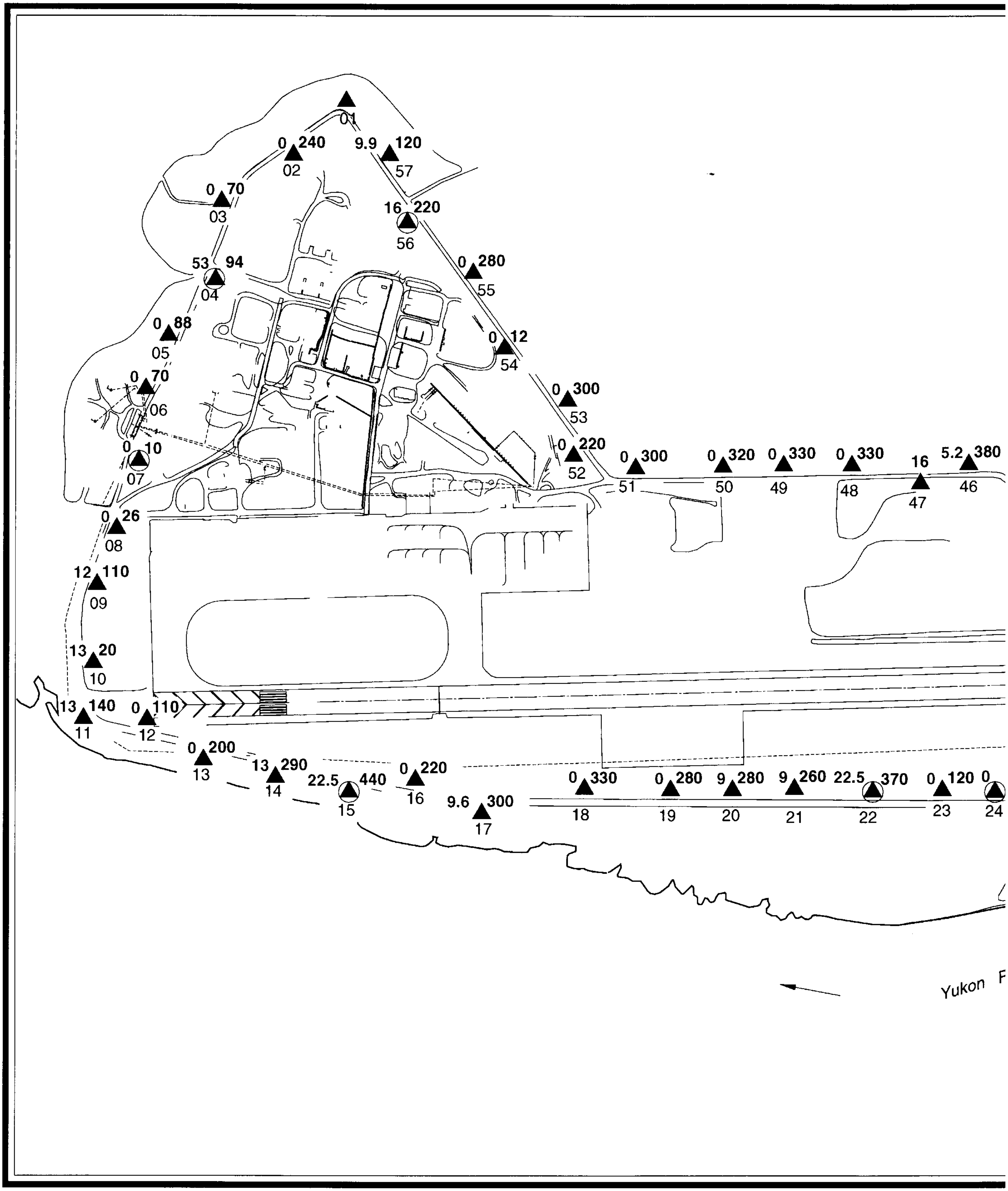
The concentration of TPH and AH in soil samples from around the dike was generally very low. TPH concentrations ranged from 3 ppm at location 4 to 55 ppm at location 57. The AH levels were consistently lower, ranging from 1 to 14 ppm.

3.6.4 Conclusions

The reported claim that drums were used in the construction of the perimeter dike is unsubstantiated. The results of field screening activities conducted along the length of the dike suggest that the dike is not releasing significant contamination to the soil and does not pose a threat to the groundwater. The discrepancy between soil gas instrument response may be attributed to the presence of naturally occurring methane in the soil surrounding the dike. The presence of several potential sources of VOCs along the dike road also make the data difficult to interpret.

3.6.5 Recommendations

The low levels of TPH measured in soils from around the dike do not constitute a potential source of contamination. Therefore, it is recommended that this source area be removed from consideration at Site SS007. Following completion of the drum removal activities being conducted north and west of the Galena Airport installation, an NFRAP decision document should be prepared for this site.


01
0 240
02
9.9 120
57
0 70
03
16 220
56
53 94
04
0 280
55
0 88
05
0 12
54
0 70
06
0 300
53
0 10
07
0 220
52
0 300
51
0 320
50
0 330
49
0 330
48
16
47
5.2 380
46
0 26
08
12 110
09
13 20
10
13 140
11
0 110
12
0 200
13
13 290
14
22.5 440
15
0 220
16
9.6 300
17
0 330
18
0 280
19
9 280
20
9 260
21
22.5 370
22
0 120
23
0
24
Yukon

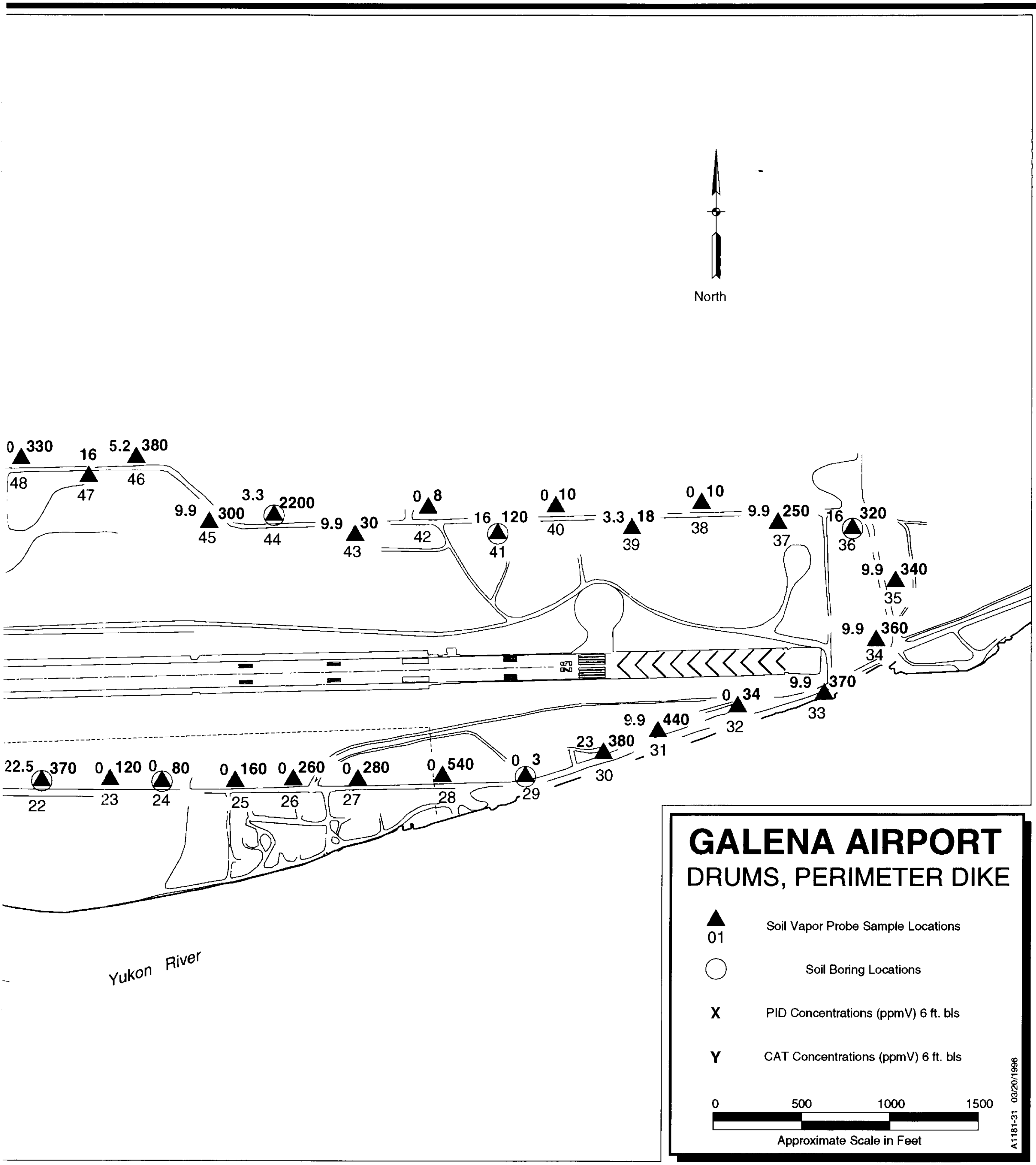


Figure 3.6-1. Soil Gas Survey Results for the Perimeter Dike Site (SS007)

3.7 Southeast Runway Fuel Spill (ST010)

The Southeast Runway Fuel Spill site is located just south of the airstrip and includes a shallow ditch that runs roughly parallel to the runway (Figure 1.1-1). This is the location of a reported fuel release that occurred during the winter of 1984. The purpose of the investigation at this site was to confirm the presence of soil and groundwater contamination, to delineate the nature and extent of contamination, and to collect sufficient data to complete a baseline risk assessment.

The conceptual diagram for the Southeast Runway Fuel Spill is presented in Figure 3.7-1. This diagram provides a plan view, a geologic cross section, and a table that lists the range of detected concentrations for analytes that have exceeded their screening criteria. The area of contamination, as determined by soil gas data, is shown on the plan view, as are all the soil and water sampling locations.

3.7.1 Site Description

The Southeast Runway Fuel Spill site is located inside of the perimeter dike in a low-lying area that is bounded to the north by the runway and to the south by the dike road. The site is vegetated primarily with grass; the state mows the area periodically to keep willows or other tall vegetation from growing too near the runway. Several gardens, maintained by inhabitants of Galena, grow along the southern edge of the site. Surface drainage from the ditch flows to the west and accumulates against a dike. In the spring, standing water is common in the lowest portions of the site. Accumulated water evaporates or infiltrates the soil.

3.7.2 Background

Site ST010 was reportedly contaminated in 1984 from a pipeline leak. During an interview, a Galena resident stated that a spill occurred at this location when the ground was frozen and covered with snow (Danny Patrick, personal communication, 4 October 1992). The source of the spill appeared to be the 4-in.-diameter diesel pipeline that leads from the barge loading area under the runway to the POL Tank Farm. The spill volume is unknown, but fuel reportedly covered the ground and accumulated in the drainage ditch south of the runway. The accumulated fuel was reported to have been removed from the ground before significant amounts could infiltrate the frozen soil.

The ruptured diesel line was replaced with a 6-in.-diameter diesel and 8-in.-diameter JP-4 pipeline that were rerouted along the south side of the runway in 1988 (21st Civil Engineering Squadron, drawing no. 86E008, 3 March 1986, with changes made in 1988). The abandoned 4-in.-diameter pipeline was to be removed where it was above ground or interfered with the installation of the new pipeline. Where the old pipeline ran under the runway, it was to be abandoned in place for a distance of 25 ft on either side of the runway shoulder. All piping that was abandoned in place was to be drained, flushed, and capped with ¼-in. steel plates or plugged with concrete.

A barrel dump was also located at the Southeast Runway Fuel Spill area. This dump is noted on the plot plan for the fuel line abandonment and reinstallation project. Several drums can be seen protruding from the ground at the site. In addition to the fuel line leak and barrel dump, other potential sources of contamination have been identified at the Southeast Runway Fuel Spill site (Assistant Airport Manager Dick Evans, personal communication, 17 July 1995). A tar pit, which has been covered over, was once present at the site, and some patches of tar are still visible at the surface. A building that was located in the area burned down; the contents or purpose of the building are unknown.

A nearby site (JP-4 Fuel Tank leak, SS004), shown in Figure 1.1-1, was investigated during the Stage 1 RI (USAF, 1989a) in response

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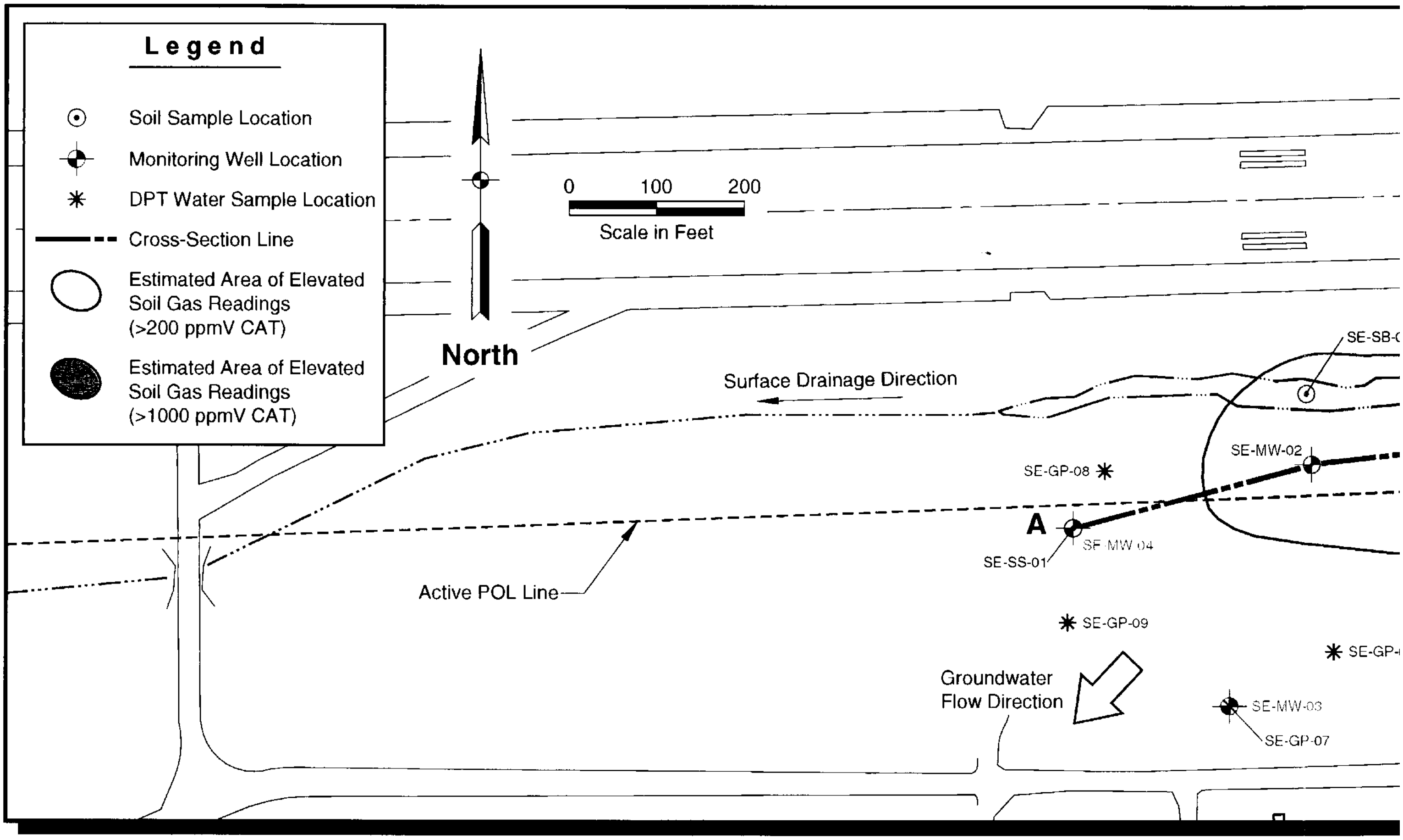
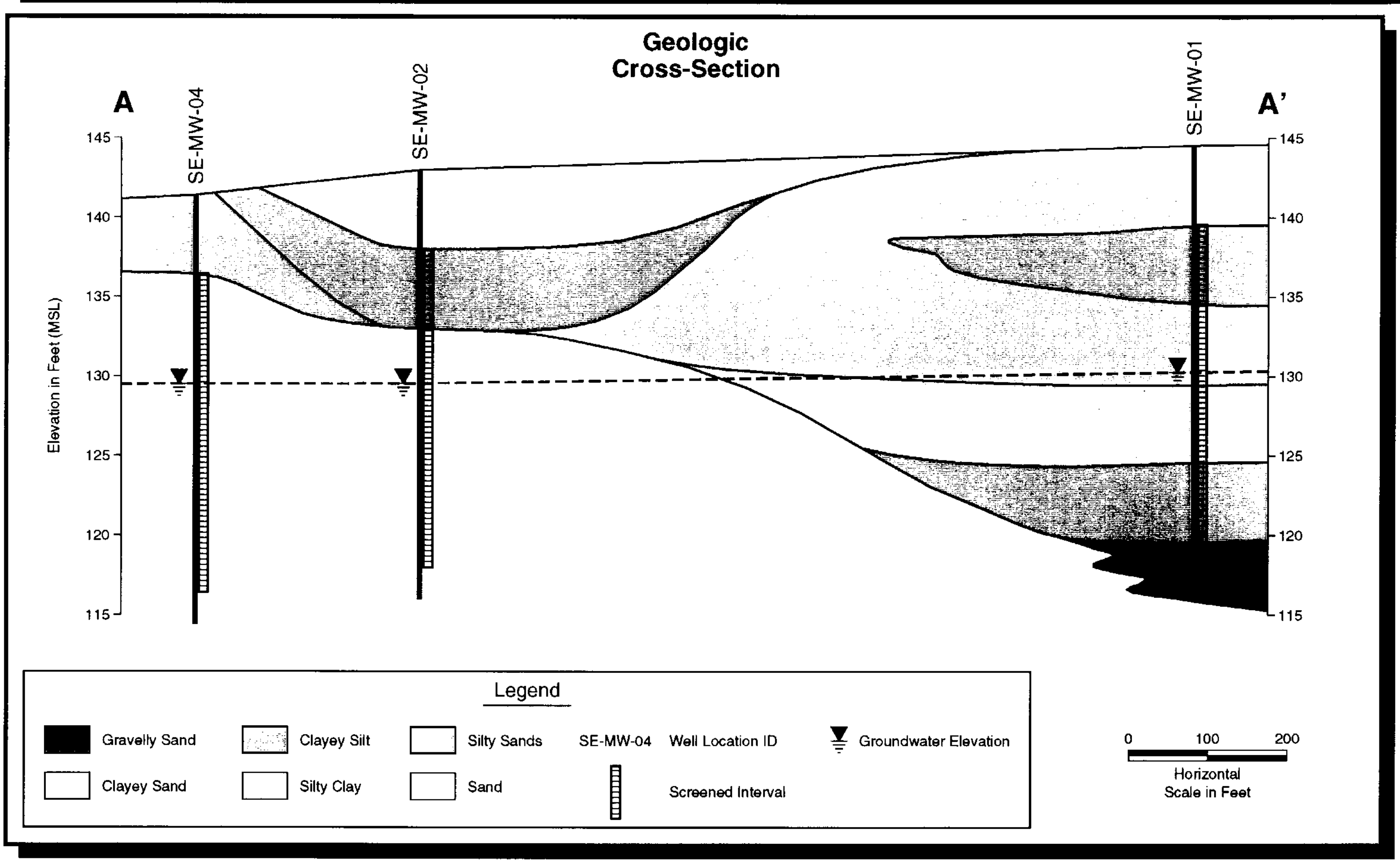
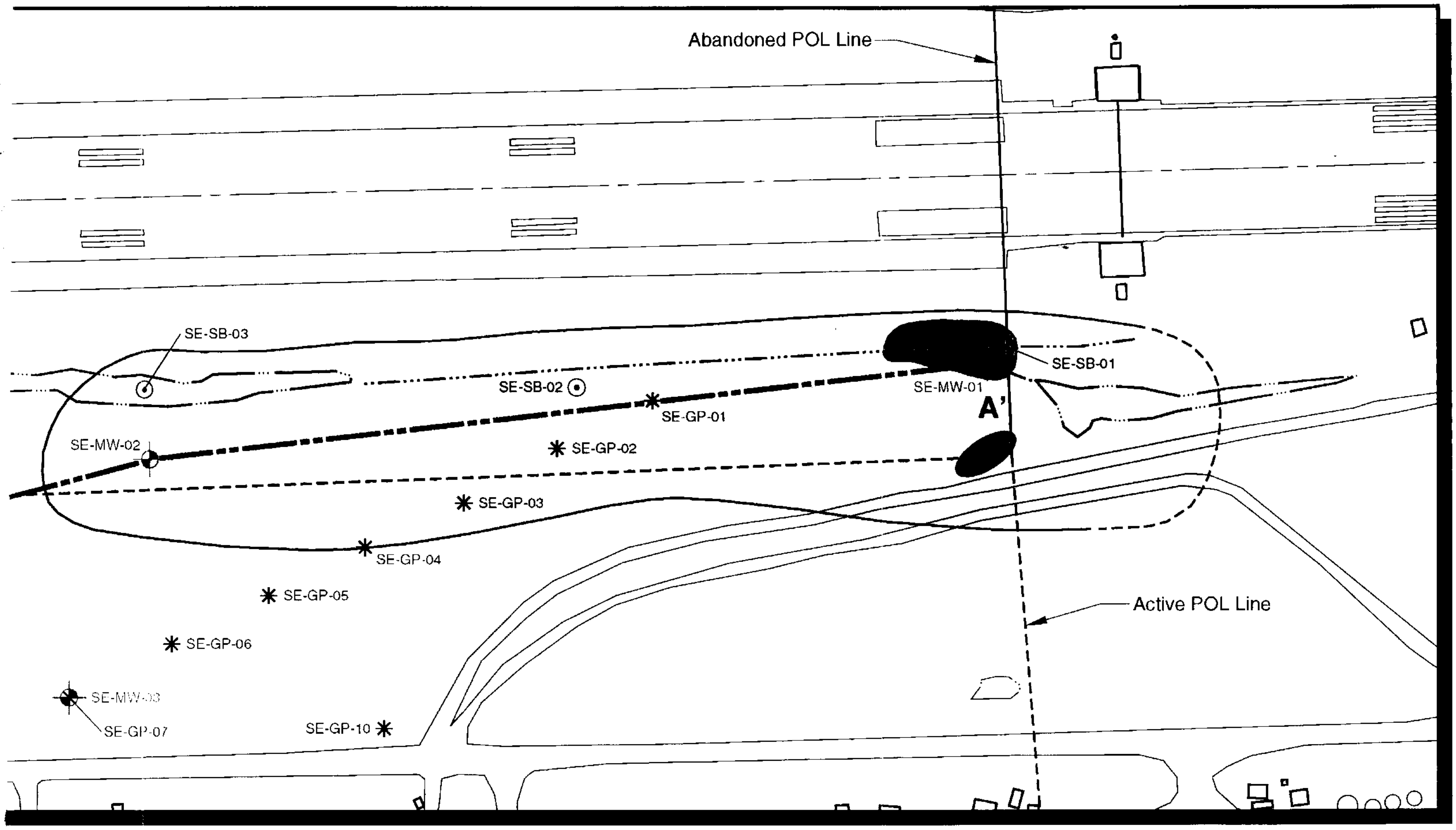
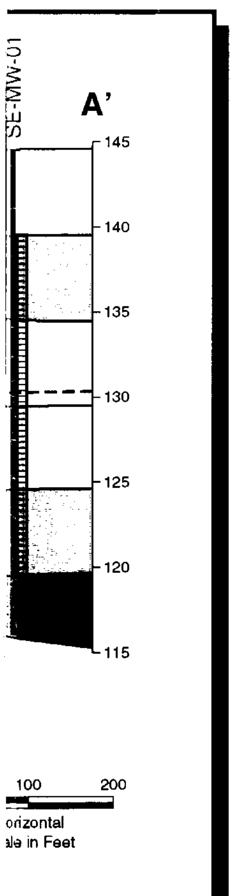


Legend
Soil Sample Location
Monitoring Well Location
DPT Water Sample Location
Cross-Section Line
Estimated Area of Elevated Soil Gas Readings (>200 ppmV CAT)
Estimated Area of Elevated Soil Gas Readings (>1000 ppmV CAT)
North
0 100 200
Scale in Feet
Surface Drainage Direction
SE-MW-02
SE-GP-08
A
SE-MW-04
SE-SS-01
Active POL Line
SE-GP-09
Groundwater Flow Direction
SE-MW-03
SE-GP-07



Geologic Cross-Section
A
A'
SE-MW-04
SE-MW-02
SE-MW-01
Elevation in Feet (MSL)
145
140
135
130
125
120
115
Legend
Gravelly Sand
Clayey Silt
Silty Sands
SE-MW-04 Well Location ID
Groundwater Elevation
Clayey Sand
Silty Clay
Sand
Screened Interval
0 100 200
Horizontal Scale in Feet





Compounds Exceeding Screening Criteria

Analyte	Soils		Waters	
	Screening Criteria (µ g/kg)	Range of Detections (µ g/kg)	Screening Criteria (µg/L)	Range of Detections (µg/L)
Benzene	500 AK	340	5M	58
Ethylbenzene	15,000 AK	6,800		
Toluene	15,000 AK	4,500		
Total Xylenes	15,000 AK	19 - 43,000		
Benzo(a)pyrene	88 RC	550		
Dibenzo(a,h)anthracene	88 RC	95		
DRO	200,000 AK	$2.6x10^4$ - $1.8x10^7$		
GRO	100,000 AK	$1.5x10^5$ - $5.4x10^5$		
Selenium			50 M	142
Thallium			2 M	204

Key:
AK - State of Alaska Cleanup Standard
RC - EPA Region III Risk-Based Concentration, Carcinogenic
M - Maximum Contaminant Level

Galena Airport - Southeast Runway Fuel Spill

Conceptual Diagram and Summary of Compounds Exceeding Screening Criteria

A1181-59 3/20/96

Figure 3.7-1. Conceptual Diagram for the Southeast Runway Fuel Spill (ST010)

to an accident that resulted in a POL tank truck releasing approximately 4,000 gal. of JP-4 fuel. During that study, petroleum hydrocarbons were detected in the soil. The contaminated soil was removed and no further action was recommended. The JP-4 spill from the tanker did not contribute to the contamination at the Southeast Runway Fuel Spill site.

3.7.3 RI Activities and Findings

An investigation was conducted at the Southeast Runway Fuel Spill area during the 1993 and 1995 field seasons. Field screening using soil gas, field IR analysis of soils, and laboratory analysis of DPT water samples was conducted to determine the extent of fuel contamination at the site. Laboratory confirmation analysis was performed for surface and subsurface soils and groundwater to determine the nature and concentration of site contaminants. Figure 3.7-1 shows the locations of all samples collected at the site. The Attachment to Section 3.7 summarizes the laboratory confirmation data.

During 1993, field screening was conducted southeast of the main runway to document the presence of hydrocarbons in the soil and to determine the extent of the fuel spill along the ditch. Twenty-four soil vapor samples were collected along the ditch at depths of 5 ft. The samples were analyzed with the PID and CAT. No appreciable hydrocarbon detections were found in sample locations 1 through 13 with either instrument. An abrupt increase in organic vapor concentration was observed in sample locations 14 through 23. Concentrations ranged from 104 to 764 ppmV as measured with the PID analyzer and from 86 to 1250 ppmV as measured with the CAT analyzer. The results from the instruments correlate very well: the sharp increase in hydrocarbon concentration was noted with both instruments at the same location. Similarly, an abrupt decrease in hydrocarbon concentration was found with both instruments in sample location 24. The PID detections indicate the presence of alkenes and aromatics (BTEX), or other double-bond compounds. The CAT detections indicate the presence of combustible hydrocarbons. The similar responses by the two instruments indicate the presence of relatively fresh fuels. Double-bond compounds break down most rapidly, and therefore, are significantly lower in concentration than other hydrocarbons in an older, weathered spill.

On the basis of the results of the soil gas survey, 16 shallow soil samples were collected from locations 10 through 24 and analyzed in the field IR laboratory to determine the presence of hydrocarbons in the soil. The TPH and AH results for these samples are shown in Table 3.7-1. Samples from locations 14 through 22 exhibited TPH concentrations of at least one order of magnitude higher than flanking locations, confirming the east-west extent of contamination found with the soil gas screen. Sample location 15 exhibited the highest TPH concentration (16,500 mg/kg).

Table 3.7-1
Southeast Runway Soil Field Screening Results

Sampling Location	Field IR Analysis (mg/kg)	
	AH	TPH
10	ND	31
11	ND	9
12	ND	13
13	2	42
14	ND	874
15	66	16,567
16	144	3,788
17	ND	33
18	ND	312
19	21	692
20	27	829
21	6	495
22	ND	113
23	ND	10
24	ND	5

ND = Not detected.

During 1995, additional investigation activities were conducted at the Southeast Runway Fuel Spill site to confirm the extent of soil contamination and determine the nature of the contaminants and the extent of potential groundwater contamination. Additional soil gas data were gathered south of the ditch line to help direct sampling activities. On the basis of the soil gas data, DPT water samples were collected and analyzed for DRO. These data were then used to determine the optimum locations of monitoring wells and soil samples. The results of the groundwater screening data are shown in Table 3.7-2.

Table 3.7-2
Southeast Runway
Groundwater Field Screening Results

Location ID	Diesel Range Organics (µg/L)
SE-GP-01	9,200 (100)
SE-GP-02	940 (100)
SE-GP-03	200 (100)
SE-GP-04	30J (100)
SE-GP-05	ND (100)
SE-GP-06	80J (100)
SE-GP-07	130 (100)
SE-GP-08	130 (100)
SE-GP-09	80J (100)
SE-GP-10	60J (100)

( ) = Sample quantitation limit (SQL).

Three soil borings were sampled at two intervals each along the ditch line. The sample from the easternmost location (SE-SB-01) at a depth of 6 to 7.5 ft bgl was found to contain DRO, GRO, and BTEX compounds in excess of the State of Alaska cleanup levels. This sample is believed to be located very near to the source of the fuel contamination. Soils at this location were unusually fine grained (primarily silts and clays) compared to the sands and silts predominant in the subsurface in Galena. This location also exhibited characteristics indicating reducing conditions (i.e. dark gray soil color), which are not very common in the subsurface at Galena Airport. One other deep interval soil sample, collected at a depth of 5 to 6.5 ft at location SE-SB-03, contained concentrations of DRO and GRO in excess of State of Alaska cleanup levels, and small quantities of xylene. This location corresponds with the westernmost boundary of the soil contamination as determined by the soil gas data. Soils at this location were coarser grained and were the olive brown color more typical of subsurface soils in Galena, indicating more oxidizing conditions. The coarser grained soils at this location may have allowed for the eventual infiltration of fuel that flowed along the surface of the ditch.

The shallow interval samples (0 to 0.5 ft) collected along the ditch line all contained lower concentrations of DRO. Only one shallow interval sample, collected from location SE-SB-01, exceeded the State of Alaska cleanup level for DRO of 200 mg/kg. None of the other surface interval soil samples contained any other fuel constituents (GRO or BTEX) at concentrations exceeding the SQL. Surface soil sample 5E-SB-001 also contained benzo(a)pyrene and dibenz(a,h)anthracene in excess of the residential RBC of 88 µg/kg.

Soil samples were also collected at three of the four monitoring well locations at the Southeast Runway Fuel Spill area. Samples were collected at a depth of 10 to 12 ft bgl from the well bore of SE-MW-02, -03, and -04. In addition, a surface soil sample (SE-SS-01) was collected from the same location as SE-MW-04. With the exception of 150-mg/kg DRO in SE-SS-01, none of these soil samples were found to contain significant quantities of site contaminants.

Groundwater samples were collected from all four monitoring wells installed at the site. Benzene was measured at 58.1 µg/L in the groundwater sample from monitoring well SE-MW-01, exceeding the MCL of 5 μg/L. DRO and GRO were also detected in this sample at elevated concentrations: 9,300 and 790 μg/L, respectively. DRO were the only fuel constituents detected above the SQL in groundwater samples from the other wells. Samples from SE-MW-02 and -03 contained 770 and 710 μg/L of DRO, respectively; the sample from SE-MW-04 contained 330 μg/L. The sample from SE-MW-04, the monitoring well farthest downgradient of the source, also contained concentrations of chloromethane and 1,2-dichloromethane approaching the screening criteria of 1.4 and 5 μg/L, respectively.

Several metals exceeded the screening criteria in groundwater samples from the Southeast Runway Fuel Spill area. Arsenic, cadmium, selenium, and thallium were all detected at concentrations exceeding the MCLs and/or UTLs. However, most of these detections were below the SQL and, in the case of cadmium, were seen in laboratory and field blanks at similar concentrations. Only selenium, in the sample from SE-MW-01, and thallium, in the sample from SE-MW-04, exceeded the MCL and UTL as well as the SQL.

The concentration of dissolved iron in samples from SE-MW-01 are two to three orders of magnitude higher than those measured in samples from the other three wells (see Appendix A). Because iron is far more soluble as the reduced ferrous (Fe^{2+}) ion than the oxidized ferric (Fe^{3+}) ion, these data suggest the presence of reducing conditions in the vicinity of SE-MW-01. This supports the observation of reducing conditions made during soil sampling at nearby SE-SB-01.

3.7.4 Conclusions

On the basis of the field screening and laboratory confirmation results, it appears that the reported fuel line rupture occurred near the eastern end of the ditch. Soil contamination due to the fuel leak is limited to the ditch line, and groundwater contamination extends downgradient (south and west) of the ditch. Contaminants of concern include DRO, GRO, and BTEX in the immediate vicinity of the leak; however, only DRO are detected any distance from the source. This is consistent with site evidence that indicates reducing conditions near the leak. The high contaminant loading and low permeability in the immediate vicinity of the leak appears to have depleted the available oxygen, limiting the microbial action necessary to break down the BTEX components. Lower concentrations of DRO in the surface soils along the ditch may reflect residual diesel from the spill, or the presence of hydrocarbons in runoff from the runway. Although the ground was reportedly frozen at the time of the pipeline rupture, subsurface soil contamination at the western edge of the plume may indicate the infiltration of fuels flowing along the ditch upon encountering coarser grained soils.

The presence of other site contaminants, such as chlorinated solvents in groundwater and PNAs in soils, are likely to be the result of other sources at the site, such as the drums, the tar pit, or the burned-down building.

The detections of selenium and thallium in groundwater may be a function of the high detection limit of the analytical method (SW846 Method 6010 for ICP), which exceeds the MCL of these analytes. There is no known source at the Southeast Runway Fuel Spill site for either of these elements.

3.7.5 Recommendations

The baseline risk assessment conducted for the Southeast Runway Fuel Spill indicated that the only potential risk to human health would come from beryllium in the groundwater, for which there is no known source at the site and which may be attributable to background (USAF, 1996). Therefore, the human health assessment findings do not warrant remedial action at the site. However, field screening and laboratory data indicate that, although the leak is more than 10 years old, the contamination is not attenuating in the area of the source, likely because of reducing conditions. Therefore, it is recommended that a limited bioventing effort be conducted in the immediate vicinity of the pipeline leak at the Southeast Runway Fuel Spill. In addition, a record search and interview of involved personnel should be conducted to confirm that the pipeline that runs under the runway was cleaned and abandoned according to plan and does not represent a continuing source of contamination at the site. If this pipeline was not properly abandoned, it should be cleaned and properly abandoned.

Other potential sources of contamination at the site, such as the drums and the tar pit, should be evaluated with regard to age and extent in order to assess whether they constitute a continuing source of contamination at the Southeast Runway Fuel Spill area. The ecological risk assessment has indicated that there may be some risk to avian life because of PNAs in the surface soils at the site. These compounds may be associated with the tar pit.

ATTACHMENT TO SECTION 3.7

SOUTHEAST RUNWAY FUEL SPILL
DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Y	Sample analyzed at lowest possible dilution due to extract viscosity and matrix effects.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Southeast Runway 1995 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth (feet)									
			SE-SB-01 (0-0.5)	SE-SB-01 (6-7.5)	SE-SB-02 (0-0.5)	SE-SB-02 (6-7.5)	SE-SB-03 (0-0.5)	SE-SB-03 (5-6.5)	SE-MW-02 (10-12)	SE-MW-03 (10-12)	SE-MW-04 (10-12)	SE-SS-01 (0-0.5)
Gasoline Range Organics	AK101 (mg/kg)	100 AK	0.022 J (1)	540 (50)	0.055 J (1)	0.13 J (1)	0.028 J (1)	150 (1)	0.48 J (1)	0.15 J (1)	0.12 J (1)	0.12 J (1)
Diesel Range Organics	AK102 (mg/kg)	200 AK	250 (4)	18,000 (4)	120 (4)	26 (4)	110 (4)	7,100 (4)	0.0 J (5)	0.0 J (4)	0.25 J (4)	150 (6)
Benzene	SW8260 (µg/kg)	500 AK	ND (0.910)	336 (4.93)	ND (0.993)	ND (0.890)	ND (1.01)	ND (2.04)	ND (1.07)	ND (0.861)	ND (0.894)	ND (1.13)
Ethyl benzene		15,000 AK-BTEX	ND (0.686)	6,810 (82.1)	ND X (0.749)	ND (0.671)	ND X (0.764)	ND (1.54)	ND (0.808)	ND (0.649)	ND (0.675)	ND (0.855)
Toluene		15,000 AK-BTEX	ND (0.783)	4,540 (62.8)	ND (0.855)	ND (0.766)	ND (0.872)	ND (1.76)	ND (0.922)	ND (0.741)	ND (0.770)	ND (0.976)
Total xylenes		15,000 AK-BTEX	ND (1.62)	43,000 (138)	ND X (1.77)	ND (1.59)	ND X (1.81)	18.92 (3.65)	ND (1.91)	ND (1.54)	ND (1.60)	ND (2.02)
Benzo(a)pyrene	SW8270 (µg/kg)	88 RC	554 (21.8)	ND Y (14,300)	ND Y (240)	ND (21.7)	ND (24.6)	ND (71.5)	ND (21.7)	ND (17.5)	ND (18.2)	ND (23.2)
Benzo(b)fluoranthene		880 RC	447 (19.6)	ND Y (12,900)	ND Y (215)	ND (19.5)	ND (22.1)	ND (64.1)	ND (47.6)	ND (38.3)	ND (39.9)	ND (50.8)
Dibenz(a,h)anthracene		88 RC	94.7 (27.9)	ND Y (18,400)	ND Y (307)	ND (27.8)	ND (31.6)	ND (91.6)	ND (32.0)	ND (25.8)	ND (26.8)	ND (34.2)

Southeast Runway 1995 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID			
			SE-MW-01	SE-MW-02	SE-MW-03	SE-MW-04
Gasoline Range Organics	AK101 (µg/L)	NA	790 (50)	21 J (50)	15 J (50)	12 J (50)
Diesel Range Organics	AK102 (µg/L)	NA	9,300 (100)	770 (100)	710 (100)	330 (100)
Benzene	SW8260 (µg/L)	5 M	58.1 (0.366)	ND (0.122)	ND (0.122)	0.0505 J (0.122)
Chloromethane		1.4 RC	ND (0.268)	ND (0.0893)	ND (0.0893)	1.19 (0.0893)
1,2-Dichloroethane		5 M	1.07 (0.144)	ND (0.0481)	ND (0.0481)	4.55 (0.0481)
Tetrachloroethene		5 M	1.74 B (1.26)	0.0346 BJ (0.420)	ND (0.420)	0.0289 BJ (0.420)
Arsenic	SW6010 (mg/L)	0.05 M	0.0320 J (0.0468)	<0.0468	<0.0468	<0.0468
Cadmium		0.005 M	0.00851 B (0.00386)	<0.00386	0.00323 BJ (0.00386)	0.00424 B (0.00386)
Selenium		0.05 M	0.142 (0.0891)	0.0585 J (0.0891)	0.0510 J (0.0891)	<0.0891
Thallium		0.002 M	<0.0833	0.0128 J (0.0833)	0.0340 J (0.0833)	0.204 (0.0833)

3.8 Landfills at Galena Airport

Two landfills, the Alternate Landfill and the Southwest Dump (Figure 1.1-1), were investigated as part of the RI conducted at the Galena Airport. The Alternate Landfill is located on the north side of the Perimeter Dike about one-quarter mile west of the road leading to the radar tower and the FPTA. The Southwest Dump was originally anticipated to be a 250-ft^2 area adjacent to the Yukon River and southwest of the runway. The area was expanded to include all of the open field west of the perimeter road at the west end of the runway. Both of the landfills were investigated during 1993 by using field screening and geophysical methods to determine whether past waste disposal practices have caused contamination.

3.8.1 Alternate Landfill (LF011)

The Alternate Landfill is a relatively flat, cleared area approximately 300 by 150 ft. There is little vegetation over the exposed area. Much of the eastern and northern areas of the site contained remnants of drums, metal machinery pads, and exposed scrap metal debris. Drums were visible on the ground at the north end of the cleared area. The northeast corner of the site has a natural depression 3 to 4 ft below the rest of the grade. The first 100 ft off of the perimeter dike road is built up with gravel to the level of the dike.

Background

Information on past waste disposal practices at the Alternate Landfill is limited. No written description of waste disposal at the site was found, but the site appeared on a base drawing (Drawing Number 65E074, dated 4 October 1965) as the Sludge Disposal Area. The site is evident in aerial photographs dated 27 June 1965, 28 September 1971, 30 June 1974, and 28 May 1978. Several areas of disposed 55-gal. drums were evident in the 1965 photograph. Also evident in these photographs are several blazed paths that lead away from the clearing. During the geophysical survey, drums and debris were observed along the side of the pathways. No full-scale trenching and filling were evident. Two transformers were discovered to the west of the site during the soil gas/soil sample survey. No oils were noticed leaking from the transformers.

The raised part of the site located near the dike road is currently used for disposal of some food wastes by the local population. Black bears are regularly seen digging through the waste. The site has reportedly been used for waste disposal during times when the other dumping sites at the west end of the runway were covered with floodwater.

RI Activities and Findings

Two field screening investigations were performed at the Alternate Landfill during the summer of 1993. Initially, geophysical surveys consisting of an electromagnetic (EM) survey and a GPR survey were performed. A detailed discussion of the geophysical investigation is given in the *Remedial Investigation Geophysical Survey Report*, included in Appendix G. The results of these surveys were used to pick sampling locations for a subsequent soil gas/soil sample screening survey. Fourteen screening points were set up on a regular grid. Soil gas data were collected at 13 of these points and soil samples were collected from 10 points at depths of 5 ft bgl. Soil samples were also collected at 10 ft bgl at two of the locations. Soil gas readings were taken with both a PID and FID analyzer, and soil samples were analyzed for AH and TPH. In addition, two soil samples were taken near the two transformers that were found in the woods west of the cleared area. The locations of the EM grid, GPR survey lines, soil gas/soil sample screening points, and the two transformers are shown in Figure 3.8-1.

The EM and GPR surveys identified several areas that potentially have buried metallic objects. Figure 3.8-1 also shows contour maps of the ground conductivity data collected at the Alternate Landfill. Two main areas of EM anomalies were defined by the surveys, one in the north-

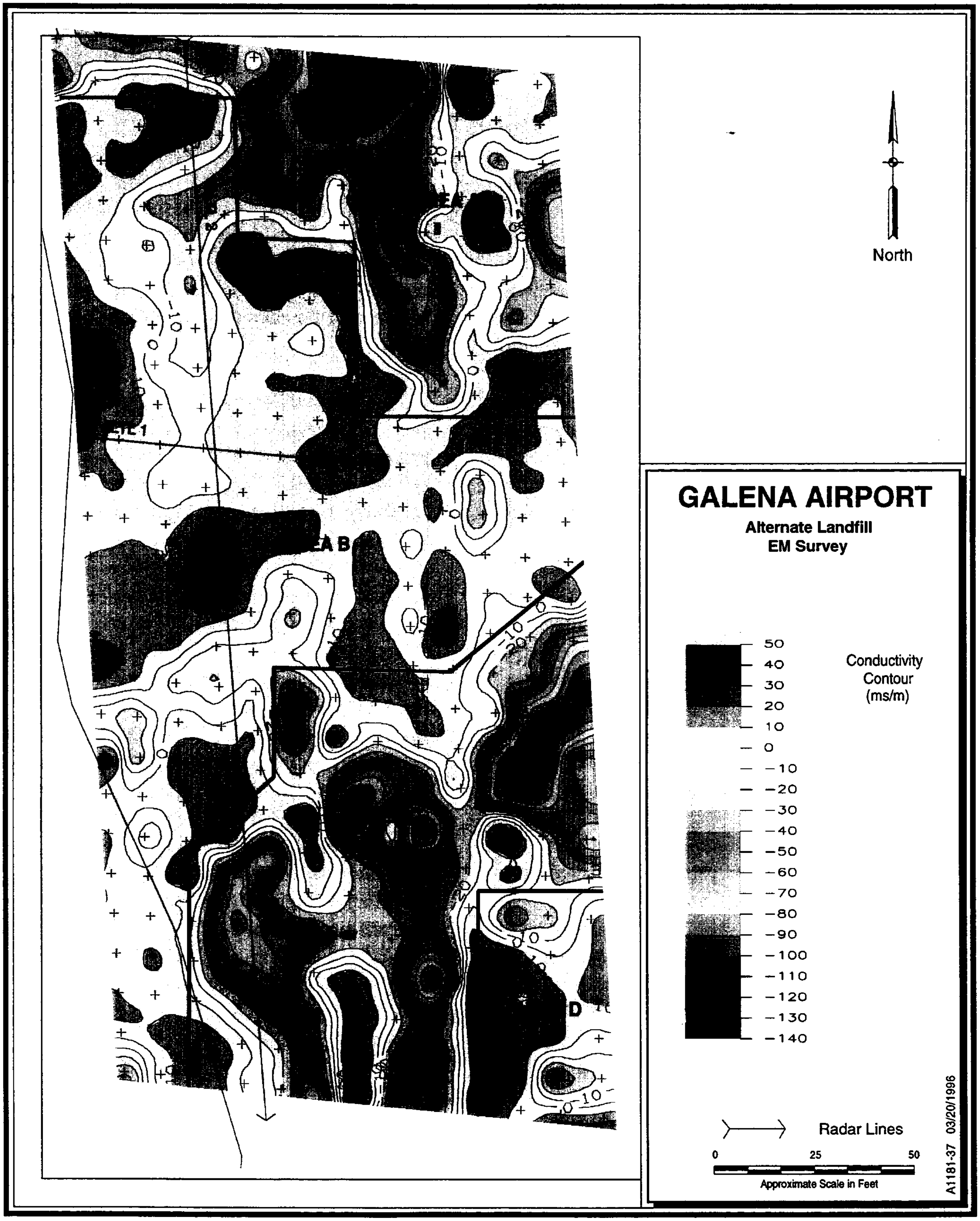


Figure 3.8-1. EM and GPR Contours at the Alternate Landfill

east corner of the grid (Area A) and the other across the southeast corner of the grid (Area B). The in-phase contour plot (Figure 3-19, *RI Geophysical Survey Report*, Appendix G), which is more susceptible to metallic objects, confirms that the areas represent buried metallic objects and are not changes in ground conductivity as a result of disturbed soil. In addition, several isolated anomalies appear more enhanced on the in-phase plot. These are labeled I1 through I5 in Figure 3-19 of the *RI Geophysical Survey Report* (Appendix G), and probably represent isolated bodies of buried metallic waste or metal-bearing objects. Analysis of the GPR lines collected at the site indicates that the base of the Alternate Landfill is approximately 8 to 12 ft bgl.

Soil gas/soil sample field screening was performed at the Alternate Landfill after the data from the geophysical survey were reviewed. Figure 3.8-2 shows the results of the PID and FID screening and soil screening results are shown in Table 3.8-1. The highest readings were generally in the south and west side of the site. The PID/FID readings generally indicate that the highest soil gas concentrations are located near the middle of the site, but the data are too sparse to contour. TPH were detected at all locations sampled, ranging from 2 to 24 mg/kg, with the exception of a peak of 506 mg/kg at location A-2. AH were detected only at three locations.

The two soil samples taken adjacent to the transformers were analyzed in the field for polychlorinated biphenyls (PCBs) using an immunoassay test kit. The results indicated that no PCBs were present in the soil. One of the samples was sent to a certified laboratory for further analysis. Although the sample was not received within hold time or at the proper temperature, the decision was made to analyze the sample because of the persistent nature of PCBs. No PCBs were detected in the sample.

Table 3.8-1
Alternate Landfill
Soil Field Screening Results

Point	Depth (ft)	AH (mg/kg)	TPH (mg/kg)
A2	5	14	506
A3	5	ND	8
A3	10	ND	6
A4	5	ND	16
A5	5	ND	24
B2	5	ND	11
B3	5	ND	18
B4	5	ND	ND
C1	5	2	2
C2	5	2	ND
C4	5	ND	ND

The lack of records of disposal at the Alternate Landfill makes it difficult to determine what wastes may be present, although the aerial photograph and field observations confirm the presence of metal wastes and transformers. The field screening surveys at the Alternate Landfill indicate buried metallic debris and potential hydrocarbon waste. Higher soil gas/soil sample hits were generally found in the unvegetated area, and may indicate sludge disposal from base operations. The lower soil gas/soil sample screening results correspond to the areas of buried (and surficial) metallic waste.

Conclusions

The aerial photographs indicate that the Alternate Landfill has been in use as a disposal site since at least the mid-1960s. This site is still used to dispose of food wastes and as an alternate dumping location when the main landfill is flooded. The investigation indicates that metallic waste and, potentially, petroleum sludge wastes have been disposed of at this location. The reference to the Sludge Disposal Area on the 1965

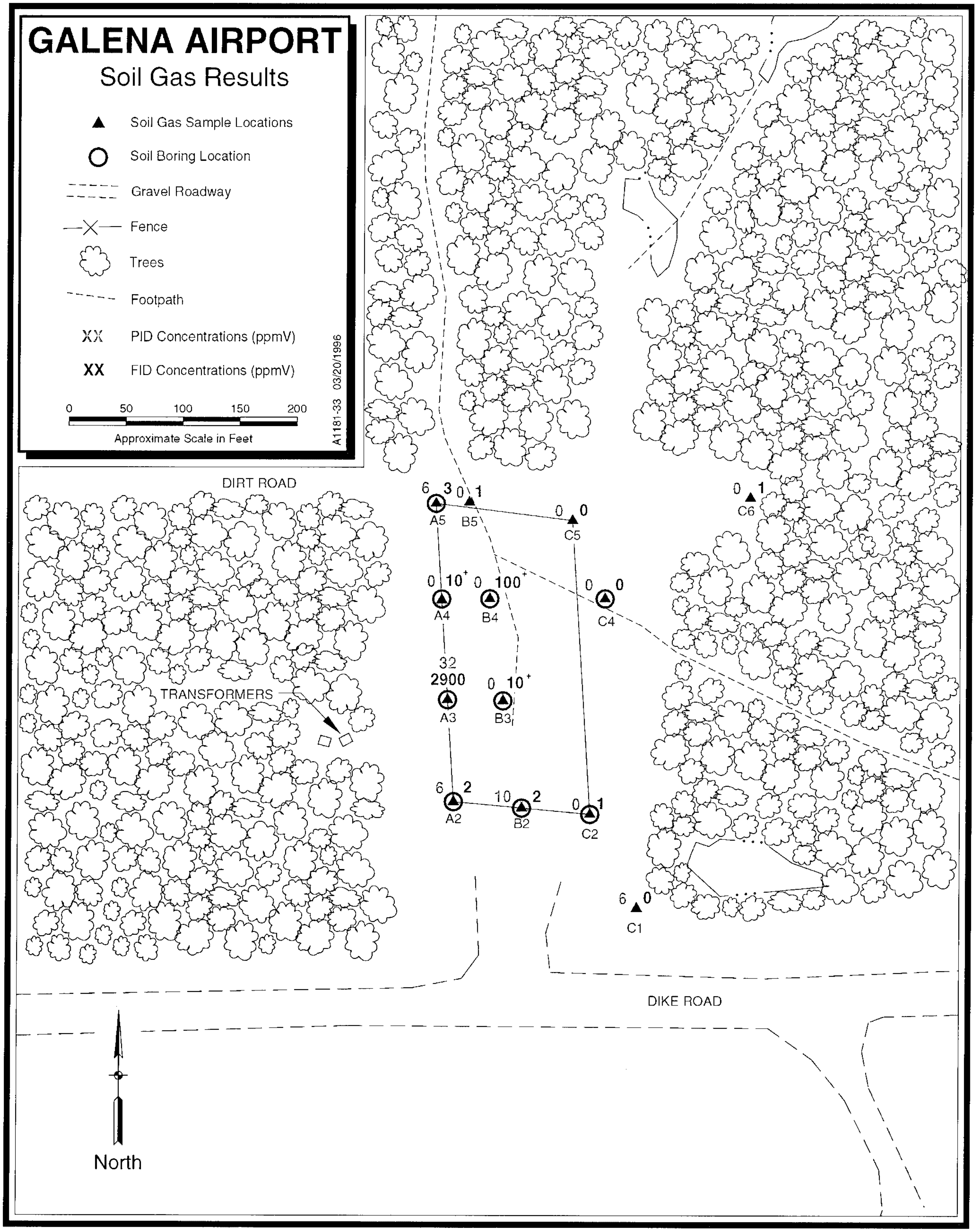


Figure 3.8-2. Field Screening Results for the Alternate Landfill

drawing suggests that this area may have been used to dispose of the sludge from storage tank cleaning. All of this information is consistent with recorded field observations and the results of field screening.

Recommendations

Because the Alternate Landfill is still being used for refuse disposal, it is considered to be an active solid waste management unit (SWMU). Therefore, even though contamination may be present at this site, it should be investigated and potentially closed under a USAF compliance program.

3.8.2 Southwest Dump (LF012)

The Southwest Dump is located in the open field immediately west of the roadway at the west end of the perimeter dike. The entire exposed area is about 8 acres in size and is bordered by roads on the north and east, the Yukon River on the south, and woods and a small lake on the west. The site is generally flat except for the northwest part of the site. This area shows signs of excavation.

The southern half of the Southwest Dump is covered by thick grass and willows. A small area of vegetation (about 50 by 100 ft) was cleared from the site prior to beginning the geophysical survey. The northern half of the site is generally clear of vegetation other than sparse grass. The only noticeable cultural features at the site were a large pile of brush in the middle of the northern half of the site, along with an old concrete bunker and numerous concrete culvert pipes along the northern edge of the survey site.

Background

Information on the past uses of the Southwest Dump was obtained from aerial photographs from 1964 and 1966, the Phase I Records Search (USAF, 1985), and discussions with local individuals. The Phase I Records Search report indicates that solid waste had been disposed of at the Southwest Dump since the early 1940s. The site was jointly operated by the community of Galena and the USAF, but was not located on USAF property. This site is currently considered a cell of the main landfill (LF008).

Landfilling took place in shallow trenches and wastes included garbage, refuse, incinerator ash, wood, metal, construction debris, ethylene glycol, paint residues, oil filters, solvent-laden rags, batteries, and empty drums. Flood waters from the Yukon river periodically moved the materials around the site.

Aerial photographs from 1964 and 1966 indicate the presence of burial pits and areas of staged drums at the Southwest Dump. This area was outlined in the Phase I Records Search. The aerial photographs also indicate that most, if not all, of the waste was disposed of in the northern half of the site. This was confirmed by the geophysical surveys performed in the summer of 1993 (see Appendix G).

Interviews with community members revealed that an asphalt plant had also operated on the site. The exact location of the plant was not verified by any site plans or aerial photographs.

RI Activities and Findings

Two field screening investigations were performed at the Southwest Dump during the summer of 1993. Initially, EM and GPR surveys were performed. A detailed discussion of the geophysical investigation is given in Appendix G (USAF, 1993). The results of these surveys were used to pick sampling locations for a subsequent soil gas/soil sample screening survey.

During the field investigations at the Southwest Dump, the presence of many surface materials was noted. Materials encountered at the Southwest Dump included metallic objects such as drum lids, drum lid rings, machinery pads, and several small patches (about 1 ft^2) of tar.

The EM survey identified six distinct anomalies. Two of these areas were combined into one large area, and one area was not investigated in the subsequent soil gas/soil sample survey. The resultant four areas are shown on Figure 3.8-3, which is a conductivity contour map of the Southwest Dump.

The results of the soil gas/soil sample screening survey are presented in Figure 3.8-4 and in Table 3.8-2. Soil gas readings were taken with both a PID and a FID analyzer, and soil samples were analyzed for AH and TPH with a field IR analyzer. The locations of the EM grid and soil gas/soil sample screening points are shown in Figure 3.8-4.

Table 3.8-2
Southwest Dump Soil Field Screening Results

Point	Depth (ft)	AH (mg/kg)	TPH (mg/kg)
A-2	5	ND	ND
A-3	5	5	80
A-3 A	5	ND	50
A-3 B	5	ND	1
A-4 A	3	ND	100
A-4 B	5	ND	98
B-3	5	6	1045
C-3	1.75	ND	112
C-4	5	ND	14
C-9	5	ND	406
C-10	2.5	7	350
C-10 A	2.5	688	4128
D-2	5	ND	9
D-3	5	2	13
D-4	5	2	22

The results of the AH/TPH screening by field IR analysis indicate that the areas identified as anomalies by the geophysical survey probably contain soil contaminated from hydrocarbon residue. In general, PID, FID, AH, and TPH readings all show peaks at the same locations, although the data are too varied to be meaningfully contoured. GPR lines through Areas C and D indicate that a significant portion of the debris in these areas is metallic (see Appendix G). The other screening results indicate that petroleum hydrocarbons and other volatile organics are also present. GPR data from Areas A and B suggest that the trenches are mostly filled with nonmetallic wastes. Radar data from the trench in Area A indicate that part of the trench lies north of the main anomaly. The EM data at this anomaly may indicate contamination of the soil and/or groundwater, along with trench fill.

Conclusions

The soil gas/soil sample results and geophysical anomalies at the Southwest Dump are probably attributable to the wastes reportedly dumped in the landfill (USAF, 1985) from the early 1940s until dumping stopped. On the basis of the analysis of the screening data, the limits of the excavation and fill can be relatively well defined for future soil borings or monitoring well installation. Currently, the site is generally free of debris and evidence of widespread waste disposal is not present at the surface. Information on the location and duration of operation of the reported asphalt plant is needed to help identify the soil gas anomalies in these areas.

On the basis of the aerial photographs, the Phase I Records Search (USAF, 1985), interviews with community members, and the geophysical and soil gas/soil sample screening effort, different potential sources exist for the different anomalies at the Southwest Dump. Areas A and B are probably primarily trash, garbage, solvent-laden rags, and, potentially, tar from the former asphalt plant. This is based on the high TPH readings in Areas A and B, and the results of the radar data that indicate that most of the fill in these areas is not metallic.

The anomalies in Areas C and D are interpreted to be caused mostly by metallic objects.

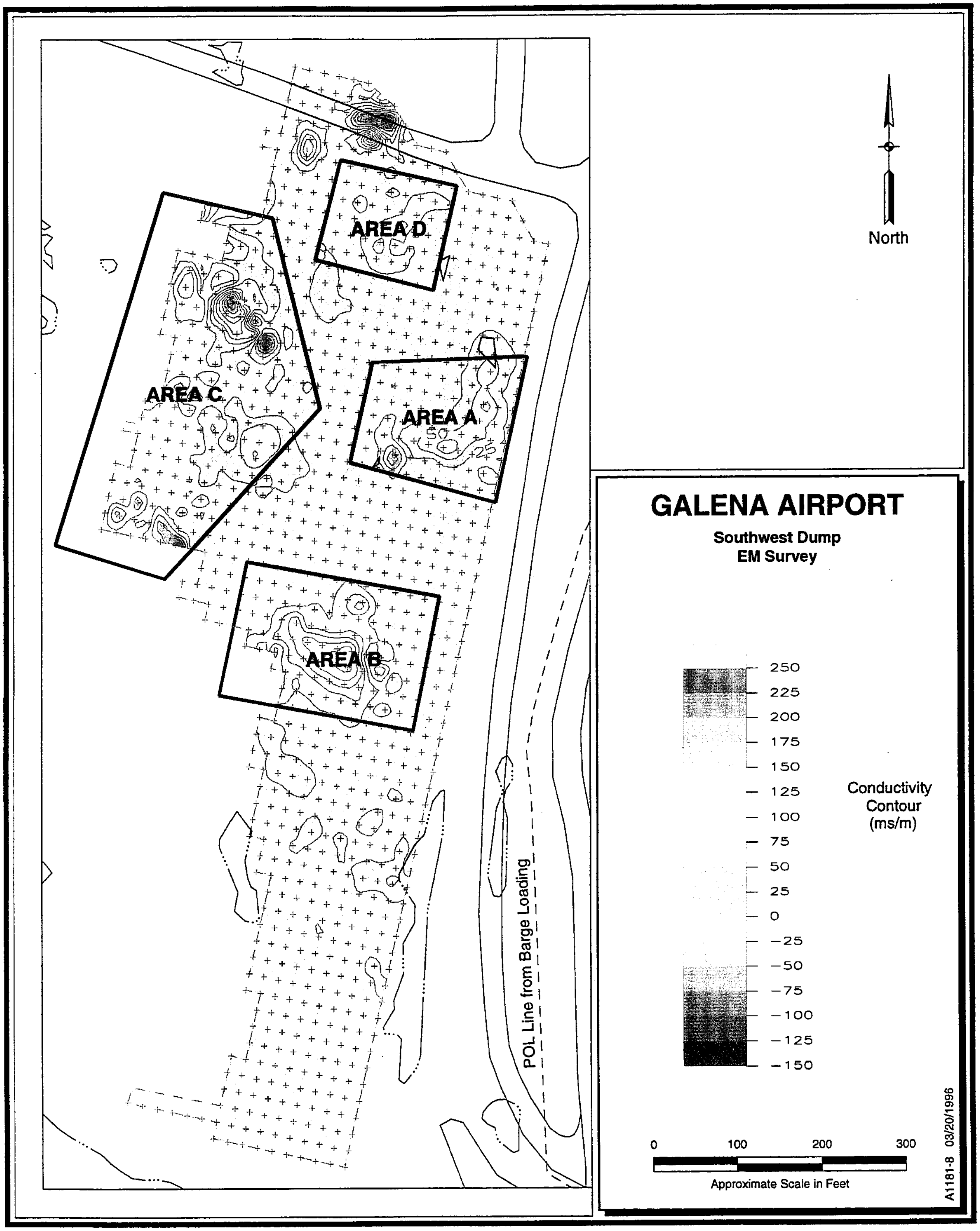


Figure 3.8-3. EM and GPR Contours at the Southwest Dump

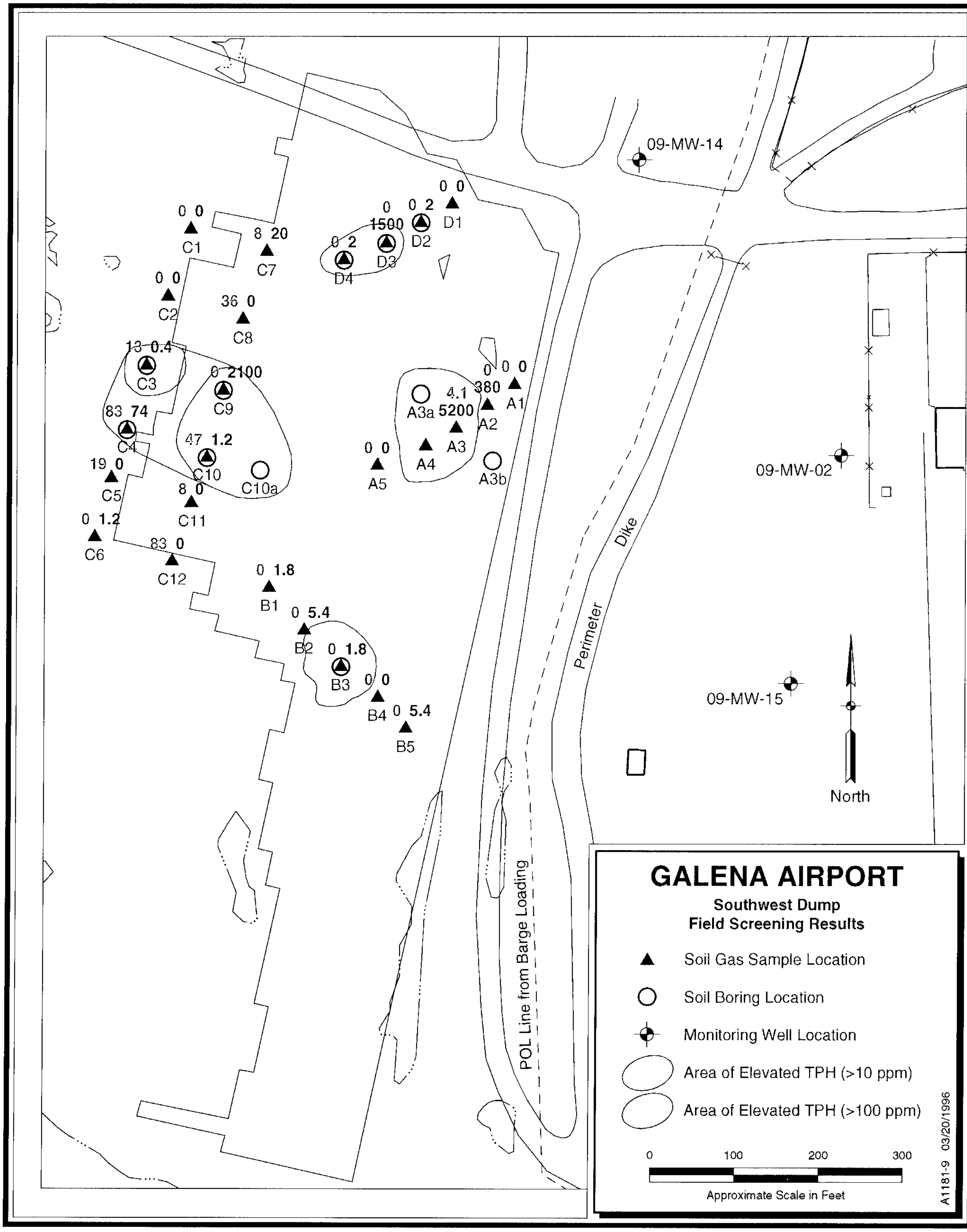


Figure 3.8-4. Field Screening Results for the Southwest Dump

The aerial photographs show a staging area for drums adjacent to these anomalies, and the in-phase data from the EM survey indicate that the anomalies are predominantly from metallic objects. The GPR lines over these areas show reflections that are also indicative of metallic objects. The TPH, AH, PID, and FID readings also indicate that hydrocarbon contamination has taken place in these areas. This contamination is probably the result of residual petroleum products draining from the drums after burial.

Recommendations

This site is associated with the main landfill (LF008) at the installation and is therefore considered to be an active SWMU. It is recommended that the Southwest Dump be turned over to USAF compliance personnel for investigation and possible closure activities.

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3.9 Pesticides at Galena Airport

Several pesticide compounds have been detected in soil and water samples from throughout the Galena Airport facility. In general, their occurrence does not appear to result from spills or leaks in areas of bulk storage or waste accumulation but from widespread application for insect control. Therefore, the following sections discuss pesticides on an installation-wide basis rather than at individual sites.

3.9.1 Background

The use of pesticides at the Galena Airport facility is not well documented. Although pesticides are still being used for mosquito control, detailed records of the types and quantities of pesticides applied in the past have not been located. The IRP Phase I Records Search conducted in 1985 stated:

> Pesticides have not been used in significant quantities. . .usage has been limited to occasional spraying of malathion to control mosquitos and/or spraying to control insects inside of buildings. There has been no usage of pesticides at (Galena Airport) that would indicate a potential for contamination because of pesticide handling.

Use of pesticides by the State of Alaska, BLM personnel, or the community of Galena cannot be ruled out.

Soil samples collected near the JP-4 Fillstand source area by the U.S. Army Corps of Engineers (USACE) in 1991 contained measurable quantities of 4,4'-DDD, -DDE, and -DDT, dieldrin, endosulfan I, and heptachlor. With the exception of one detection of 4,4'-DDD, at 5 ft bgl, all of the pesticides were detected in surface samples. Because of the presence of breakdown products (e.g., 4,4'-DDD from 4,4'-DDT; dieldrin from aldrin), the pesticides detected were thought to be the result of old releases (USACE, 1991).

3.9.2 Investigation Results and Discussion

The attachment to Section 3.9, located at the end of this section, provides tables that summarize the results of pesticide analyses in waters and soils within the Galena Airport facility. Only the results for those pesticides that have been detected above one-half their respective screening criteria in soil and water samples from the Galena Airport have been included in the tables. Results of pesticide analyses for samples collected at the Galena ambient location (background) are also given in these tables. All of the pesticides detected in soil and water samples collected at Galena Airport sites also have been detected in background soil and water samples. The source(s) of pesticides at the Galena Ambient Location is not known.

Groundwater

Groundwater sampling conducted from 1992 to 1994 indicates that low levels of pesticides are present in groundwater samples from all Galena Airport locations. Pesticides with multiple detections above screening criteria include aldrin, dieldrin, alpha- and beta-BHC, and 4,4'-DDD, -DDE, and -DDT. Many of these pesticides were detected at very low concentrations, often below the SQL or at concentrations similar to those found in laboratory method blanks. Although aldrin, dieldrin, and alpha- and beta-BHC occurred in groundwater samples from all sites, 4,4'-DDD, -DDD, and -DDT exceeded the screening criteria in only a very few cases. Groundwater samples collected in 1992 from 05-MW-10 in the POL Tank Farm contained 4',4'-DDE at 0.27 µg/L. Those collected in 1992 from 06-MW-01 contained 4',4'-DDT in excess of the screening criteria, and from 06-MW-02 contained 4',4'-DDD and -DDT in excess of screening criteria. Both of these wells are in the Building 1845 source area. A sample collected in 1994 from 09-MW-12, near the base of Million Gallon Hill, contained 0.552-µg/L 4',4'-DDD.

Pesticides also have been detected in airport and community water supply wells. The specific pesticides detected in samples from the privately owned supply wells in the old town of Galena were not consistent from sampling event to sampling event. The results of water supply analyses are discussed in more detail in Section 3.1.

Surface Water

Surface water samples were collected at the West Unit, POL Tank Farm, and the FPTA during 1992. All of these samples were collected in drainage ditches where standing water occurs following breakup of the Yukon River, and all contained pesticides in excess of the screening criteria. However, nearly all of the pesticide detections in surface water samples were less than the SQL, were detected at similar concentrations in a laboratory method blank, or were not adequately quantified based on second-column results. Aldrin, dieldrin, and alpha-BHC were the most common pesticides detected above screening criteria in surface water samples. In one surface water sample (06-SW-02) from the West Unit, heptachlor epoxide was also detected above the screening criteria.

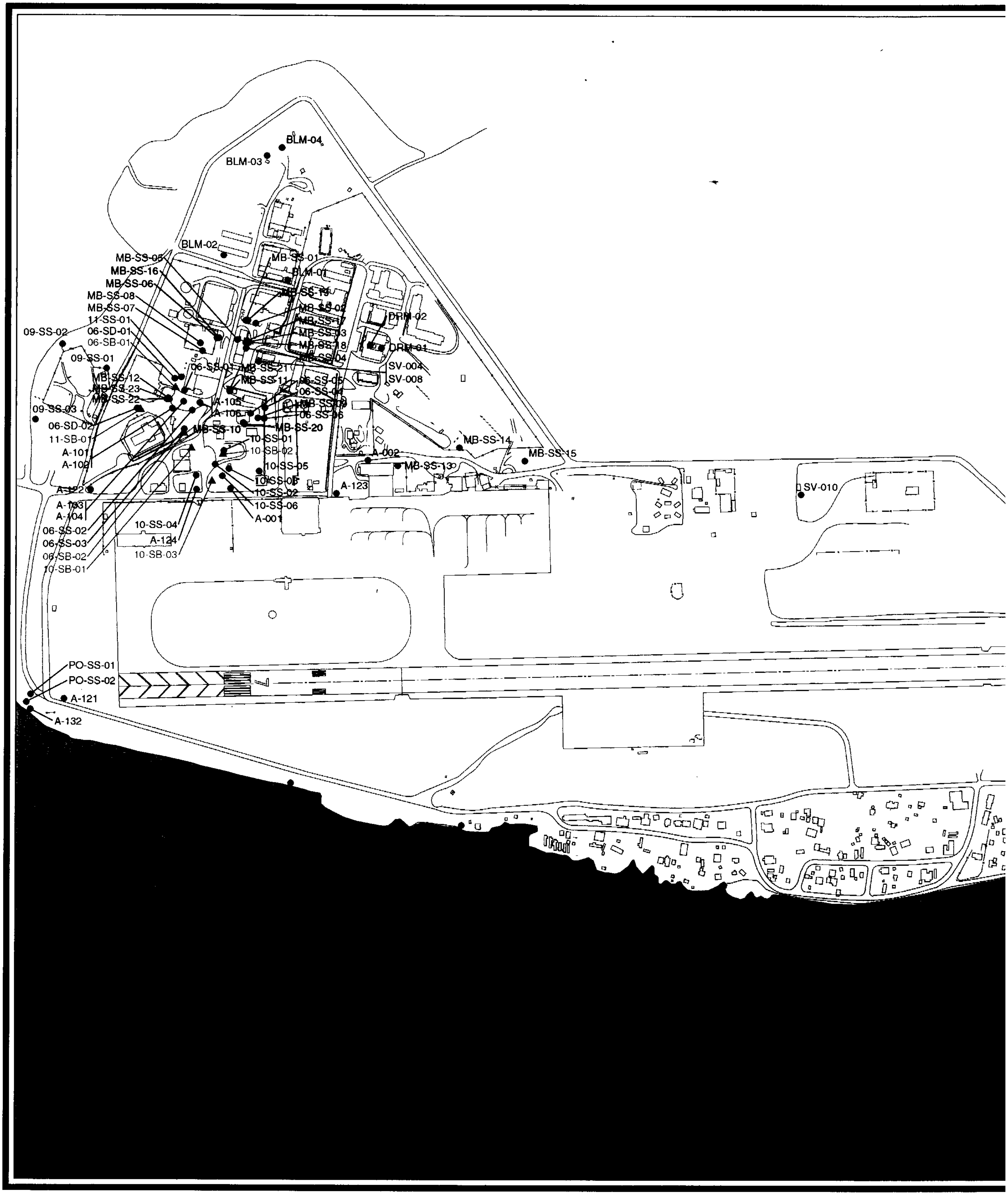
Surface Soils and Sediments

From 1992 to 1994, numerous surface soils and sediment samples have been collected within the Galena Airport boundaries for characterization of pesticides. Figure 3.9-1 shows the distribution of surface soil/sediment samples throughout the installation. Sampling locations where pesticides exceeded the screening criteria are also indicated on Figure 3.9-1.

Detections of "hot spots" of pesticides in surface soils and sediments within the Galena Airport are limited primarily to 4,4'-DDD, 4,4'-DDT, and dieldrin in the West Unit. Although the concentrations of these compounds in the surface soils are generally higher and more widely distributed than those in the subsurface, they are below the screening criteria in all but a few instances. Of the nearly 75 samples collected in these media as part of the RI, only 6 samples (2 of which are step-out samples) contained pesticides in excess of the Region III RBCs. Each site was evaluated using the most appropriate land use classification (residential or industrial)—see the data tables in the attachment to Section 3.9.

None of the surface soil or sediment samples collected during the 1992 field season exceeded the Region III RBCs. During 1993, some samples were collected in the northern portion of the main airport triangle, within the BLM housing area. One sample, collected near the apex of the triangle, was found to contain 21,400-µg/kg 4,4'-DDT (see Figure 3.9-1). A sample collected approximately 50 ft away did not contain any pesticides in excess of the screening criteria. Both of these samples were collected in an area that is apparently used as storage by the BLM. Old boats, rubber rafts, heavy equipment, and the wreckage of a small plane were located in this area at the time of sampling.

During 1994, an additional effort was made to characterize the main airport triangle surface soils for pesticide content. Current or former drum storage areas, as determined from aerial photographs, were targeted for field screening activities. Low points and obvious drainage ways around these storage areas were sampled and screened for total DDX compounds (4,4'-DDT, -DDD, and -DDE) using an immunoassay test kit. On the basis of the screening results, samples were submitted for laboratory analysis; step-out sampling was also conducted. The step-out samples were collected at the topographic high and low points of a 10-ft-radius circle centered on the original sample. These samples were also screened for DDX using the immunoassay test kit and, based on the results, submitted for laboratory confirmation. The results of the laboratory analysis showed that the step-out samples often contained lower concentrations than the original



BLM-04
BLM-03
BLM-02
BLM-01
MB-SS-05
MB-SS-16
MB-SS-06
MB-SS-08
MB-SS-07
11-SS-01
06-SD-01
06-SB-01
09-SS-02
09-SS-01
MB-SS-12
MB-SS-23
MB-SS-22
09-SS-03
06-SD-02
11-SB-01
A-101
A-102
A-122
A-103
A-104
06-SS-02
06-SS-03
06-SB-02
10-SB-01
10-SS-04
A-124
10-SB-03
MB-SS-01
MB-SS-19
MB-SS-02
MB-SS-17
MB-SS-03
MB-SS-18
MB-SS-04
06-SS-01
MB-SS-21
MB-SS-11
06-SS-05
06-SS-04
A-105
A-106
MB-SS-09
06-SS-06
MB-SS-20
MB-SS-10
10-SS-01
10-SB-02
10-SS-05
10-SS-03
10-SS-02
10-SS-06
A-001
A-123
A-002
MB-SS-13
MB-SS-14
MB-SS-15
DRM-02
DRM-01
SV-004
SV-008
SV-010
PO-SS-01
PO-SS-02
A-121
A-132

Figure 3.9-1. Locations of Surface Soil and Sediment Samples for Pesticide Analysis

sample. Samples from three sample/step-out locations, all located within the West Unit, contained pesticides in excess of the screening criteria. Figure 3.9-1 gives the concentrations and locations of the exceedences.

During the 1994 field season, two surface soil samples were collected at the stormwater pump station outfall, just outside the southwest corner of the dike road. These samples were analyzed for a full suite of analytes to determine any potential affects of drainage water from the installation on soils at the outfall. No pesticides (or any other compounds) were detected above the screening criteria in either of these samples.

Several surface soil and sediment samples collected from within the installation have been analyzed for pesticides as part of other investigations. These data are also in the attachment to Section 3.9, and the sample locations are shown in Figure 3.9-1.

Subsurface Soils

Detections of pesticides in subsurface soils (more than 2 ft bgl) at the Galena Airport are not as widespread as in other sampled media. Pesticides concentrations in the subsurface soils did not exceed the screening criteria at any of the Galena Airport sites.

3.9.3 Conclusions

An effort has been made to determine the nature and extent of pesticide occurrence at the Galena Airport. Pesticides have been detected in all sampling media within the Galena Airport boundary and the Galena Ambient Location. Low concentrations of several pesticides have been detected in groundwater samples collected from wells and in surface water throughout the area. However, pesticide concentrations in water samples from the Galena Airport are often less than the SQL, similar to concentrations detected in laboratory blanks, or unconfirmed by second-column analysis.

Pesticides are generally found in higher concentrations in surface soil and sediment samples than subsurface soil samples. These data are consistent with the widespread application of pesticides for mosquito control. Although low levels of pesticides are present in soils throughout the Galena Airport, certain areas in the West Unit appear to have limited areas of elevated DDT-related compounds. These areas of high-concentration, limited-extent pesticide detections may indicate the accumulation of applied pesticides in low points and drainageways, or possibly small spills and leaks from storage. However, these "hot spots" that exceed screening criteria are the exception.

The presence of high concentrations of DDT-related compounds in surface soils from the BLM housing area indicates that these pesticides have been stored and used by the BLM. The presence of pesticides in all sampling media from the Galena Ambient Location also suggests that the use of pesticides in the Galena area is not limited to the Air Force.

3.9.4 Recommendations

Pesticides were addressed on a site-by-site basis in the baseline risk assessment (USAF, 1996). The widespread use of pesticides in the Galena area, by the local population, the BLM, the Air Force, and others, makes it impossible to determine independent sources of pesticides and assign risk from those sources. Because of this and the limited habitat present at most of the sites, no remedial action is being recommended. A removal action to address the widespread presence of pesticides at the Galena Airport would be prohibitively expensive, impractical, and ineffective.

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ATTACHMENT TO SECTION 3.9

PESTICIDES AT GALENA AIRPORT
DATA SUMMARY REPORT

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Results for Pesticides in Galena Airport 1992 Soil Samples

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	38	40	70	100	350	490
Galena Ambient Location (Residential)										
04-MW-01 (4-6 ft.)		11 (0.54)	5.1 (0.54)	3.6 (1.1)	ND (0.54)	ND (0.54)	ND (0.54)	ND (0.54)	ND (0.54)	1.1 B (0.54)
04-MW-02 (5-6.5 ft.)		ND (0.50)	ND (0.50)	ND (1.0)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	0.44 KJB (0.50)	ND (0.50)
04-MW-03 (5-6.5 ft.)		0.11 PJB (0.49)	0.22 KJB (0.49)	0.91 JB (0.98)	1.0 (0.49)	ND (0.49)	0.84 PB (0.49)	ND (0.49)	2.1 (0.49)	0.58 B (0.49)
04-MW-04 (4-6 ft.)		ND (0.62)	ND (0.62)	0.85 JB (1.2)	1.1 (0.62)	ND (0.62)	ND (0.62)	ND (0.62)	0.80 PB (0.62)	0.60 JB (0.62)
04-SD-01 (0-0.5 ft.)		0.95 B (0.35)	ND (0.35)	1.1 P (0.69)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	0.23 PJB (0.35)	ND (0.35)
04-SD-02 (0-0.5 ft.)		46 (0.43)	37 (0.43)	43 (0.86)	ND (0.43)	ND (0.43)	1.9 B (0.43)	ND (0.43)	0.94 B (0.43)	1.0 B (0.43)
04-SD-03 (0-0.5 ft.)		45 (0.50)	40 (0.50)	16 (1.0)	0.33 KBJ (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	0.41 KJB (0.50)	1.0 B (0.50)
04-SD-04 (0-0.5 ft.)		3.0 (0.54)	4.5 (0.54)	2.5 (1.1)	ND (0.54)	ND (0.54)	2.6 B (0.54)	ND (0.54)	3.0 (0.54)	1.2 B (0.54)
04-SS-01 (0-0.5 ft.)		28 (0.59)	36 (0.59)	64 (1.2)	ND (0.59)	ND (0.59)	3.6 B (0.59)	0.43 JB (0.59)	ND (0.59)	1.6 (0.59)
04-SS-02 (0-0.5 ft.)		ND (0.54)	ND (0.54)	ND (1.1)	0.47 JB (0.54)	ND (0.54)	2.6 B (0.54)	ND (0.54)	0.67 PB (0.54)	ND (0.54)
04-SS-03 (0-0.5 ft.)		ND (0.55)	ND (0.55)	0.91 JB (1.1)	ND (0.55)	ND (0.55)	2.9 B (0.55)	1.9 (0.55)	1.4 B (0.55)	1.3 B (0.55)
Fire Protection Training Area (Industrial)										
01-MW-01 (5-7 ft.)		3.9 (0.44)	1.5 (0.44)	6.3 (0.89)	0.040 PJB (0.44)	0.42 KJ (0.44)	0.056 PJB (0.44)	0.32 KJB (0.44)	0.013 PJB (0.44)	1.4 B (0.44)
01-MW-02 (5-7 ft.)		3.3 (0.41)	2.1 (0.41)	4.2 (0.82)	ND (0.41)	ND (0.41)	0.14 JB (0.41)	0.26 KJB (0.41)	ND (0.41)	0.47 B (0.41)
01-SB-01 (3-5 ft.)		13 (0.40)	1.6 (0.40)	1.1 (0.79)	0.60 B (0.40)	ND (0.40)	0.23 PJB (0.40)	0.24 KJB (0.40)	ND (0.40)	0.54 PB (0.40)
01-SB-01 (8-10 ft.)		1.8 (0.41)	0.13 PJB (0.41)	0.24 JB (0.83)	0.032 PJB (0.41)	ND (0.41)	0.056 PJB (0.41)	0.27 KJB (0.41)	0.066 KJB (0.41)	0.44 B (0.41)

Results for Pesticides in Galena Airport 1992 Soil Samples (Continued)

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	38	40	70	100	350	490
01-SB-01 (12-15 ft.)		0.14 PJB (0.41)	ND (0.41)	0.050 PJB (0.83)	ND (0.41)	0.026 PJB (0.41)	0.026 PJB (0.41)	0.52 B (0.41)	ND (0.41)	0.46 B (0.41)
01-SB-02 (3-5 ft.)		14 (0.39)	0.73 P (0.39)	0.84 B (0.77)	2.8 (0.39)	1.3 (0.39)	1.0 BP (0.39)	5.0 (0.39)	0.36 PJB (0.39)	1.8 P (0.39)
01-SB-02 (5-7 ft.)		12 (0.43)	2.0 (0.43)	0.48 KJB (0.85)	1.1 (0.43)	ND (0.43)	0.53 BP (0.43)	0.73 B (0.43)	0.21 KJB (0.43)	ND (0.43)
01-SB-02 (12-15 ft.)		4.0 (0.44)	0.95 (0.44)	0.31 JB (0.87)	3.4 (0.44)	ND (0.44)	1.4 PB (0.44)	ND (0.44)	1.1 PB (0.44)	0.49 PB (0.44)
01-SD-01 (0-0.5 ft.)		180 (4.9)	110 (4.9)	330 (9.8)	ND (4.9)	ND (4.9)	2.0 PJB (4.9)	ND (4.9)	ND (4.9)	ND (4.9)
01-SD-02 (0-0.5 ft.)		30 (0.48)	32 (0.48)	26 (0.95)	0.80 B (0.48)	ND (0.48)	0.59 BP (0.48)	0.72 B (0.48)	ND (0.48)	0.79 B (0.48)
01-SS-01 (0-0.5 ft.)		150 (1.0)	38 (1.0)	400 (10)	0.094 KJB (1.0)	ND (1.0)	0.21 PJB (1.0)	ND (1.0)	ND (1.0)	2.1 (1.0)
01-SS-02 (0-0.5 ft.)		19 (0.35)	2.0 (0.35)	21 (0.69)	ND (0.35)	ND (0.35)	0.20 JB (0.35)	0.34 PJB (0.35)	ND (0.35)	0.19 PJB (0.35)
01-SS-03 (0-0.5 ft.)		55 (0.39)	5.0 (0.39)	2.9 (0.79)	ND (0.39)	ND (0.39)	0.67 BP (0.39)	0.50 PB (0.39)	6.1 (0.39)	1.2 B (0.39)
01-SS-04 (0-0.5 ft.)		24 (0.38)	7.5 (0.38)	81 (3.8)	0.12 KJB (0.38)	ND (0.38)	0.17 PJB (0.38)	0.61 B (0.38)	0.29 KJB (0.38)	0.82 B (0.38)
01-SS-05 (0-0.5 ft.)		5.5 (0.37)	1.1 P (0.37)	1.9 (0.74)	33 (0.37)	2.5 P (0.37)	10 P (0.37)	4.6 P (0.37)	2.3 P (0.37)	2.0 P (0.37)
01-SS-06 (0-0.5 ft.)		17 (0.36)	0.90 (0.36)	6.8 (0.72)	0.23 KJB (0.36)	0.25 JB (0.36)	0.15 JB (0.36)	0.83 B (0.36)	ND (0.36)	ND (0.36)
01-SS-07 (0-0.5 ft.)		5.2 (0.34)	ND (0.34)	0.52 JB (0.67)	ND (0.34)	0.96 (0.34)	0.11 PJB (0.34)	1.8 P (0.34)	0.45 PB (0.34)	ND (0.34)
01-SS-08 (0-0.5 ft.)		83 (1.8)	11 (0.36)	77 (3.6)	0.14 KJB (0.36)	ND (0.36)	0.91 PB (0.36)	ND (0.36)	ND (0.36)	0.68 B (0.36)
01-SS-09 (0-0.5 ft.)		2.4 (0.41)	4.5 (0.41)	3.1 (0.82)	ND (0.41)	ND (0.41)	0.13 PJB (0.41)	ND (0.41)	0.17 KJB (0.41)	0.75 B (0.41)
01-SS-10 (0-0.5 ft.)		37 (0.34)	9.8 (0.34)	310 (6.8)	0.17 KJB (0.34)	ND (0.34)	0.16 JB (0.34)	ND (0.34)	ND (0.34)	0.78 B (0.34)

Results for Pesticides in Galena Airport 1992 Soil Samples (Continued)

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	38	40	70	100	350	490
West Unit (Industrial)										
06-MW-01 (8-10 ft.)		1.8 (0.40)	4.3 (0.40)	8.2 (0.80)	0.050 PJB (0.40)	ND (0.40)	0.35 PJB (0.40)	0.26 PJB (0.40)	ND (0.40)	0.65 PB (0.40)
06-MW-02 (3-5 ft.)		10,000 (60)	160 (60)	3,700 (120)	0.45 PJB (1.2)	ND (1.2)	1.3 BP (1.2)	1.8 (1.2)	ND (1.2)	ND (1.2)
06-MW-03 (4-7 ft.)		7.3 (0.42)	2.0 (0.42)	26 (0.84)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	ND (0.42)
06-MW-04 (4-6 ft.)		ND (0.44)	ND (0.44)	ND (0.87)	0.58 B (0.44)	0.40 KJB (0.44)	ND (0.44)	ND (0.44)	1.1 PB (0.44)	ND (0.44)
06-SB-01 (6.5-9 ft.)		240 (13)	32 (13)	38 (26)	3.6 PJ (13)	12 KJ (13)	12 PJ (13)	11 KJ (13)	18 P (13)	50 (13)
06-SB-01 (10-12 ft.)		ND (0.45)	ND (0.45)	0.39 JB (0.89)	0.15 PJB (0.45)	ND (0.45)	0.36 PJB (045)	ND (0.45)	2.5 (0.45)	ND (0.45)
06-SB-02 (2-4 ft.)		2.8 (0.34)	2.5 (0.34)	20 (0.69)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	0.20 KJB (0.34)	ND (0.34)
06-SB-02 (5-7 ft.)		35 (0.42)	11 (0.42)	3.0 (0.84)	0.57 B (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	0.18 PJB (0.42)	ND (0.42)
06-SD-01 (0-0.5 ft.)		57 (12)	17 (12)	15 KJ (24)	ND (12)	8.8 J (12)	1.2 PJB (12)	16 (12)	ND (12)	15 (12)
06-SD-02 (0-0.5 ft.)		46 (0.41)	5.0 (0.41)	18 (0.82)	0.089 KJB (0.41)	ND (0.41)	0.048 PJB (0.41)	ND (0.41)	0.32 KJB (0.41)	0.86 B (0.41)
06-SS-01 (0-0.5 ft.)		14 (0.35)	ND (0.35)	24 (0.7)	ND (0.35)	ND (0.35)	0.61 B (0.35)	0.58 PB (0.35)	ND (0.35)	ND (0.35)
06-SS-02 (0-0.5 ft.)		120 (1.1)	12 (1.1)	130 (2.1)	0.63 KJB (1.1)	ND (1.1)	1.9 BP (1.1)	ND (1.1)	ND (1.1)	ND (1.1)
06-SS-03 (0-0.5 ft.)		60 (1.0)	9.1 (1.0)	170 (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
06-SS-04 (0-0.5 ft.)		130 P (3.4)	140 (3.4)	1,200 (34)	0.79 B (0.34)	ND (0.34)	0.32 PJB (0.34)	0.64 B (0.34)	ND (0.34)	0.74 B (0.34)
06-SS-05 (0-0.5 ft.)		130 (3.4)	32 (0.34)	690 (34)	ND (0.34)	ND (0.34)	1.6 B (0.34)	ND (0.34)	ND (0.34)	ND (0.34)
06-SS-06 (0-0.5 ft.)		79 (1.0)	96 (1.0)	480 (21)	0.64 PJB (1.0)	ND (1.0)	1.3 BP (1.0)	1.5 (1.0)	ND (1.0)	ND (1.0)

Results for Pesticides in Galena Airport 1992 Soil Samples (Continued)

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	38	40	70	100	350	490
09-MW-06 (4-7 ft.)		21 (0.42)	5.9 (0.42)	37 (0.83)	0.64 B (0.42)	ND (0.42)	ND (0.42)	ND (0.42)	0.16 PJB (0.42)	ND (0.42)
09-SS-01 (0-0.5 ft.)		44 (3.8)	14 (3.8)	150 (7.6)	ND (3.8)	ND (3.8)	1.7 JB (3.8)	ND (3.8)	ND (3.8)	ND (3.8)
09-SS-02 (0-0.5 ft.)		15 (0.96)	5.7 (0.96)	76 (1.9)	ND (0.96)	1.3 (0.96)	0.30 PJB (0.96)	1.3 (0.96)	ND (0.96)	1.5 (0.96)
09-SS-03 (0-0.5 ft.)		42 (0.46)	13 (0.46)	53 (0.93)	ND (0.46)	ND (0.46)	0.40 PJB (0.46)	0.93 B (0.46)	3.4 (0.46)	1.7 (0.46)
10-MW-01 (3-6 ft.)		10 (0.43)	4.4 (0.43)	29 (0.87)	0.50 B (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)
10-MW-02 (4-5.5 ft.)		290 (6.6)	19 (1.3)	89 (2.7)	1.3 (1.3)	ND (1.3)	0.61 KJB (1.3)	ND (1.3)	5.7 (1.3)	ND (1.3)
10-MW-03 (4-6 ft.)		4.8 (1.4)	2.3 (1.4)	21 (2.7)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)
10-SB-01 (2-4 ft.)		120 (1.8)	14 (0.37)	100 (3.7)	0.50 B (0.37)	ND (0.37)	ND (0.37)	ND (0.37)	1.4 PB (0.37)	ND (0.37)
10-SB-01 (5-7 ft.)		ND (0.43)	0.94 (0.43)	7.3 (0.86)	ND (0.43)	ND (0.43)	0.15 PJB (0.43)	ND (0.43)	0.72 PB (0.43)	ND (0.43)
10-SB-02 (1-3 ft.)		140 (3.8)	32 (3.8)	370 (7.6)	0.80 B (0.38)	ND (0.38)	ND (0.38)	ND (0.38)	0.60 PB (0.38)	ND (0.38)
10-SB-02 (4-6 ft.)		0.72 B (0.45)	0.59 (0.45)	1.7 (0.89)	ND (0.45)	0.29 JB (0.45)	ND (0.45)	ND (0.45)	1.1 B (0.45)	ND (0.45)
10-SB-03 (1-2.5 ft.)		220 (5.5)	17 (1.1)	210 (2.2)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)
10-SB-03 (4-5.5 ft.)		50 (1.3)	7.5 (1.3)	11 (2.7)	ND (1.3)	1.1 KJ (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
10-SB-03 (7-8.5 ft.)		1.9 P (1.3)	ND (1.3)	ND (2.6)	ND (1.3)	0.71 PJ (1.3)	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
10-SS-01 (0-0.5 ft.)		54 (0.37)	4.7 (0.37)	65 (0.75)	0.68 B (0.37)	ND (0.37)	0.21 KJB (0.37)	0.25 JB (0.37)	ND (0.37)	0.56 PB (0.37)
10-SS-02 (0-0.5 ft.)		740 (7.1)	15 (7.1)	86 (14)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)	ND (7.1)

Results for Pesticides in Galena Airport 1992 Soil Samples (Continued)

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	38	40	70	100	350	490
10-SS-03 (0-0.5 ft.)		20 (1.7)	13 (1.7)	240 (3.5)	ND (1.7)	ND (1.7)	0.73 KJB (1.7)	ND (1.7)	ND (1.7)	ND (1.7)
10-SS-04 (0-0.5 ft.)		140 (18)	81 (18)	1,300 (36)	ND (18)	ND (18)	ND (18)	ND (18)	ND (18)	ND (18)
10-SS-05 (0-0.5 ft.)		1,000 (9.4)	500 (9.4)	2,400 E (19)	ND (9.4)	ND (9.4)	ND (9.4)	ND (9.4)	ND (9.4)	ND (9.4)
10-SS-06 (0-0.5 ft.)		750 (7.4)	52 (7.4)	350 (15)	ND (7.4)	ND (7.4)	ND (7.4)	ND (7.4)	ND (7.4)	ND (7.4)
11-SB-01 (2-4 ft.)		ND (0.45)	0.57 (0.45)	0.83 JB (0.9)	ND (0.45)	0.32 JB (0.45)	0.24 PJB (0.45)	0.42 KJB (0.45)	2.2 P (0.45)	ND (0.45)
11-SB-01 (5-7 ft.)		1.7 (0.42)	0.99 (0.42)	3.0 (0.84)	1.4 (0.42)	0.37 KJB (0.42)	0.46 BP (0.42)	ND (0.42)	0.39 KJB (0.42)	0.61 B (.42)

Results for Pesticides in Galena Airport 1993 Soil Samples

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	38	40	70	100	350	490
Building 1872 (Residential)										
DRM-01		ND (0.202)	ND (0.212)	ND (0.227)	0.105 KJ (0.183)	0.104 JB (0.219)	ND (0.115)	0.0929 P (0.0702)	ND (0.230)	0.291 B (0.111)
DRM-02		0.594 P (0.207)	1.96 (0.217)	17.7 (0.232)	0.0774 KJ (0.307)	0.198 J (0.255)	ND (0.118)	ND (0.0719)	ND (0.235)	0.246 B (0.114)
BLM Housing Area (Residential)										
BLM-01		355 (23.5)	55.4 (24.7)	1,260 (26.5)	ND (21.3)	ND (25.6)	ND (13.4)	ND (8.19)	ND (26.8)	ND (13.0)
BLM-02		9.07 P (2.29)	17.8 (2.4)	155 (2.57)	0.812 KJ (3.40)	1.64 KJ (1.68)	ND (1.30)	ND (0.796)	ND (2.60)	0.522 PJB (1.26)
BLM-03		ND (24.1)	655 (25.3)	968 (27.1)	ND (21.8)	ND (26.2)	ND (13.7)	ND (8.38)	ND (27.4)	ND (13.3)
BLM-04		122 PJ (238)	1,760 (249)	21,400 (267)	ND (215)	ND (259)	ND (135)	ND (82.8)	ND 271	ND (131)

Note: All sample depths are from 0 to 0.3 ft.

Results for Pesticides in Galena Airport 1994 Soil Samples

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	40	40	70	100	350	490
Galena POL Tank Farm (Residential)										
MB-SS-13		35.0 (1.74)	8.62 (2.00)	42.9 (2.13)	ND (1.39)	11.7 P (1.63)	1.26 P (1.09)	ND (1.66)	ND (2.35)	10.2 (1.04)
MB-SS-14		245 (1.89)	49.6 (2.18)	80.9 (2.32)	ND (1.51)	10.9 P (2.57)	ND (5.92)	ND (1.81)	ND (2.56)	ND (1.13)
MB-SS-15		79.1 (10.8)	40.0 (12.5)	127 (13.3)	ND (8.67)	ND (10.2)	2.90 PJ (33.9)	ND (10.4)	ND (14.7)	ND (6.47)
West Unit (Industrial)										
MB-SS-01		23.2 (1.66)	5.09 (1.92)	33.4 (2.04)	ND (1.33)	7.33 (1.56)	1.77 KJ (5.21)	ND (1.59)	ND (2.25)	ND (0.993)
MB-SS-02		350 (6.63)	52.0 (7.63)	625 (8.13)	ND (5.30)	87.5 (6.22)	3.05 PJ (4.17)	ND (6.35)	ND (8.98)	ND (3.96)
MB-SS-03		278 (33.4)	115 (38.5)	542 (41.0)	62.0 (45.9)	ND (45.5)	ND (105)	ND (32.0)	ND (45.3)	ND (20.0)
MB-SS-04		142 (6.81)	71.8 (7.83)	949 (8.35)	ND (9.35)	29.7 P (9.26)	ND (21.3)	ND (6.52)	ND (9.22)	ND (4.06)
MB-SS-05		129 (6.26)	52.9 (7.20)	547 (7.67)	ND (5.17)	27.0 (5.87)	ND (19.6)	ND (5.99)	ND (8.47)	ND (3.73)
MB-SS-06		2,930 (43.3)	597 (49.8)	13,400 (53.0)	ND (34.6)	484 (40.6)	10.5 KJ (135)	ND (41.4)	ND (58.6)	ND (25.8)
MB-SS-07		275 (7.61)	28.0 (8.75)	363 (9.33)	ND (10.4)	ND (10.3)	ND (23.8)	ND (7.28)	ND (10.3)	ND (4.54)
MB-SS-08		170 (1.66)	39.4 (1.91)	112 (2.04)	ND (2.28)	24.0 (1.56)	ND (5.20)	ND (1.59)	ND (2.25)	ND (0.992)
MB-SS-09		431 (3.24)	120 (3.73)	1180 (3.97)	ND (4.45)	9.15 (3.04)	ND (10.1)	ND (3.10)	ND (4.39)	ND (1.93)
MB-SS-10		37,800 (131)	1,280 (151)	81,900 (161)	ND (180)	490 P (179)	ND (411)	ND (126)	ND (178)	ND (78.4)
MB-SS-11		176 (3.48)	67.4 (4.00)	1170 (4.26)	ND (2.78)	34.1 (3.26)	ND (10.9)	ND (3.33)	ND (4.71)	ND (2.08)
MB-SS-12		1,180 (3.47)	56.9 (3.99)	376 (4.25)	ND (2.78)	58.8 (3.25)	ND (10.9)	ND (3.32)	ND (4.70)	11.9 (2.07)

Results for Pesticides in Galena Airport 1994 Soil Samples (Continued)

Sample ID	Analyte	4,4'-DDD (µg/kg)	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µg/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	40	40	70	100	350	490
MB-SS-16		1510 (31.1)	507 (35.8)	3510 (38.2)	ND (34.9)	338 (29.2)	ND (97.3)	ND (29.8)	ND (42.1)	ND (18.6)
MB-SS-17		179 (12.9)	32.2 (14.8)	325 (15.8)	21.2 (17.7)	63.9 (12.1)	ND (40.3)	ND (12.3)	ND (17.4)	ND (7.68)
MB-SS-18		158 (12.9)	33.1 (14.8)	272 (15.8)	ND (17.7)	ND (17.5)	ND (40.3)	ND (12.3)	ND (17.5)	ND (7.70)
MB-SS-19		2,920 (35.4)	1,950 (40.7)	8,450 (43.4)	ND (48.6)	409 (33.2)	ND (111)	ND (33.9)	ND (47.9)	ND (21.1)
MB-SS-20		5,810 (31.9)	249 (36.7)	8,540 (39.1)	ND (43.8)	109 P (43.4)	ND (99.8)	ND (30.5)	ND (43.2)	ND (19.0)
MB-SS-21		105 (6.97)	94.6 (8.02)	861 (8.55)	ND (5.58)	26.5 (6.54)	3.27 KJ (4.39)	ND (6.67)	ND (9.44)	ND (4.16)
MB-SS-22		213 (3.63)	22.6 (4.18)	72.2 (4.45)	ND (2.90)	ND (4.94)	ND (11.4)	ND (3.48)	ND (4.92)	ND (2.17)
MB-SS-23		146 (4.34)	19.4 (5.00)	116 (5.33)	24.4 (5.97)	13.2 (4.07)	ND (13.6)	ND (4.16)	ND (5.88)	71.4 (2.59)
Pump Station Outfall (Industrial)										
PO-SS-01		3.87 P (0.368)	0.911 (0.424)	18.3 (0.452)	ND (0.295)	ND (0.501)	ND (0.232)	ND (0.353)	ND (0.499)	ND (0.220)
PO-SS-02		9.80 P (0.352)	1.75 (0.405)	75.7 (0.432)	ND (0.282)	2.87 (0.330)	ND (0.222)	ND (0.337)	ND (0.477)	1.16 (0.210)

Note: All sample depths are from 0-0.5 ft.

Results for Pesticides in Galena Airport 1992 Water Samples

Sample ID	Analyte	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
	Screening Criteria	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
Fire Protection Training Area										
01-MW-01		ND (0.0099)	ND (0.0099)	ND (0.020)	ND (0.0099)	0.0047 JB (0.0099)	0.0075 KJB (0.0099)	0.025 (0.0099)	ND (0.0099)	ND (0.0099)
01-MW-02		ND (0.010)	ND (0.010)	0.016 KJ (0.021)	ND (0.010)	0.012 (0.010)	0.0039 KJB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
01-MW-03		ND (0.0098)	ND (0.0098)	0.011 KJ (0.020)	ND (0.0098)	0.0083 JB (0.0098)	ND (0.0098)	ND (0.0098)	ND (0.0098)	0.010 B (0.0098)
01-MW-04		ND (0.010)	ND (0.010)	0.0086 KJB (0.020)	0.018 B (0.010)	0.016 (0.010)	0.012 B (0.010)	0.031 (0.010)	0.013 (0.010)	ND (0.010)
01-MW-05		ND (0.010)	ND (0.010)	0.00050 PJ (0.020)	ND (0.010)	0.0099 J (0.010)	0.0035 B (0.010)	ND (0.010)	0.011 (0.010)	0.014 B (0.010)
01-MW-06		ND (0.010)	ND (0.010)	ND (0.020)	ND (0.010)	0.0068 KJB (0.010)	0.0050 KJB (0.010)	0.014 B (0.010)	ND (0.010)	ND (0.010)
01-SW-01		0.0019 PJB (0.0095)	0.00060 PJB (0.0095)	0.00060 PJB (0.019)	ND (0.0095)	0.0068 JB (0.0095)	0.056 B (0.0095)	0.012 B (0.0095)	ND (0.0095)	0.013 B (0.0095)
01-SW-02		0.0021 PJB (0.0095)	0.015 B (0.0095)	ND (0.019)	0.0038 PJB (0.0095)	0.0071 JB (0.0095)	0.012 BP (0.0095)	0.020 (0.0095)	0.00090 PJB (0.0095)	0.016 B (0.0095)
Airport Supply Wells										
02-GW-01		ND (0.010)	ND (0.010)	ND (0.020)	ND (0.010)	0.0079 KJB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
02-GW-02		ND (0.010)	ND (0.010)	0.0062 KJB (0.020)	ND (0.010)	0.0090 KJ (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
02-GW-03		ND (0.011)	ND (0.011)	ND (0.022)	ND (0.011)	0.010 KJ (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)
02-GW-04		ND (0.011)	ND (0.011)	ND (0.021)	0.011B (0.011)	0.0096 KJ (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.012 B (0.011)
Community Supply Wells										
03-GW-01		ND (0.0099)	ND (0.0099)	ND (0.020)	ND (0.0099)	ND (0.0099)	2.0 (0.0099)	0.017 P (0.0099)	0.061 P (0.0099)	ND (0.0099)
03-GW-02		ND (0.0099)	ND (0.0099)	ND (0.020)	ND (0.0099)	ND (0.0099)	ND (0.0099)	ND (0.0099)	ND (0.0099)	0.010 B (0.0099)
03-GW-03		ND (0.010)	ND (0.010)	ND (0.021)	ND (0.010)	0.011 (0.010)	0.016 B (0.010)	ND (0.010)	ND (0.010)	ND (0.010)

Results for Pesticides in Galena Airport 1992 Water Samples (Continued)

Sample ID / Analyte	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
Screening Criteria	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
03-GW-04	ND (0.011)	ND (0.011)	ND (0.022)	ND (0.011)	0.0099 KJ (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)
Galena Ambient Location									
04-MW-02	ND (0.011)	ND (0.011)	ND (0.022)	ND (0.011)	0.0073 KJB (0.011)	ND (0.011)	0.0073 JB (0.011)	ND (0.011)	ND (0.011)
04-MW-03	ND (0.010)	ND (0.010)	ND (0.021)	ND (0.010)	0.0094 J (0.010)	ND (0.010)	0.014 B (0.010)	0.023 (0.010)	0.0086 KJB (0.010)
04-SW-01	ND (0.010)	0.012 PB (0.010)	0.00090 PJB (0.020)	ND (0.010)	0.0086 J (0.010)	0.0033 JB (0.010)	0.015 B (0.010)	ND (0.010)	0.0040 PJB (0.010)
04-SW-02	ND (0.0095)	0.0082 KJB (0.0095)	0.0085 KJB (0.019)	ND (0.0095)	0.0073 JB (0.0095)	0.010 BP (0.095)	ND (0.0095)	ND (0.0095)	0.014 B (0.0095)
04-SW-03	ND (0.0095)	0.011 B (0.0095)	0.0018 PJB (0.019)	ND (0.0095)	0.0070 JB (0.0095)	0.0048 JB (0.095)	0.012 B (0.0095)	ND (0.0095)	0.0044 KJB (0.0095)
04-SW-04	ND (0.011)	0.010 KJB (0.011)	0.0098 KJB (0.021)	0.00010 PJB (0.011)	0.0090 J (0.011)	0.093 PJ (0.011)	ND (0.011)	ND (0.011)	ND (0.011)
POL Tank Farm									
05-MW-01	ND (0.0099)	ND (0.0099)	0.0088 JB (0.020)	0.014 B (0.0099)	0.0088 J (0.0099)	0.046 PJB (0.0099)	ND (0.0099)	0.014 (0.0099)	0.011 B (0.0099)
05-MW-02	ND (0.0099)	ND (0.0099)	ND (0.020)	ND (0.0099)	0.017 (0.0099)	0.0073 PJB (0.0099)	ND (0.0099)	ND (0.0099)	0.012 B (0.0099)
05-MW-03	0.026 P (0.010)	0.021 (0.010)	0.014 J (0.020)	0.014 B (0.010)	ND (0.010)	0.0062 PJB (0.010)	0.013 B (0.010)	ND (0.010)	ND (0.010)
05-MW-04	ND (0.010)	ND (0.010)	0.010 JB (0.020)	0.023 PB (0.010)	0.026 (0.010)	0.048 BP (0.010)	0.094 (0.010)	0.086 (0.010)	0.033 PB (0.010)
05-MW-05	0.025 (0.0099)	ND (0.0099)	0.00070 PJB (0.020)	0.026 (0.0099)	0.0087 J (0.0099)	0.023 BP (0.0099)	0.054 (0.0099)	0.072 (0.0099)	0.068 (0.0099)
05-MW-06	0.021 B (0.0099)	ND (0.0099)	0.00090 PJB (0.020)	0.013 B (0.0099)	0.0095 J (0.0099)	0.0050 PJB (0.0099)	0.016 (0.0099)	0.011 (0.0099)	0.011 B (0.0099)
05-MW-07	0.038 (0.010)	ND (0.010)	ND (0.021)	0.018 B (0.010)	ND (0.010)	0.071 P (0.010)	0.038 (0.010)	0.11 (0.010)	0.046 (0.010)
05-MW-08	ND (0.0097)	ND (0.0097)	0.0081 KJB (0.019)	ND (0.0097)	ND (0.0097)	0.0011 KJB (0.0097)	ND (0.0097)	ND (0.0097)	ND (0.0097)

Results for Pesticides in Galena Airport 1992 Water Samples (Continued)

Sample ID	Analyte / Screening Criteria	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
		0.28	**0.20**	**0.20**	**0.004**	**0.0042**	**0.20**	**0.011**	**0.037**	**0.20**
05-MW-09		ND (0.011)	ND (0.011)	0.014 KJ (0.022)	ND (0.011)	0.0092 KJ (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	ND (0.011)
05-MW-10		0.22 (0.010)	0.27 (0.010)	0.16 (0.020)	ND (0.010)	ND (0.010)	0.078 P (0.010)	0.13 (0.010)	0.14 (0.010)	0.073 (0.010)
05-MW-11		0.00060 KJB (0.0098)	ND (0.0098)	ND (0.020)	0.0064 JB (0.0098)	0.0089 J (0.0098)	ND (0.0098)	0.016 (0.0098)	0.0060 KJB (0.0098)	0.0083 JB (0.0098)
05-MW-12		ND (0.0097)	ND (0.0097)	ND (0.019)	ND (0.0097)	ND (0.0097)	0.014 B (0.0097)	0.010 PB (0.0097)	0.0057 PJB (0.0097)	ND (0.0097)
05-SW-01		ND (0.010)	ND (0.010)	0.031 (0.020)	ND (0.010)	0.0070 JB (0.010)	0.0053 PJB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
05-SW-02		ND (0.010)	ND (0.010)	0.0010 PJB (0.020)	0.0055 PJB (0.010)	0.0080 JB (0.010)	0.0061 PJB (0.010)	ND (0.010)	ND (0.010)	0.015 B (0.010)
05-SW-03		ND (0.0095)	ND (0.0095)	0.0030 PJB (0.019)	0.0046 PJB (0.0095)	0.0071 JB (0.0095)	0.0097 BP (0.0095)	ND (0.0095)	ND (0.0095)	0.0046 PJB (0.0095)
West Unit										
06-MW-01		0.11 (0.010)	0.16 (0.010)	0.56 (0.020)	ND (0.010)	ND (0.010)	ND (0.010)	0.0096 KJB (0.010)	ND (0.010)	0.013 B (0.010)
06-MW-02		3.1 (0.019)	0.022 (0.0097)	0.24 (0.019)	0.0040 KJB (0.0097)	ND (0.0097)	ND (0.0097)	0.0076 KJB (0.0097)	ND (0.0097)	0.0082 JB (0.0097)
06-MW-03		ND (0.010)	ND (0.010)	0.0083 KJB (0.020)	ND (0.010)	0.0081 JB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
06-MW-04		ND (0.0099)	ND (0.0099)	0.016 KJ (0.020)	0.011 BL (0.0099)	ND (0.0099)	0.0068 PJB (0.0097)	ND (0.0099)	0.0012 PJB (0.0099)	0.025 PB (0.0099)
06-MW-06		ND (0.0098)	ND (0.0098)	ND (0.020)	0.0058 JB (0.0098)	0.0067 PJB (0.0098)	ND (0.0098)	ND (0.0098)	0.071 (0.0098)	0.027 B (0.0098)
06-SW-01		ND (0.0096)	ND (0.0096)	0.0066 JB (0.019)	0.013 B (0.0096)	0.0068 JB (0.0096)	0.0064 PJB (0.0096)	ND (0.0096)	0.027 (0.0096)	ND (0.0096)
06-SW-02		0.25 (0.0095)	0.023 (0.0095)	0.0013 PJB (0.019)	0.015 B (0.0095)	ND (0.0095)	0.43 P (0.0095)	0.013 PB (0.0095)	0.030 (0.0095)	0.018 B (0.0095)
09-MW-01		ND (0.0096)	ND (0.0096)	0.0015 PJB (0.019)	ND (0.0096)	0.0084 KJB (0.0096)	0.0032 PJB (0.0096)	ND (0.0096)	0.0055 KJB (0.0096)	0.012 B (0.0096)
09-MW-02		0.014 B (0.010)	ND (0.010)	0.017 J (0.020)	ND (0.010)	0.011 (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)

Results for Pesticides in Galena Airport 1992 Water Samples (Continued)

Sample ID	Analyte / Screening Criteria	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
		0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
09-MW-03		ND (0.010)	ND (0.010)	ND (0.020)	ND (0.010)	0.0083 JB (0.010)	0.0094 KJB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
09-MW-04		ND (0.0097)	ND (0.0097)	0.0097 KJB (0.019)	ND (0.0097)	0.0097 (0.0097)	0.0029 PJB (0.0097)	ND (0.0097)	ND (0.0097)	0.010 B (0.0097)
09-MW-05		0.023 B (0.010)	ND (0.010)	ND (0.020)	ND (0.010)	0.011 (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
09-MW-06		0.028 (0.010)	0.017 (0.010)	0.0033 PJB (0.020)	0.013 B (0.010)	ND (0.010)	0.0039 JB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
09-MW-07		ND (0.010)	ND (0.010)	ND (0.021)	ND (0.010)	0.0083 KJB (0.010)	0.00030 KJB (0.010)	ND (0.010)	ND (0.010)	ND (0.010)
09-MW-08		ND (0.050)	ND (0.050)	ND (0.10)	ND (0.050)	0.046 KJ (0.050)	0.027 JB (0.050)	ND (0.050)	0.019 PJ (0.050)	0.21 P (0.050)
09-MW-10		0.016 PB (0.0099)	0.0091 KJB (0.0099)	ND (0.020)	ND (0.0099)	ND (0.0099)	ND (0.0099)	0.053 (0.0099)	ND (0.0099)	0.016 B (0.0099)
09-MW-11		0.0015 PJB (0.0097)	0.0061 KJB (0.0097)	0.0029 JB (0.019)	0.012 B (0.0097)	ND (0.0097)	ND (0.0097)	0.013 PB (0.0097)	ND (0.0097)	0.0034 PJB (0.0097)
09-MW-12		0.088 (0.051)	ND (0.051)	ND (0.10)	0.053 (0.051)	ND (0.051)	0.026 PJB (0.051)	0.19 (0.051)	0.15 (0.051)	0.18 (0.051)
09-MW-14		0.020 B (0.010)	0.016 (0.010)	0.032 (0.020)	0.012 B (0.010)	0.013 (0.010)	0.0079 JB (0.010)	ND (0.010)	0.022 (0.010)	ND (0.010)
10-MW-01		0.027 (0.010)	ND (0.010)	0.0020 PJB (0.021)	ND (0.010)	ND (0.010)	ND (0.010)	ND (0.010)	0.038 (0.010)	ND (0.010)
10-MW-02		ND (0.0099)	ND (0.0099)	0.010 KJB (0.020)	0.016 B (0.0099)	ND (0.0099)	0.0036 PJB (0.0099)	ND (0.0099)	0.038 (0.0099)	ND (0.0099)
10-MW-03		ND (0.010)	ND (0.010)	0.010 KJB (0.020)	ND (0.010)	ND (0.010)	0.0042 PJB (0.010)	0.022 (0.010)	0.043 (0.010)	ND (0.010)
11-MW-01		0.016 B (0.0097)	ND (0.0097)	0.021 (0.019)	ND (0.0097)	0.0094 KJ (0.0097)	ND (0.097)	ND (0.0097)	0.0031 KJB (0.0097)	ND (0.0097)
11-MW-02		ND (0.011)	ND (0.011)	0.011 KJ (0.021)	0.0064 JB (0.011)	ND (0.011)	ND (0.011)	ND (0.011)	0.044 (0.011)	0.049 (0.011)

Results for Pesticides in Galena Airport 1993 Water Samples

Sample ID / Analyte	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
PAL	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
Fire Protection Training Area									
01-MW-01	ND (0.00598)	ND (0.00629)	ND (0.00680)	ND (0.00546)	ND (0.00443)	ND (0.00340)	0.0109 B (0.00206)	ND (0.00680)	0.0144 (0.00330)
01-MW-02	ND (0.00433)	ND (0.00629)	ND (0.00680)	ND (0.00897)	ND (0.00443)	ND (0.00340)	ND (0.00206)	ND (0.00680)	ND (0.00330)
Galena Ambient Location									
04-MW-02	ND (0.00926)	0.0101 B (0.00532)	0.0163 B (0.00985)	ND (0.00916)	ND (0.00788)	0.0043 PJB (0.0246)	ND (0.00345)	0.00120 PJ (0.00916)	ND (0.00453)
04-MW-03	ND (0.00913)	ND (0.00524)	ND (0.00971)	0.00880 PJB (0.00903)	0.0113 (0.00777)	0.0174 PJB (0.0243)	ND (0.00388)	ND (0.00903)	ND (0.0126)
POL Tank Farm									
05-MW-01	ND (0.0239)	ND (0.00348)	ND (0.00696)	ND (0.00408)	0.00920 B (0.00557)	0.00200 JB (0.00328)	0.0173 (0.00199)	0.0139 J (0.0468)	0.0140 (0.00229)
05-MW-02	ND (0.0239)	ND (0.00488)	ND (0.00696)	ND (0.00239)	ND (0.00557)	ND (0.00328)	ND (0.00199)	ND (0.0468)	ND (0.00229)
05-MW-03	ND (0.0238)	ND (0.00485)	ND (0.00693)	ND (0.00406)	ND (0.00465)	0.00820 PB (0.00327)	ND (0.00198)	ND (0.0465)	0.0239 (0.00228)
05-MW-04	0.0308 B (0.0236)	0.0113 B (0.00483)	0.0196 B (0.00690)	0.0205 (0.00236)	0.0140 (0.00552)	0.00420 PB (0.00325)	0.0457 (0.00197)	ND (0.0463)	0.0629 (0.00227)
05-MW-05	0.101 (0.0245)	ND (0.00357)	ND (0.00714)	0.0344 (0.00245)	ND (0.00480)	0.0237 B (0.00337)	ND (0.00143)	ND (0.0480)	0.0624 (0.00235)
05-MW-06	ND (0.0238)	ND (0.00485)	ND (0.00634)	ND (0.00238)	ND (0.00554)	ND (0.00327)	ND (0.00198)	ND (0.0465)	ND (0.00228)
West Unit									
06-MW-01	0.00290 PJB (0.00598)	0.00560 JB (0.00629)	0.0316 (0.00680)	ND (0.00897)	ND (0.00660)	ND (0.00340)	0.00810 B (0.00206)	ND (0.00680)	0.0109 B (0.00330)
06-MW-02	0.101 (0.00577)	0.00120 PJB (0.00607)	0.0227 B (0.00657)	ND (0.00866)	ND (0.00637)	ND (0.00328)	ND (0.00199)	ND (0.00657)	ND (0.00318)
06-MW-03	ND (0.00792)	ND (0.00653)	ND (0.00990)	0.00910 PJB (0.00921)	ND (0.00792)	0.0428 B (0.00337)	0.0173 (0.00396)	ND (0.00921)	ND (0.00455)
06-MW-04	ND (0.00571)	ND (0.00601)	0.0163 B (0.00650)	0.00360 JB (0.00522)	0.0113 (0.00630)	ND (0.00325)	ND (0.00197)	0.0708 (0.00650)	ND (0.00197)
09-MW-01	ND (0.00598)	0.000600 PJB (0.00629)	ND (0.00680)	0.00220 JB (0.00546)	ND (0.00660)	ND (0.00340)	ND (0.00186)	ND (0.00680)	0.0122 (0.00330)

Results for Pesticides in Galena Airport 1993 Water Samples (Continued)

Sample ID	Analyte	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
	PAL	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
09-MW-02		ND (0.00598)	ND (0.00629)	ND (0.00680)	ND (0.00897)	0.0127 (0.00660)	ND (0.00340)	ND (0.00206)	ND (0.00680)	0.0115 B (0.00330)
09-MW-03		ND (0.00769)	ND (0.00519)	ND (0.00962)	ND (0.00894)	ND (0.00769)	0.0132 B (0.00327)	ND (0.00385)	ND (0.00615)	ND (0.00442)
09-MW-04		ND (0.00769)	ND (0.00519)	ND (0.00962)	ND (0.00894)	ND (0.00769)	ND (0.0240)	ND (0.00385)	ND (0.00615)	ND (0.0125)
09-MW-05		ND (0.00769)	ND (0.00519)	ND (0.00962)	ND (0.00894)	ND (0.00769)	0.00870 B (0.00327)	ND (0.00385)	ND (0.00615)	ND (0.0125)
09-MW-06		ND (0.00769)	0.0100 B (0.00519)	ND (0.00962)	ND (0.00336)	ND (0.00769)	0.00820 B (0.00327)	0.00800 B (0.00385)	ND (0.00894)	ND (0.0125)
10-MW-01		ND (0.00922)	ND (0.00647)	ND (0.00980)	ND (0.00912)	ND (0.00784)	ND (0.0245)	ND (0.00392)	ND (0.00627)	ND (0.00451)
10-MW-02		ND (0.00800)	ND (0.00540)	ND (0.0100)	ND (0.00350)	ND (0.00800)	0.00510 PJB (0.0250)	ND (0.00350)	ND (0.00640)	0.0191 P (0.0130)
10-MW-03		ND (0.00808)	ND (0.00545)	ND (0.0101)	0.0173 (0.00354)	ND (0.00808)	ND (0.0253)	ND (0.00404)	0.0230 (0.00646)	ND (0.00465)

Results for Pesticides in Galena Airport 1994 Water Samples

Sample ID	Analyte / Screening Criteria	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
	Screening Criteria	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
Fire Protection Training Area										
01-MW-01		ND (0.00225)	ND (0.00464)	0.00800 KJ (0.00878)	ND (0.00292)	0.00250 KJB (0.00403)	ND (0.00227)	ND (0.00429)	0.0144 P (0.00339)	ND (0.00135)
01-MW-02		ND (0.00220)	ND (0.00453)	0.00690 KJ (0.008566)	ND (0.00285)	ND (0.00242)	ND (0.00221)	ND (0.00418)	ND (0.00331)	ND (0.00381)
01-MW-05		ND (0.00220)	ND (0.00455)	ND (0.00731)	ND (0.00286)	ND (0.00395)	ND (0.00222)	ND (0.00289)	ND (0.00332)	ND (0.00383)
01-MW-06		ND (0.00212)	ND (0.00540)	ND (0.00704)	ND (0.00275)	0.00230 KJB (0.00380)	0.00330 P (0.00236)	0.00810 (0.00405)	ND (0.00320)	ND (0.00369)
01-MW-07		ND (0.00210)	ND (0.00536)	0.00720 KJ (0.00820)	ND (0.00273)	0.00230 KJB (0.00377)	ND (0.00212)	ND (0.00401)	ND (0.00317)	ND (0.00365)
01-MW-08		ND (0.00218)	ND (0.00556)	ND (0.00724)	ND (0.00283)	0.00230 KJB (0.00391)	0.000900 KJ (0.00220)	ND (0.00416)	ND (0.00329)	ND (0.00380)
POL Tank Farm										
05-MW-02		ND (0.0162)	ND (0.00358)	ND (0.00382)	ND (0.00428)	ND (0.00292)	ND (0.00973)	ND (0.00298)	ND (0.00421)	ND (0.00186)
05-MW-03		ND (0.00302)	ND (0.00376)	0.0106 KJ (0.0132)	ND (0.00415)	0.00620 (0.00283)	0.0155 (0.00944)	ND (0.00289)	0.000600 KJ (0.00409)	0.0363 (0.00180)
05-MW-04		ND (0.0147)	ND (0.0169)	ND (0.0180)	0.0407 (0.0201)	ND (0.0137)	0.124 (0.0459)	0.132 (0.0140)	ND (0.0199)	0.0924 (0.00875)
05-MW-05		ND (0.00293)	ND (0.00337)	0.00970 KJ (0.0128)	0.00530 P (0.00403)	0.00750 (0.00275)	0.0320 P (0.00185)	ND (0.00240)	ND (0.00326)	0.0168 (0.00175)
05-MW-06		ND (0.00288)	ND (0.00331)	ND (0.00353)	0.0114 (0.00395)	0.0169 (0.00270)	0.00850 P (0.00181)	ND (0.00236)	ND (0.00390)	0.00860 (0.00172)
05-MW-07		ND (0.0150)	ND (0.0172)	0.0506 KJ (0.0652)	ND (0.0120)	ND (0.0140)	0.0270 P (0.00941)	0.161 (0.0143)	ND (0.0166)	0.156 (0.00892)
05-MW-11		ND (0.00299)	ND (0.00344)	0.00640 (0.00367)	0.00540 (0.00411)	0.0102 (0.00280)	0.00510 P (0.00188)	ND (0.00245)	0.00230 PJ (0.00332)	0.00850 (0.00178)
05-MW-13		ND (0.0110)	ND (0.0227)	ND (0.0366)	ND (0.0143)	ND (0.0198)	ND (0.0111)	0.0662 (0.0210)	ND (0.0166)	ND (0.00662)
05-MW-14		ND (0.00293)	ND (0.00365)	ND (0.00360)	0.00510 (0.00400)	ND (0.00399)	0.0132 (0.00917)	ND (0.00240)	ND (0.00397)	ND (0.00175)

Results for Pesticides in Galena Airport 1994 Water Samples (Continued)

Sample ID / Analyte	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
Screening Criteria	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
05-MW-15	ND (0.00311)	ND (0.00388)	0.0121 KJ (0.0136)	ND (0.00428)	ND (0.00292)	0.000800 J (0.00973)	ND (0.00255)	ND (0.00421)	ND (0.00186)
West Unit									
02-GW-01	ND (0.0153)	ND (0.00337)	0.00620 (0.00360)	ND (0.00403)	ND (0.00399)	0.000400 KJ (0.00917)	ND (0.00281)	ND (0.00397)	ND (0.00175)
02-GW-03	ND (0.0149)	ND (0.00328)	ND (0.0124)	0.00680 (0.00392)	0.00840 (0.00267)	0.00490 P (0.00179)	ND (0.00273)	ND (0.00386)	ND (0.00160)
02-GW-04	ND (0.00214)	ND (0.00442)	0.00770 KJ (0.00836)	ND (0.00278)	ND (0.00384)	0.00140 KJ (0.00238)	ND (0.00408)	ND (0.00323)	ND (0.00372)
06-MW-01	ND (0.00223)	0.00460 (0.00459)	0.00840 KJ (0.00869)	ND (0.00289)	ND (0.00399)	ND (0.00225)	ND (0.00425)	ND (0.00336)	ND (0.00387)
06-MW-02	0.0910 (0.00296)	0.00760 (0.00341)	0.0108 (0.00363)	0.00630 (0.00407)	0.0204 (0.00278)	0.00820 KJ (0.00926)	ND (0.00283)	ND (0.00401)	ND (0.00177)
06-MW-03	ND (0.00285)	ND (0.00328)	ND (0.00350)	ND (0.00392)	ND (0.00267)	ND (0.00892)	ND (0.00273)	ND (0.00386)	ND (0.00170)
06-MW-04	ND (0.0110)	ND (0.0227)	ND (0.0366)	ND (0.0143)	ND (0.0198)	ND (0.0123)	ND (0.0210)	ND (0.0166)	0.0511 P (0.00662)
06-MW-05	ND (0.00308)	ND (0.00354)	ND (0.00378)	ND (0.00423)	0.00910 (0.00289)	ND (0.00194)	ND (0.00252)	ND (0.00417)	ND (0.00184)
06-MW-06	ND (0.00298)	ND (0.00342)	0.0170 (0.00365)	0.0613 (0.00409)	0.0344 (0.00279)	0.0257 P (0.00187)	0.0441 (0.00285)	0.284 (0.00403)	0.111 (0.00178)
06-MW-07	ND (0.00218)	ND (0.00556)	0.00850 KJ (0.00852)	ND (0.00283)	0.00250 KJB (0.00391)	ND (0.00220)	ND (0.00416)	ND (0.00329)	ND (0.00380)
09-MW-01	ND (0.00290)	ND (0.00334)	0.0123 KJ (0.0127)	ND (0.00232)	0.00720 (0.00272)	0.00270 P (0.00183)	ND (0.00278)	ND (0.00393)	0.0102 (0.00173)
09-MW-02	ND (0.00302)	ND (0.00348)	ND (0.00370)	ND (0.00415)	ND (0.00283)	0.00550 KJ (0.00944)	ND (0.00289)	ND (0.00409)	0.00700 (0.00180)
09-MW-03	ND (0.00308)	ND (0.00354)	ND (0.00378)	ND (0.00246)	ND (0.00289)	0.00710 KJ (0.00964)	ND (0.00295)	ND (0.00417)	ND (0.00173)
09-MW-04	ND (0.00295)	ND (0.00339)	ND (0.00361)	ND (0.00405)	ND (0.00276)	0.00560 KJ (0.00922)	ND (0.00282)	ND (0.00399)	ND (0.00176)

Results for Pesticides in Galena Airport 1994 Water Samples (Continued)

Sample ID / Analyte	4,4'-DDD (µg/L)	4,4'-DDE (µg/L)	4,4'-DDT (µg/L)	Aldrin (µg/L)	Dieldrin (µg/L)	Heptachlor epoxide (µg/L)	alpha-BHC (µg/L)	beta-BHC (µg/L)	gamma-BHC (µg/L)
Screening Criteria	0.28	0.20	0.20	0.004	0.0042	0.20	0.011	0.037	0.20
09-MW-05	ND (0.00299)	ND (0.00344)	0.00620 (0.00367)	ND (0.00411)	ND (0.00280)	ND (0.00188)	ND (0.00286)	ND (0.00405)	0.00670 (0.00178)
09-MW-06	ND (0.00296)	ND (0.00341)	0.0260 (0.00363)	ND (0.00237)	0.0137 (0.00278)	0.0161 (0.00926)	ND (0.00283)	ND (0.00401)	0.00870 (0.00177)
09-MW-08	0.0510 (0.0212)	0.0577 (0.0438)	ND (0.0704)	ND (0.0275)	ND (0.0380)	ND (0.0236)	0.105 (0.0405)	ND (0.0320)	ND (0.0127)
09-MW-12	0.552 (0.0225)	0.0791 (0.0464)	ND (0.0746)	0.00810 PJ (0.0292)	ND (0.0403)	ND (0.0227)	ND (0.0295)	ND (0.0339)	ND (0.0391)
09-MW-15	ND (0.00300)	ND (0.00346)	ND (0.00368)	0.00590 (0.00413)	ND (0.00282)	0.00550 KJ (0.00940)	ND (0.00288)	ND (0.00407)	ND (0.00179)
10-MW-01	0.0122 KJ (0.0276)	ND (0.00453)	ND (0.00728)	ND (0.00285)	0.00240 KJB (0.00393)	ND (0.00244)	ND (0.00418)	ND (0.00331)	ND (0.00381)
10-MW-03	ND (0.00288)	ND (0.00358)	0.00970 KJ (0.0125)	ND (0.00230)	ND (0.00270)	0.00450 P (0.00181)	ND (0.00275)	ND (0.00390)	0.00650 (0.00172)
Control Tower Drum Storage Area									
13-MW-37	ND (0.00299)	ND (0.00344)	ND (0.00367)	ND (0.00411)	ND (0.00280)	0.000100 KJ (0.00935)	ND (0.00286)	ND (0.00405)	ND (0.00178)
13-MW-38	ND (0.00305)	0.00500 P (0.00351)	0.0126 KJ (0.0133)	0.0177 (0.00419)	0.00790 (0.00286)	0.0555 (0.00954)	ND (0.00292)	0.00710 P (0.00413)	0.0133 (0.00182)

Pesticide Data From Other Investigations at Galena Airport

Sample ID	Analyte	4,4'-DDE (µg/kg)	4,4'-DDT (µg/kg)	4,4'-DT (µg/kg)	Aldrin (µg/kg)	Dieldrin (µg/kg)	Heptachlor epoxide (µg/kg)	alpha-BHC (µg/kg)	beta-BHC (µ/kg)	gamma-BHC (µg/kg)
	Industrial RBC	12,000	8,400	8,400	170	180	310	450	1,600	2,200
	Residential RBC	2,700	1,900	1,900	40	40	70	100	350	490
Ecology and Environment, 1992 (Industrial)										
(FAA-GAL-) SV-004		ND (2,000)	ND (2,000)	5,000 (5,000)	ND (1,000)	ND (2,000)	ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)
(FAA-GAL-) SV-008 (dup)		ND (2,000)	ND (2,000)	ND (5,000)	ND (1,000)	ND (2,000)	ND (1,000)	ND (1,000)	ND (1,000)	ND (1,000)
(FAA-GAL-) SV-010		ND (20)	ND (20)	220 (50)	ND (10)	ND (20)	ND (10)	ND (10)	ND (10)	ND (10)
USAF, 1993 (Industrial)										
(GA-K005-) A-101		36 P (3.6)	ND (3.6)	4.1 P (3.6)	ND (1.8)	ND (3.6)	ND (1.8)	ND (1.8)	ND (1.8)	ND (1.8)
(GA-K005-A-) 103		51 P (3.7)	ND (3.7)	33 P (3.7)	1.8 J (1.8)	3.7 J (3.7)	1.8 J (1.8)	1.8 J (1.8)	1.8 J (1.8)	1.8 J (1.8)
(GA-K005-) A-105		11 P (3.5)	5.0 P (3.5)	150 (35)	ND (1.7)	ND (3.5)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)
(GA-K005-) A-502		ND (3.8)	ND (3.8)	ND (3.8)	ND (1.9)	ND (3.8)	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)
(GA-K005-) A-504		ND (4.1)	ND (4.1)	ND (4.1)	ND (2.1)	ND (4.1)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)
(GA-K005-) A-506		ND (3.4)	ND (3.4)	ND (3.4)	ND (1.7)	ND (3.4)	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.7)
(GA-K005-) A-001		64 P (34)	4.7 J (34)	130 (34)	ND (17)	ND (34)	ND (17)	17 J (17)	ND (17)	ND (17)
(GA-K005-) A-002		2.8 JP (3.4)	1.1 J (3.4)	24 P (3.4)	1.7 J (1.7)	3.4 J (3.4)	1.7 J (1.7	1.7 J (1.7)	1.7 J (1.7)	1.7 J (1.7)
(GA-E005-) A-012		3.6 J (3.6)	3.6 J (3.6)	3.6 J (3.6)	0.76 J (1.8)	ND (3.6)	ND (1.8)	1.8 J (1.8)	1.8 J (1.8)	ND (1.8)
(GA-E005-) A-013		3.7 J (3.7)	3.7 J (3.7)	3.7 J (3.7)	ND (1.8)	ND (3.7)	ND (1.8)	1.8 J (1.8)	1.8 J (1.8)	ND (1.8)
(GA-E005-) A-121		220 (42)	21 (4.2)	63 P (4.2)	ND (2.1)	ND (4.2)	ND (2.1)	ND (2.1)	ND (2.1)	ND (2.1)
(GA-E005-) A-122		1,700 (87)	40 J (87)	410 (87)	ND (44)	ND (87)	ND (44)	44 J (44)	ND (44)	ND (44)
(GA-E005-) A-123		630 (73)	29 J (73)	170 (73)	ND (37)	ND (73)	ND (37)	37 J (37)	ND (37)	ND (37)
(GA-E005-) A-124		140 (36)	14 J (36)	210 (36)	ND (18)	ND (36)	ND (18)	18 J (18)	ND (18)	ND (18)

Section 4
RESULTS OF REMEDIAL INVESTIGATION—CAMPION AS

Campion AS is located approximately 6 miles to the ESE of Galena Airport (see Figure 1.0-1). This installation was once a long-range radar station covering 2,395 acres. Active from 1951 to 1984, the radar operations formerly conducted at Campion AS were moved to Galena AFS (now Galena Airport) following deactivation in October 1984. The facility was demolished in 1986, and the surface was graded smooth.

Several sites have been identified and investigated during RI activities at Campion AS. With the exception of one, the Campion POL Area (ST007), all of these sites have been recommended for no further action.

4.1 Campion AS NFRAP-Status Sites

Four IRP sites at Campion AS have been investigated and determined to require no additional response actions:

- Waste Accumulation Area No. 1 (SS002);
- Waste Accumulation Area No. 2 (SS003);
- White Alice Site (OT006); and
- Barge Landing Area (SS008).

These sites have been shown to be areas below action levels (ABALs) and are therefore eligible for NFRAP status.

4.1.1 Background

The Air Force has been conducting an investigation at Campion AS, located in central Alaska. During the PA conducted in 1985 (USAF, 1985) the following seven sites were identified as areas of potential hazardous substance release and added to the WIMS-ES database:

- Waste Accumulation Area No. 1 (SS002);
- Waste Accumulation Area No. 2 (SS003);
- Landfill No. 1 (LF004);
- Landfill No. 2 (LF005);
- White Alice Site (OT006);
- POL Area (ST007); and
- Barge Landing Area (SS008).

These sites were then investigated under the Air Force IRP (USAF, 1989a, 1991). In the final reports, the Air Force recommended that all sites, except the POL Area (ST007), be considered for No Further Action Decisions (NFADs). In response, the State of Alaska Department of Environmental Conservation (DEC) approved the NFAD status for the Waste Accumulation Area No. 1, but requested that additional data be collected at the remaining five proposed NFAD sites before they could be approved.

4.1.2 Investigation Activities and Findings

During the summer of 1993, additional field activities were conducted at the proposed NFAD sites to collect the data requested by the Alaska DEC:

- A soil gas survey and confirmational water sampling were conducted at the Waste Accumulation Area No. 2.
- The Campion White Alice Site was located via aerial photographs and field reconnaisance. A surface soil sampling grid was established at this site, and 15 soil samples were field screened for PCBs using an immunoassay test kit.
- A soil gas survey, covering two separate parts of the Barge Landing Area, was conducted, and surface and subsurface soil, surface water, and Geoprobe groundwater sampling was conducted.

No activities were conducted at the two landfills (LF004 and LF005), which are being addressed by the USAF under the compliance program.

A review of 1993 field data and analytical results from the laboratory supported the NFAD at each of the three sites. Contamination at the Waste Accumulation Site No. 2 was limited to one sample for pentachlorophenol at 1.91 μg/L. This compound was not detected at the other two sampling locations at that site. The White Alice Site showed no detection (< 1 ppm) of PCBs in any sample. Lastly, soil, groundwater, and surface water samples at the Barge Landing Area did not show contaminant levels above regulatory criteria.

4.1.3 Conclusions

The USAF has demonstrated that the following IRP sites, located at Campion AS, are ABALs:

- Waste Accumulation Area No. 2 (SS003);
- White Alice Site (OT006); and
- Barge Landing Area (SS008).

The Alaska DEC has concurred with the findings of the additional investigations at these sites. Therefore, these sites should be considered as NFRAP-status sites.

4.2 POL Area (ST007)

ST007 is the former Campion AS POL Tank Farm. The location of this site is shown in Figure 1.1-2.

The conceptual diagram for the Campion POL is presented in Figure 4.2-1. This diagram provides a plan view, a geologic cross section, and a table that lists the maximum concentration for analytes that have exceeded their respective screening criteria. The plan view shows the location of all analytical data points (surface soil samples, surface water samples, soil borings, sediment samples, and monitoring well locations). The area of soil contamination is shown as an overlay to the plan view. The area of soil contamination is defined by soil gas results that exceeded 50 ppmV volatile organics. The plan view and the lithologic cross section can be used in conjunction to provide a three-dimensional visualization of site characteristics.

4.2.1 Site Description

The main base area of Campion AS was situated on a high river terrace, and the POL Tank Farm was located within a diked area between the former installation and a lower, marshy area to the east. For a more detailed discussion of the local geology and hydrology, refer to Section 2.

Before the installation was abandoned, several fuel oil tanks were situated within the bermed platform that made up the Campion POL Area. A smaller, outer dike was built around the southeastern end of the POL Area. Four 6-in.-diameter culverts penetrated the inner dike, apparently to allow accumulated rain and melt water to drain from the tank farm.

Figure 4.2-2 shows a photograph of the Campion POL Area as it looked during the investigation. The tank farm area and dike were constructed of fill and were sparsely vegetated with squirrel grass and some small willows. The low-lying area to the east contains two poorly defined drainages where standing water occurs. The vegetation of the marshy area consists mainly of grasses, moss, and rushes. The surface geology within the drainage consists of up to several inches of partially decomposed moss (peat) and other vegetation overlying fine, well-sorted organic-rich silt. Bordering the drainages are higher and dryer areas characterized by more diverse and thicker vegetation. Trees and shrubs in these areas include alders, birch, and black spruce; ground vegetation consists of low-bush cranberries, labrador tea, mosses, and lichens.

4.2.2 Background

Although the rest of the installation was demolished in 1986, four bulk storage tanks remained in the POL Area until 1989, when the City of Galena removed them. During the 1985 Phase I investigation, interviews revealed that several spills and leaks occurred at this site, and seepage was observed outside the diked area (USAF, 1985). Spillage from the POL Area escaped through a break in the outer dike, allowing a surface sheen of petroleum hydrocarbons to migrate eastward into a marshy area (USAF, 1989a). In 1986, a test boring was drilled on the upgradient (west) side of the POL Area and two monitoring wells were installed downgradient (east). In 1987, two test borings were drilled to the south and southeast of the monitoring wells. The ground surface at each of the boring locations was reported to be saturated with petroleum and displayed a characteristic sheen and odor. A soil gas survey conducted in 1988 showed widespread BTX (benzene, toluene, and xylene) contamination at the site (USAF, 1989a). Table 4.2-1 summarizes the previous investigations conducted at the Campion POL Area.

4.2.3 Investigation Results and Discussion

During 1992 and 1993, four monitoring wells were installed; three soil borings were drilled; surface soil, water, and sediment samples

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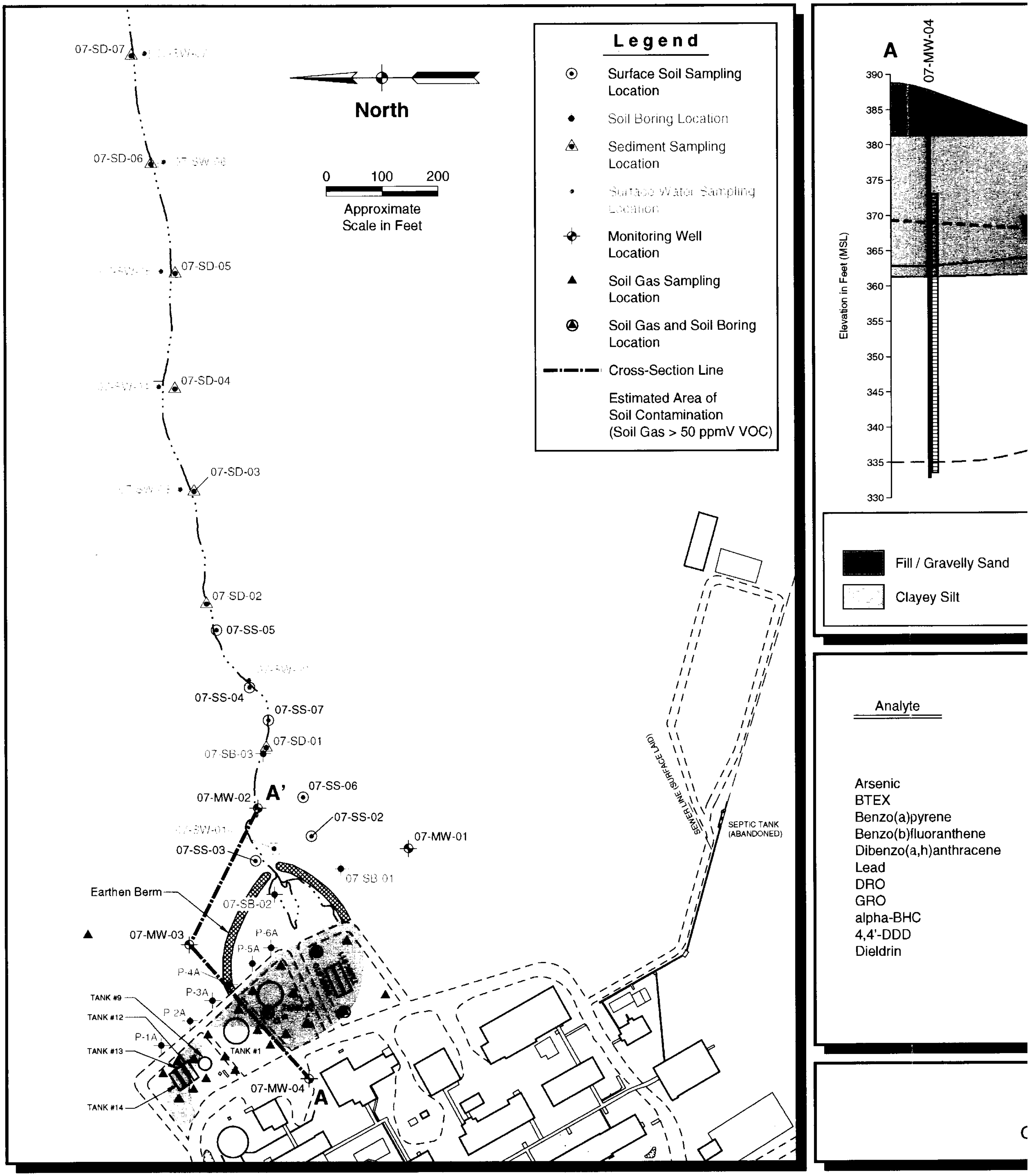
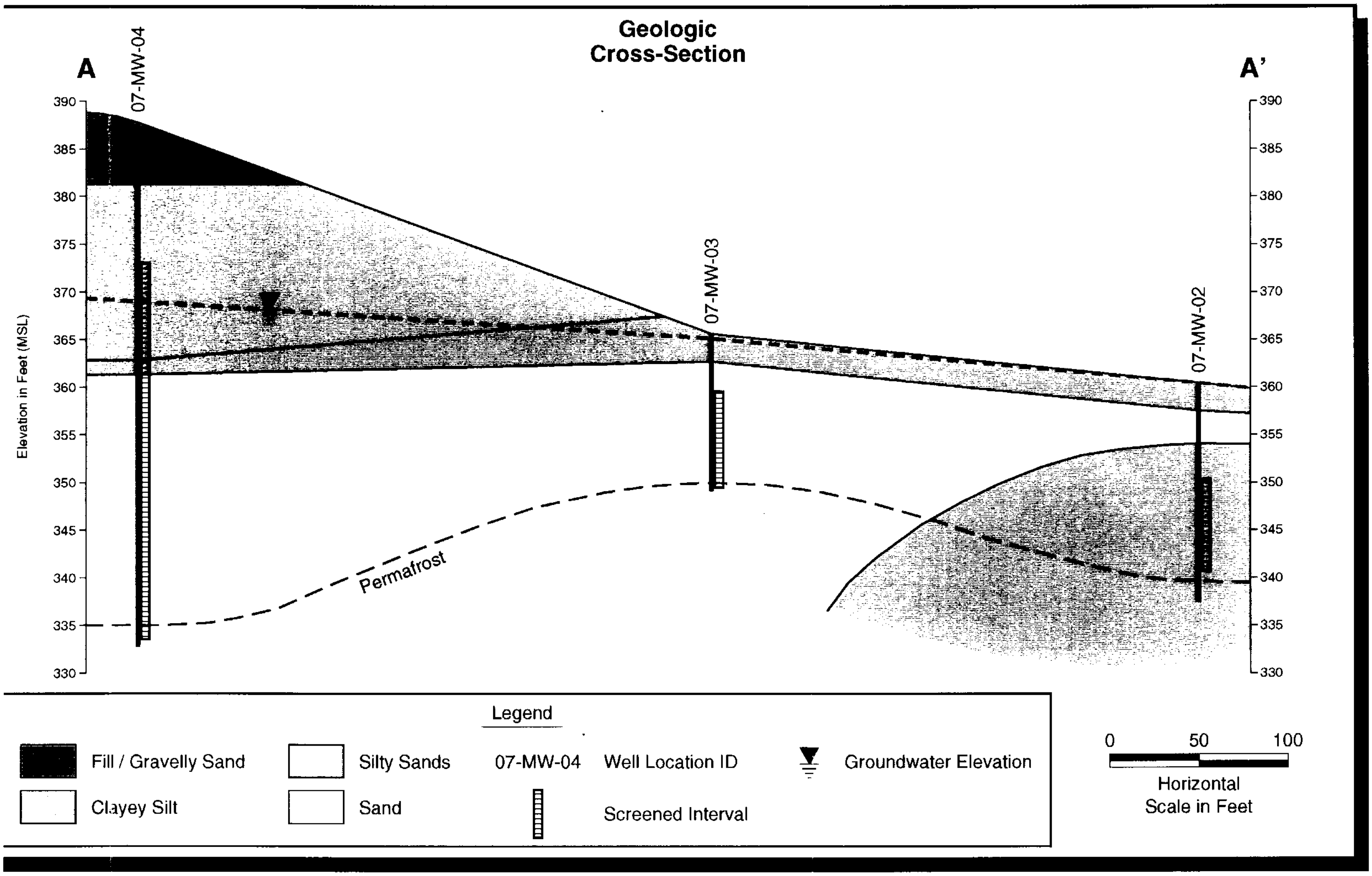


Legend
Surface Soil Sampling Location
Soil Boring Location
Sediment Sampling Location
Surface Water Sampling Location
Monitoring Well Location
Soil Gas Sampling Location
Soil Gas and Soil Boring Location
Cross-Section Line
Estimated Area of Soil Contamination (Soil Gas > 50 ppmV VOC)
North
0 100 200
Approximate Scale in Feet
07-SD-07
07-SD-06
07-SD-05
07-SD-04
07-SD-03
07-SD-02
07-SS-05
07-SS-04
07-SS-07
07-SD-01
07-SB-03
07-MW-02
A'
07-SS-06
07-SS-02
07-MW-01
07-SS-03
07 SB 01
Earthen Berm
07-SB-02
07-MW-03
P-6A
P-5A
P-4A
P-3A
P 2A
P-1A
TANK #9
TANK #12
TANK #13
TANK #14
TANK #1
07-MW-04
A
SEWER LINE (SURFACE LAID)
SEPTIC TANK (ABANDONED)
A
07-MW-04
390
385
380
375
370
365
360
355
350
345
340
335
330
Elevation in Feet (MSL)
Fill / Gravelly Sand
Clayey Silt
Analyte
Arsenic
BTEX
Benzo(a)pyrene
Benzo(b)fluoranthene
Dibenzo(a,h)anthracene
Lead
DRO
GRO
alpha-BHC
4,4'-DDD
Dieldrin



Compounds Exceeding Screening Criteria

Analyte	Soils: Screening Criteria (µg/kg)	Soils: Range of Detections (µg/kg)	Waters: Screening Criteria (µg/L)	Waters: Range of Detections (µg/L)
Arsenic	23,000 RN	4,600 - 72,000		
BTEX	15,000 AK	210 - 33,900		
Benzo(a)pyrene	88 RC	103 - 519		
Benzo(b)fluoranthene	880 RC	3 - 956		
Dibenzo(a,h)anthracene	88 RC	90		
Lead			0.015 M	0.010 - 0.046
DRO	200,000 AK	3.6×10^{4} - 7.5×10^{7}		
GRO	100,000 AK	5.9×10^{4} - 6.5×10^{6}		
alpha-BHC			0.011 RN	0.020
4,4'-DDD			0.28 RC	0.030 - 0.81
Dieldrin			0.0042 RC	0.0109 - 0.0137

Key:
AK - State of Alaska Cleanup Standard
RN - EPA Region III Risk-Based Concentration, Non-Carcinogenic
RC - EPA Region III Risk-Based Concentration, Carcinogenic
M - Maximum Contaminant Level

Campion AS - POL Area

Conceptual Diagram and Summary of Compounds Exceeding Screening Criteria

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Figure 4.2-1. Conceptual Diagram for the Campion POL Area (ST007)

Figure 4.2-2. A Photograph of the Campion POL Area

Table 4.2-1
Summary of Previous Investigations and Findings—Campion POL Area

Activities		Analyses Performed	Maximum Level of Contamination		Comments
1985[a]	Records search.				
1986-87[b]	Installed and sampled 2 ground water monitoring wells and 3 test borings, sampled surface soils in identified stained areas. Drafted preliminary RI/FS document.	Purgeable halocarbons and purgeable aromatics--waters; TPH--all samples.	**Water:** TPH 1,1-DCA MEK Benzene Toluene Ethylbenzene **Soil:** TPH Xylene	 5.2 mg/L 0.1 µg/L 4.5 µg/L 0.5 µg/L 3.5 µg/L 0.6 µg/L 597 mg/kg 1.181 µg/kg	Estimated area of contamination reported to be 300 ft by 150 ft by 1 ft deep.
1988[b]	Conducted soil gas survey.	BTX.	BTX	1000 ppmV	
1989[b]	Collected 2 surface water samples and 1 groundwater sample.	TPH and dissolved lead.	TPH	2 mg/L	
1990[b]	Collected 2 surface water samples and 18 surface soil samples.	Purgeable halocarbons and purgeable aromatics--waters; TPH and lead--soils.	**Soil:** TPH	 16,000 mg/kg	

Notes: [a] USAF, 1985. [b] USAF, 1989a, 1991.

were collected; and a soil gas survey was conducted to determine the extent of contamination at the Campion POL. No RI activities have been conducted at this site since 1994. The RI sampling locations are shown in Figure 4.2-1. The analytical data for 1992 and 1993 soil and water samples for the Campion POL Area are summarized in the attachment to Section 4.2, located at the end of this section.

Results of the soil gas survey conducted at the Campion POL Area indicate that contamination centered on the former locations of Tanks 2, 10, and 11 and the abandoned tank saddles in the southern part of the diked area. Figure 4.2-3 shows the locations and results of soil gas screening, as well as the results of field laboratory screening. Soil gas concentrations in the southern part of the POL Area were found to be as high as 1,000 ppmV. Soil gas concentrations in the northern part of the POL Area were generally lower (from 0 to 80 ppmV), but one point to the east of the former location of Tank 14 had a concentration of 680 ppmV. This may be the result of a localized surface spill in that area.

On the basis of the soil gas screening results, soil samples from three different depths at each of three locations were collected for laboratory analysis. The points chosen for laboratory analysis are shown in Figure 4.2-3, and the results are summarized in the attachment to this section. In general, laboratory data showed fairly good correlation to soil gas data. Soil gas samples from POL-1 and POL-21 contained 360 and 380 ppmV VOCs, respectively, and soil samples from the 4- to 8-ft depths at these locations were found to contain concentrations of DRO, GRO, and some BTEX compounds above State of Alaska cleanup levels. Soil samples collected from within the top 1 ft at these two locations did not contain any petroleum-related compounds above the screening criteria, indicating a subsurface origin, surface volatilization of contaminants, or the recent introduction of clean fill material during site demolition. There was no evidence of the latter. Although the soil gas sample collected at POL-19 was reported to contain 380-ppmV volatile organics, no DRO, GRO, or BTEX compounds were detected above the State of Alaska cleanup levels in subsurface soil samples from this location. Soil samples collected at a 1-ft depth at POL-19 were found to contain levels of benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene that exceeded their screening criteria. Benzo(a)-pyrene was above the residential RBC of 88 μg/kg in the deepest sample collected at that location (8 ft).

To determine whether contamination is seeping from the diked area, six soil samples were collected at the outside base of the dike for analysis using field IR methods. Figure 4.2-3 shows the location of these samples. Field screening data indicated that elevated levels of TPH (up to 20,667 ppm) are present in the shallow soils immediately outside of the main POL dike. Three of these samples were chosen to be sent to the laboratory for confirmation. Surface soil samples from POL-3A and -4A were found to contain high concentrations of DRO, GRO, and BTEX, consistent with the findings of the field laboratory. The soil sample from POL-5A did not contain any of these constituents above their respective screening criteria, and was found to contain only 14-ppm TPH using the field IR method.

During the 1992 field season, two sediment samples were collected in the drainage to the east of the POL. In 1993, five additional sediment samples were collected to further define the extent of off-site migration. These samples were collected along the drainage beginning 200 ft downgradient of the farthest downstream sample collected in 1992 and continuing every 200 ft for 1,000 ft (see Figure 4.2-1). Some of the soil and sediment samples were found to contain elevated concentrations of GRO and/or BTEX compounds,

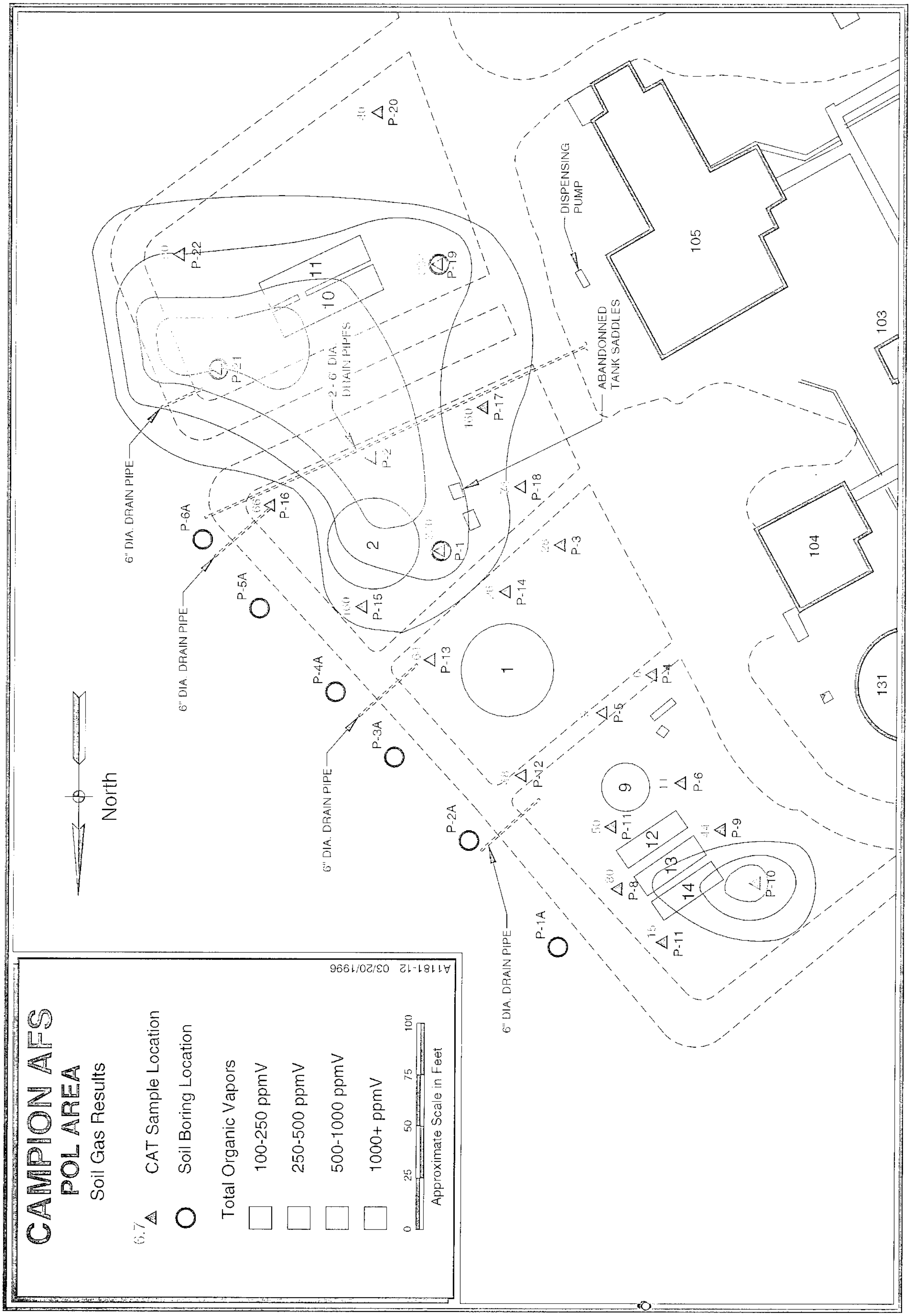

Figure 4.2-3. Soil Gas Survey Results for the Campion POL Area (ST007)

as well as DRO, indicating the presence of fuel contamination at this site. Most of these samples were collected in or near the POL Tank Farm.

Several of the sediment samples collected along the drainage were found to contain DRO above the screening criteria, but not significant concentrations of GRO or BTEX compounds. Surface water samples collected at these same locations also contained DRO but did not contain elevated levels of GRO or BTEX compounds. It is possible that some of the DRO data reflect interferences from naturally occurring organic matter. Naturally occurring compounds are cited in the method as known sources of interference (State of Alaska, 1994). Both the surface water and sediment at Campion appear to have a very high natural organic content.

No BTEX compounds were detected above the screening criteria in water samples from the Campion POL Area. Although BTEX has been detected at only very low concentrations in groundwater and surface water at this site, DRO have been detected at concentrations well above the detection limit. Monitoring well 07-MW-03 and the four surface water samples closest to the POL area (07-SW-01 through -04) contained DRO in concentrations ranging from 1,000 to 3,500 µg/L. No other water samples contained DRO or GRO above the SQL.

Lead was detected in one 1992 groundwater and one 1992 surface water sample at concentrations above the MCL (0.015 mg/L). These samples also exceeded the respective lead UTLs for groundwater and surface water. Lead concentrations were not detected above the UTL in 1993 water samples, but were detected at low levels in 1993 method blanks. Bis(2-ethylhexyl)phthalate was also detected at very low concentrations (less than the MCL of 6 µg/L) in 1992 and 1993 water samples from the Campion POL Area.

The results of RI sampling indicate the presence of low levels of pesticides in all media collected from the site. None of the solid samples—surface soils, subsurface soils, or sediments—were found to contain pesticides above the screening criteria. However, both groundwater and surface water samples were found to contain pesticides above the screening criteria. Those pesticides that were most commonly detected were aldrin, alpha-BHC, and dieldrin. Several of these compounds occurred in concentrations very near the SQLs. Both aldrin and dieldrin were detected in blanks at concentrations similar to those reported for the samples.

4.2.4 Conclusions

This site is an area of petroleum hydrocarbon contamination that has apparently originated from leaks and spills in the Campion POL Area. The results of the 1993 soil gas survey indicate that the center of fuel contamination is located in the southern half of the POL Area at the former locations of fuel oil tanks No. 2, No. 10, and No. 11. Although groundwater is very close to the surface at this site, the hydrocarbon contamination has not resulted in groundwater BTEX concentrations in excess of MCLs. A petroleum-type sheen has been noted on the surface water downgradient of the site on several occasions; however, no related compounds have been detected above the screening criteria in surface water samples. Contamination that may have been present in surface water during and shortly after any releases may have since washed downstream of sampling locations.

Surface and subsurface soils and sediments from this site contain DRO, GRO, and BTEX compounds in excess of screening criteria. Several of the sediment samples collected downgradient of the site contain DRO in excess of the State of Alaska cleanup levels but little GRO or BTEX. It is possible that DRO detections in some samples from the Campion POL are a result of interference from naturally occurring organic matter.

Low levels of pesticides have been detected in all media from the site and are probably associated with base-wide spraying of various compounds for mosquito control.

4.2.5 Recommendations

An IRA has been conducted at the Campion POL Area to remove the contaminated soil that occurred within the former fuel oil storage tank area. This action removed a continuing source of contamination. It is recommended that the site now be allowed to recover naturally.

ATTACHMENT TO SECTION 4.2

CAMPION POL AREA
DATA SUMMARY TABLES

HOW TO USE THE DATA

The data presented in the following tables have been screened as discussed in Section 1.3. Data presented are for those analytes that exceeded the screening criteria in any sample of a given matrix (soil or water) at the site or source area. For ease of comparison, the analytes presented for 1992, 1993, and 1994 for a given matrix and site are the same. The following tables provide an explanation for the screening criteria source codes, data flags, and sample types presented in the data summary tables.

Screening Criteria Source Codes

Screening Criteria	Code
State of Alaska Cleanup Levels	AK
Maximum Contaminant Level (MCL)	M
EPA Region III Risk-Based Concentrations (RBC), Carcinogenic Level	RC
EPA Region III RBC, Noncarcinogenic Level	RN
EPA Lead Guidance (EPA, 1994)	EL

Sample Type Code

Sample Type	ID Code
Surface Soil	SS
Soil Boring	SB
Sediment	SD
Hand Auger	HA
Groundwater from Monitoring Well	MW
Groundwater from Water Supply Well	GW
Surface Water	SW

Data Flags

Flag	Definition
NA	Sample was not analyzed for indicated parameter.
ND	Not detected—no instrument response for analyte or result was less than zero.
<	The sample quantitation limit (SQL) is reported because the result is below the SQL and is less than one-half the screening criteria.
( )	SQL—calculated based on the method detection limit (determined according to 40 CFR), QA/QC results (see Appendix B), and preparation, analytical, and moisture factors.
B	Analyte concentration in the sample is not distinguishable from results reported for the method blanks.
E	Analyte concentration exceeded calibration curve but did not saturate detector, therefore data are usable.
F	Interference or coelution suspected.
J	Reported analyte concentration is less than SQL.
K	Peak did not meet method identification criteria—analyte not detected on both primary and secondary GC columns.
L	Analyte concentration may be biased low—see Appendix B (QA/QC) for details.
P	Analyte identification is not confirmed because the quantitation from primary and secondary GC columns differ by greater than a factor of three. The lower result is reported since the higher result is generally due to coelution with a nontarget analyte.
R	Result has been invalidated—see Appendix B (QA/QC) for details.
S	Analyte concentration was obtained using the method of standard additions.
T	Second-column confirmation analysis was not performed.
X	One or more surrogate recoveries outside of control limits. Potentially affected analytes are flagged with an X.
Z	Oily drops suspended in extract. A homogenized extract aliquot was analyzed.
	Shaded cells indicate that the result exceeds the screening criterion (values are presented in Appendix A).
____	Underlined results exceed the UTLs (inorganic analytes only). The UTLs are given in Section 2.0 and Appendix D.

Campion POL Area 1992 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth													
			07-MW-01 5-6.5 ft.	07-MW-02 2-4 ft.	07-MW-03 1.5-3 ft.	07-MW-04 10-12 ft.	07-SB-01 3-5 ft.	07-SB-02 3-5 ft.	07-SB-03 3-5 ft.	07-SD-01 0-0.5 ft.	07-SD-02 0-0.5 ft.	07-SS-01 0-0.5 ft.	07-SS-02 0-0.5 ft.	07-SS-03 0-0.5 ft.	07-SS-04 0-0.5 ft.	07-SS-05 0-0.5 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	19 B (18)	21 B (15)	6,500 (0.1)	ND (11)	14 B (13)	17 B (15)	ND (13)	ND (1,400)	ND (84)	3,300 (1,200)	ND (25)	420 (50)	ND (65)	ND (95)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	72 (35)	3,600 (760)	14,000 (3,100)	94 (22)	160 (26)	790 (300)	36 (27)	26,000 (5,600)	1,600 (480)	39,000 (4,700)	820 (170)	21,000 (2,200)	1,700 (120)	44,000 (9,500)
4,4'-DDD	SW8080 (µg/kg)	2,700 RC	1.5 (0.59)	85 (0.51)	71 (0.53)	67 (1.9)	4.4 (0.43)	11 (0.50)	ND (0.45)	1300 (9.4)	330 (1.6)	390 (7.8)	450 (2.9)	830 (15)	210 (2.2)	1,100 (33)
Dieldrin		40 RC	ND (0.59)	ND (0.51)	ND (0.53)	ND (0.38)	ND (0.43)	ND (0.50)	0.32 PJB (0.45)	20 P (9.4)	ND (1.6)	ND (0.39)	ND (2.9)	ND (0.76)	ND (2.2)	ND (1.6)
Benzene	SW8240 (µg/kg)	500 A	ND (8.9)	ND (7.7)	ND (160)	130 (14)	ND (6.5)	ND (7.5)	ND (6.7)	ND (140)	ND (24)	ND (130)	ND (13)	ND (25)	ND (32)	ND (25)
Ethylbenzene		15,000 AK-BTEX	ND (8.9)	ND (7.7)	1,200 (160)	ND (14)	ND (6.5)	ND (7.5)	ND (6.7)	ND (140)	ND (24)	41 J (130)	ND (13)	27 (25)	ND (32)	ND (25)
Toluene		15,000 AK-BTEX	ND (8.9)	0.89 JB (7.7)	35 J (160)	75 (14)	ND (6.5)	0.42 JB (7.5)	ND (6.7)	ND (140)	ND (24)	170 (130)	ND (13)	5.4 J (25)	ND (32)	ND (25)
Total Xylenes		15,000 AK-BTEX	ND (8.9)	ND (7.7)	3,500 (160)	5.1 J (14)	ND (6.5)	ND (7.5)	ND (6.7)	ND (140)	ND (24)	23,000 (330)	ND (13)	300 (25)	ND (32)	ND (25)
Benzo(a)anthracene	SW8310 (µg/kg)	880 RC	1.1 J (2.3)	ND (20)	ND (20)	ND (1.5)	2.6 (1.7)	2.7 (1.9)	3.4 (1.7)	11 (6.1)	ND (10)	1.5 J (2.5)	ND (20)	ND (4.9)	2.2 J (2.9)	ND (11)
Benzo(a)pyrene		88 RC	1.5 J (4.1)	ND (35)	ND (36)	ND (2.6)	2.0 J (2.9)	2.3 J (3.4)	2.8 J (3.0)	5.1 J (11)	5.6 J (18)	2.0 J (4.5)	ND (35)	ND (8.7)	2.4 J (5.1)	8.4 J (19)
Benzo(b)fluoranthene		880 RC	6.5 (3.2)	ND (27)	ND (28)	3.0 (2.0)	8.4 (2.3)	ND (2.6)	10 (2.4)	22 (8.4)	ND (14)	2.4 J (3.5)	ND (27)	ND (6.8)	4.7 (4.0)	ND (15)
Dibenzo(a,h)anthracene		88 RC	ND (5.3)	18 J (45)	ND (47)	ND (3.4)	ND (3.8)	ND (4.4)	ND (4)	ND (14)	ND (24)	1.6 J (5.9)	ND (45)	ND (11)	ND (6.7)	ND (25)
Arsenic	SW7060 (mg/kg)	23 RN	13 (1.0)	5.9 (0.39)	8.2 (0.88)	9.0 (0.66)	14 (1.1)	7.2 (0.72)	9.0 (0.64)	12 (1.3)	10 (1.3)	8.7 (0.70)	72 (4.7)	4.6 (0.66)	35 (3.3)	32 (2.8)

Campion POL Area 1993 Soil Data

Analyte	Method (Units)	Screening Criteria	Location ID/Depth									
			07-SD-03 0-0.5 ft.	07-SD-04 0-0.5 ft.	07-SD-05 0-0.5 ft.	07-SD-06 0-0.5 ft.	07-SD-07 0-0.5 ft.	07-SS-06 0-0.5 ft.	07-SS-07 0-0.5 ft.	07-HA-01 (POL-19) 0-1 ft.	07-HA-01 (POL-19) 4 ft.	07-HA-01 (POL-19) 8 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	59 (10)	110 (10)	88 (10)	ND (10)	9 J (10)	NA	NA	ND (10)	NA	ND (10)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	7,200 (20)	75,000 (20)	760 (20)	9 JB (20)	640 (20)	NA	NA	5 JB (20)	ND (20)	19 JB (20)
4,4'-DDD	SW8080 (µg/kg)	2,700 RC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin		40 RC	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	SW8240 (µg/kg)	500 AK	ND (200)	ND (400)	ND (300)	ND (400)	ND (200)	NA	NA	ND (1.14)	NA	ND (1.47)
Ethylbenzene		15,000 AK-BTEX	ND (200)	ND (400)	ND (300)	ND (400)	ND (200)	NA	NA	ND (1.10)	NA	ND (1.41)
Toluene		15,000 AK-BTEX	ND (200)	ND (400)	ND (300)	ND (400)	ND (200)	NA	NA	ND (2.26)	NA	ND (2.91)
Total Xylenes [a]		15,000 AK-BTEX	ND (500)	ND (1,200)	ND (900)	ND (1,300)	ND (500)	NA	NA	ND (5.09)	NA	1.83 J (6.55)
Benzo(a)anthracene	SW8270 (µg/kg)	880 RC	ND (588)	ND (1,680)	ND (170)	ND (57.4)	ND (769)	NA	NA	499 (17.0)	NA	130 (66.5)
Benzo(a)pyrene		88 RC	ND (437)	ND (1,250)	ND (127)	ND (42.7)	ND (572)	NA	NA	519 (19.6)	NA	103 (76.7)
Benzo(b)fluoranthene		880 RC	ND (650)	ND (1,860)	ND (188)	ND (63.5)	ND (850)	NA	NA	956 F (34.3)	NA	207 F (134)
Dibenzo(a,h)anthracene		88 RC	ND (541)	ND (1,550)	ND (157)	ND (52.9)	ND (708)	NA	NA	89.6 (30.6)	NA	ND (120)
Arsenic	SW7060 (mg/kg)	23 SN	5.72 (0.172)	8.41 (0.437)	32.3 (0.443)	15.1 (0.376)	8.71 (0.221)	10.4 (0.161)	8.04 (0.188)	NA	NA	NA

Campion POL Area 1993 Soil Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID/Depth								
			07-HA-02 (POL-21) 1 ft.	07-HA-02 (POL-21) 4 ft.	07-HA-02 (POL-21) 6 ft.	07-HA-03 (POL-1) 1 ft.	07-HA-03 (POL-1) 4 ft.	07-HA-03 (POL-1) 8 ft.	07-HA-10 (POL-3A) 0.5-1 ft.	07-HA-11 (POL-4A) 0.5-1 ft.	07-HA-12 (POL-5A) 0.5-1 ft.
Gasoline Range Organics	AKGRO (mg/kg)	100 AK	ND (10)	610 (10)	940 910)	ND (10)	NA	5 J (10)	1,300 (10)	1,500 (10)	ND (10)
Diesel Range Organics	AKDRO (mg/kg)	200 AK	ND (20)	5,600 (20)	2,600 (20)	4 JB (20)	3,500 (20)	13 JB (20)	17,000 (20)	1,200 (20)	170 (20)
4,4'-DDD	SW8080 (µg/kg)	2700 RC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin		40 RC	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	SW8240 (µg/kg)	500 AK	ND (1.15)	ND (5.65)	ND (51.3)	ND (1.20)	NA	ND (5.85)	364 (7.26)	218 (7.64)	ND (2.02)
Ethylbenzene		15,000 AK-BTEX	ND (1.10)	ND (5.42)	340 (54.0)	ND (1.15)	NA	ND (5.62)	6,520 (62.6)	1,340 X (7.34)	ND X (1.94)
Toluene		15,000 AK-BTEX	ND (2.27)	ND (11.2)	134 (59.2)	ND (2.37)	NA	ND (11.6)	580 (14.4)	77.7 (15.1)	ND (4.00)
Total Xylenes [a]		15,000 AK-BTEX	1.40 J (5.12)	470 (25.2)	13,500 (125)	ND (5.33)	NA	20.5 J (26.1)	26,400 E (144)	27,300 E (161)	ND X (9.00)
Benzo(a)anthracene	SW8270 (µg/kg)	880 RC	17.8 (17.1)	ND (522)	ND (498)	ND (477)	NA	ND (465)	ND (632)	ND (700)	ND (872)
Benzo(a)pyrene		88 RC	15.8 J (19.7)	ND (602)	ND (575)	ND (551)	NA	ND (537)	ND (730)	ND (807)	ND (1010)
Benzo(b)fluoranthene		880 RC	46.8 F (34.5)	ND (1,050)	ND (1,010)	ND (965)	NA	ND (941)	ND (1,280)	ND (1,420)	ND (1,760)
Dibenzo(a,h)anthracene		88 RC	ND (30.9)	ND (942)	ND (900)	ND (862)	NA	ND (840)	ND (1,140)	ND (1,260)	ND (1,580)
Arsenic	SW7060 (mg/kg)	23 SN	NA	NA	NA	NA	NA	NA	NA	NA	NA

[a]Total xylenes are the sume of m&p-xylenes and o-xylene.

Campion POL Area 1992 Water Data

Analyte	Method (Units)	Proposed Action Level	Location ID					
			07-MW-01	07-MW-02	07-MW-03	07-MW-04	07-SW-01	07-SW-02
Gasoline Range Organics	SW8020mod (µg/L)	NA	ND (100)	ND (100)	ND (500)	ND (100)	ND (100)	ND (100)
Diesel Range Organics	SW8015ME (µg/L)	NA	ND (200)	ND (190)	2,300 (190)	ND (220)	3,500 (950)	2,900 (400)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)	ND (2,000)
Aldrin	SW8080 (µg/L)	0.0040 RC	0.014 B (0.0098)	ND (0.0095)	ND (0.0096)	ND (0.010)	0.019 B (0.0095)	ND (0.0095)
alpha-BHC		0.011 RN	ND (0.0098)	ND (0.0095)	0.020 (0.0096)	0.0077 JB (0.010)	0.020 (0.0095)	0.0058 PJB (0.0095)
4,4'-DDD		0.28 RC	ND (0.0098)	ND (0.0095)	0.030 (0.0096)	ND (0.010)	0.81 (0.0095)	0.34 (0.0095)
Dieldrin		0.0042 RC	0.012 (0.0098)	ND (0.0095)	0.0053 KJB (0.0096)	0.0074 KJB (0.010)	ND (0.0095)	0.011 (0.0095)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	3.5 JB (9.8)	ND (9.5)	ND (9.7)	ND (10)	0.72 JB (9.4)	4.3 JB (9.4)
Lead	SW7421 (mg/L)	0.015 M	0.017 (0.0030)	ND (0.0030)	0.0034 B (0.0030)	ND (0.0030)	0.046 (0.0030)	0.010 (0.0030)

Campion POL Area 1993 Water Data

Analyte	Method (Units)	Screening Criteria	Location ID			
			07-MW-01	07-MW-02	07-MW-03	07-MW-04
Gasoline Range Organics	AKGRO (µg/L)	NA	17 B (10)	39 JB (100)	45 B (10)	58 JB (100)
Diesel Range Organics	AKDRO (µg/L)	NA	2 JB (20)	4 JB (200)	1,400 (20)	5 JB (200)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	1,680 B (1,460)	ND (1,500)	1,680 B (1,460)	1,370 JB (1,460)
Aldrin	SW8080 (µg/L)	0.0040 RC	ND (0.00270)	ND (0.00350)	ND (0.00250)	ND (0.00568)
alpha-BHC		0.011 RN	ND (0.00225)	ND (0.00400)	ND (0.00146)	ND (0.00189)
4,4'-DDD		0.28 RC	ND (0.0270)	ND (0.00800)	0.0194 JB (0.0250)	ND (0.00627)
Dieldrin		0.0042 RC	0.0137 (0.00629)	ND (0.00800)	0.0109 (0.00583)	ND (0.00683)
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	4.62 B (2.03)	ND (0.580)	2.65 B (1.99)	1.07 B (0.572)
Lead	SW7421 (mg/L)	0.015 M	0.00140 B (0.000800)	0.0108 (0.00110)	0.00410 B (0.000800)	0.00420 B (0.000800)

Campion POL Area 1993 Water Data
(Continued)

Analyte	Method (Units)	Screening Criteria	Location ID				
			07-SW-03	07-SW-04	07-SW-05	07-SW-06	07-SW-07
Gasoline Range Organics	AKGRO (µg/L)	NA	32 JB (100)	26 JB (100)	31 JB (100)	27 JB (100)	30 JB (100)
Diesel Range Organics	AKDRO (µg/L)	NA	1,000 (20)	3,300 (20)	44 (20)	170 (20)	8 JB (20)
4-Methyl-2-Pentanone(MIBK)	SW8015 (µg/L)	2,900 RN	NA	NA	NA	NA	NA
Aldrin	SW8080 (µg/L)	0.0040 RC	NA	NA	NA	NA	NA
alpha-BHC		0.0011 RB	NA	NA	NA	NA	NA
4,4'-DDD		0.28 RC	NA	NA	NA	NA	NA
Dieldrin		0.0042 RC	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	SW8270 (µg/L)	6 M	0.477 JB (1.82)	0.932 JB (1.83)	ND (2.03)	ND (1.97)	ND (2.00)
Lead	SW7421 (mg/L)	0.015 M	0.00160 B (0.00105)	0.00341 B (0.00105)	0.00637 B (0.00105)	0.00652 B (0.00105)	0.00677 B (0.00105)

Section 5
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