DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 898
ANCHORAGE, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

02 JUN 1999

CEPOA-PM-M-A (210-20b)

MEMORANDUM FOR Commander, U.S. Army Alaska, ATTN: APVR-RPW-ENV (Fosbrook), 600 Richardson, #6505, Bldg. 724, Fort Richardson, AK 99505-6505

SUBJECT: Landfill Closure Study, Fall 1998, Fort Richardson, Alaska

1. Enclosed for your information is a copy of the above mentioned subject document.

2. Please contact me at (907) 753-5582 if you have any questions.

FOR THE COMMANDER:

SIGNED

Encl

CATHERINE A. LAKY, P.E.
Project Manager

CF:
Commander, U.S. Army Alaska, ATTN: APVR-RPW-ENV (J. Mets), 600 Richardson, #6505, Bldg. 724, Fort Richardson, AK 99505-6505 (3 copies)
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FTR Rec File

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LANDFILL CLOSURE STUDY

FORT RICHARDSON, ALASKA

Fall 98

PREPARED BY THE

ALASKA DISTRICT U.S. ARMY CORPS OF ENGINEERS

MATERIALS AND INSTRUMENTATION SECTION

GEOTECHNICAL BRANCH

9 April 1999

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ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CDQAR	Chemical Data Quality Assurance Report
COD	Chemical Oxygen Demand
DPW	Directorate of Public Works, Fort Richardson
DRO	Diesel Range Organics
FSP	Field Sampling Plan
GCS	Groundwater Cleanup Standard (18 AAC 75)
GRO	Gasoline Range Organics
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSL	Mean Sea Level
ppb	parts per billion
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
RBC	Risk-based Concentration
RRO	Residual Range Organic Compound
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
USARAK	United States Army, Alaska
VOC	Volatile Organic Compound

Executive Summary

This report presents the analytical results for groundwater sampling performed by the Materials and Instrumentation Section of the U.S. Army Corps of Engineers, Alaska District, Geotechnical Branch (CEPOA-EN-G-MI) in late October and early November 1998 at the Fort Richardson landfill. The work was performed at the request of the Alaska District's Environmental Engineering Branch, Active Installations Section (CEPOA-EN-EE-AI), on behalf of the Fort Richardson Department of Public Works (DPW), United States Army, Alaska (USARAK).

Water samples were collected from eleven of thirteen monitoring wells located within and around the landfill and were analyzed for a wide variety of potential contaminants and water quality parameters. Two of the wells (AP-3011 and AP-3012) could not be sampled because the water table had dropped below their well screens.

Data generated during this portion of the closure study is generally consistent with historical data generated for these wells. The only metal above the EPA Region III risk-based concentration was arsenic for AP-3219 at 12 ppb. The EPA Region III risk-based concentration for arsenic is 11 ppb. No other analytes have been detected above the regulatory limits in any of the wells. Low levels of gasoline range organic compounds were reported in some of the wells.

1.0 Introduction

This effort represents the sixth sampling event of the five-year biannual groundwater monitoring program designed to fulfill Alaska Department of Environmental Conservation (ADEC) landfill closure requirements. Water samples were collected from eleven of thirteen monitoring wells located within and around the former Ft. Richardson landfill (see Figures 1 & 2) in late October and early November 1998. The samples were analyzed for volatile aromatic hydrocarbons, gasoline range organic compounds (GRO), total and dissolved metals, total organic carbon (TOC), total dissolved solids (TDS), nitrate-nitrite, sulfate, chloride, alkalinity and turbidity. Two of the wells (AP-3011 and AP-3012) could not be sampled because the water table had dropped below the bottom of their well screens.

All of the wells included in this investigation have been periodically sampled during previous investigations. Prior to the commencement of the landfill monitoring program, most of the landfill wells were included in the basewide groundwater monitoring program that was implemented in 1989. Data generated during this investigation generally agrees with that of previous investigations. Significant variations from historical data are described in the text discussing individual analytical results.

2.0 Environmental Setting

2.1 Location:

Fort Richardson is located on the northeast side of the city of Anchorage in south-central Alaska. It is bound by the municipality of Anchorage to the southwest, Elmendorf Air Force Base to the west, Eagle Bay and

Knik Arm (of Cook Inlet) to the north and the Chugach Mountains to the east and south (see Figure 1). The Fort Richardson landfill is located about 0.75 miles north of the main cantonment area just north of Circle Road (see Figure 2).

2.2 Landfill History:

The Ft. Richardson Landfill is an unlined landfill covering about 400 acres. Its former use is characterized as a trench and fill operation where one trench is dug (approximately 20 to 30 feet deep) while another is simultaneously being filled and covered. It is not known exactly when landfilling operations began at this site, but the first portion of the landfill to be utilized is known to have been closed prior to 1966. The landfill accepted sanitary waste and mess hall grease after 1987, when the municipality of Anchorage began operating a regional landfill that now accepts the solid waste from Ft. Richardson. In addition to the disposal of sanitary solid wastes, the landfill accepted construction rubble, grease, paint and solvent waste and is the site of a former fire training pit and a human waste disposal trench area.

2.3 Area Geology:

The last major glaciation in the upper Cook Inlet extended to the area of the Fort Richardson landfill. Remnants from the glaciation include the massive Elmendorf Moraine, alluvial fans, and a large preglacial outwash deposit.

The Elmendorf Moraine is a northeast-southwest-tending, terminal moraine representing the Naptowne glaciation and consists of poorly sorted, unconsolidated till with boulders, gravel, sand and silt. This moraine represents the terminal margin of a glacier that once filled Cook Inlet. This moraine transects the main cantonment area at Fort Richardson. The southern boundary of the Elmendorf Moraine is about 60 feet high and

forms the northern boundary of the landfill.

Glacial meltwater formed a large outwash plain along the margin of the Elmendorf Moraine. The outwash plain alluvium consists of gravel in the eastern portion of the installation and grades to sand to the west. Approximately 90% of the landfill lies within this deposit with the remainder located in areas mapped as alluvial fans.

Subsurface investigations performed at the Fort Richardson landfill indicate that surficial deposits consisting of interbedded glacial till, glaciofluvial and glaciolacustrine deposits extend to at least 240 feet below ground surface (bgs). A glacial till deposit consisting of silt, sand, gravel and cobbles occurs at the ground surface throughout the landfill area. No permafrost underlies the landfill.

North and west of the landfill, a glaciolacustrine deposit consisting of silt and clay occurs at approximately 45 feet bgs. Interbedded glacial till and glaciofluvial deposits underlie the glaciolacustrine deposits to a depth of at least 140 feet bgs.

South and east of the landfill, interbedded glacial till and glaciofluvial deposits extend to approximately 165 feet bgs. The glaciofluvial deposits consist of sand and gravel. These deposits are underlain by a 10-foot thick glaciolacustrine deposit that was also encountered to the north of the landfill, but not to the northwest.

2.4 Groundwater:

Groundwater at Fort Richardson exists as a deep confined aquifer, a shallow unconfined aquifer, and discontinuous zones of perched groundwater. The area described above constitutes much of the confining layer that separates the confined and unconfined aquifers. Depth to groundwater ranges from near the surface along

Ship Creek (see Figure 1) too greater than 250 feet bgs along the thicker glacial deposits found in the northern section of Fort Richardson. Lenses of silt found 20 to 40 feet bgs often underlie perched groundwater. Wells installed in these zones of perched groundwater often become unproductive or poorly productive after development. Water is known to recharge the groundwater system of Fort Richardson in several ways. Groundwater seeps from bedrock fractures into the sediments along the Chugach Mountains to the east. Snowmelt and rainfall infiltrate to the groundwater. Streams feed groundwater in areas where the elevation of the stream is above the water table. Discharge of the aquifers is by groundwater flow into Knik Arm to the west, into streams (e.g., Ship Creek, Eagle River) that ultimately discharge into Knik Arm or to wells.

Groundwater within the unconfined aquifer is thought to flow in a direction trending to the northwest on the north side of Ship Creek and toward the southwest on the south side of Ship Creek. In the area directly adjacent to Ship Creek, the direction of flow appears to trend westward, parallel to the general downstream direction of Ship Creek. This is due to the fact that Ship Creek is a losing stream and is recharging the groundwater. The confined aquifer flow trends predominantly to the northwest.

Three aquifers were encountered during monitoring well installations at the Fort Richardson landfill. North and west of the landfill, a perched unconfined aquifer occurs at approximately 35 feet bgs. The lateral extent of this aquifer is not known; however, it is not believed to exist beneath the landfill and is likely a perennial water-bearing zone.

A second aquifer was encountered throughout the landfill area and has a groundwater potentiometric surface which occurs at approximately 170 to 178 feet above mean sea level (MSL). Currently, eight monitoring wells (FR-1, FR-2, AP-3010, AP-3013, AP-3015, AP-3220, AP-3221 and AP-3222) are screened between about 160 and 180 feet above MSL within this glacial till aquifer. This aquifer is the first non-perched groundwater encountered in borings in the vicinity of the landfill. Groundwater levels measured in wells that screen this

aquifer indicate that this groundwater flows primarily to the northwest. The hydraulic gradient in the vicinity of the landfill is about 0.0025.

A third aquifer was encountered at about 204 feet above MSL within a gravely, silty sand overlying a six-foot thick silt layer located east of the landfill. This aquifer, which overlies the glacial till aquifer is not encountered elsewhere within or around the landfill. The lateral extent of this aquifer is not known and there does not appear to be a direct hydraulic connection with the glacial till aquifer. Well FR-3 is the only functioning well that is screened within this aquifer.

3. Field Activities

3.1 Sample Summary:

Sampling activities began on 26 October, and concluded on 12 November 1998. All sampling was performed by Richard Ragle and Gerald Archibald, chemists, CEPOA-EN-G-MI. Water samples were collected from eleven wells located within and around the Ft. Richardson landfill as described in the closure plan for the Ft. Richardson landfill. Two of the wells (AP-3011 and AP-3012) included for sampling in the closure plan could not be sampled because they were dry.

3.2 Sampling Procedures:

Sampling was performed according to the procedures described in the closure plan and was consistent with the Sampling and Analysis Plan used for the Ft. Richardson Groundwater Monitoring Program, with the following notations. The dedicated submersible pump was removed from AP-3220 during the June 1997

investigation because of the well's low recharge rate. As a result, AP-3220 well was bailed dry three consecutive times and sampled using disposable Teflon bailers. Just prior to sampling, all wells, except AP-3220, were purged until physical parameters stabilized. Water conductivity, pH, oxidation-reduction potential, and temperature were measured periodically during purging of all wells to monitor stabilization of the groundwater. Measurements of physical characteristics along with other well-specific information are included in Appendix A. All purge water and decontamination water was disposed of through the water treatment facility operated on Ft. Richardson by ENSR Consulting and Engineering of Anchorage, Alaska.

Sampling began immediately after water quality measurements indicated stabilization. The types of containers, preservatives used and the volume of sample collected met standard protocols. All containers were precleaned and then capped with Teflon lined lids. Vials used to hold samples to be tested for volatiles were filled so that there was no headspace or trapped bubbles. Sufficient extra volume of one sample were sent to each laboratory for use as matrix spike and matrix spike duplicate samples. Sampling times varied due to problems encountered with the electric well pump.

3.3 QA/QC Samples:

Quality assurance (QA) and quality control (QC) duplicates were collected for each method of analysis. QA and QC duplicates were collected so that a triplicate set of samples resulted. In this case, the triplicate sample sets were collected at FR-1 and AP-3013. The triplicate sets were tested for the same analytes as the rest of the samples.

Trip blanks and rinsate blanks were also prepared, used and analyzed for this project. Trip blanks were collected for GRO and volatile aromatic hydrocarbons. Nine GRO trip blanks were collected and one sample had GRO detected below the practical quantitation limit. Seven volatile aromatic hydrocarbons trip blanks were

collected and one sample had toluene, o-xylene and 1,4-dichlorobenzene detected below the practical quantitation limits. Results indicate that cross contamination of contaminants during collection, shipment and storage was not likely. However, very low levels of several analytes were detected in the rinsate blank and two of the trip blanks. Though these detections may be evidence of low level cross contamination, it is more likely that the water used to prepare the blanks contained low levels of these analytes or, in some cases, that laboratory contamination contributed to their presence.

4. Analytical Results

4.1 Chemical Analyses:

Data from the chemical analyses are reported in Tables 1 through 5 (Appendix B). In the tables, parts per million (ppm) are expressed as milligrams per liter (mg/L). Parts per billion (ppb) are expressed as micrograms per liter (µg/L). One ppm is equal to 1000 ppb. Where possible, reported concentrations are compared to federal or state Maximum Contaminant Levels (MCLs), State of Alaska Groundwater Cleanup Standards (GCS) proposed in the draft version of 18 AAC 75, or EPA Region III risk-based concentrations (RBCs).

4.2 Quality Assurance and Quality Control:

4.2.1 Data Quality Review:

The complete chemical data packages, including the laboratories' internal quality control reports, are on file at CEPOA-MI. The data and associated materials were reviewed by ETHIX, Inc., of Modesto, California. A copy of the resulting laboratory data quality report is included in Appendix C.

Laboratory data quality is summarized in the laboratory data quality report (attached as Appendix C). A small portion of the data for this project has been qualified as estimated or rejected based on the report's conclusions. The impact on data usability is discussed in the text associated with specific test results.

a. Gasoline Range Organics (GRO):

The results for samples 98FRL06WA and 98FRL23WA were qualified as estimated low due to expired holding times. The results for sample 98FRL16WA was qualified as estimated high due to Rinsate Blank contamination. The results for samples 98FRL03WA, -20WA, -23WA and -28WA were below the practical quantitation limits and were qualified as estimated.

b. Volatile Aromatic Hydrocarbons (SW8021A/SW8260B):

The results for all compounds for samples 98FRL06WA and 98FRL23WA were qualified as estimated low due to expired holding times. The benzene result for sample 98FRL15WA was below the practical quantitation limits and was qualified as estimated. The m,p,o-xylene results for sample 98FRL17WA was below the practical quantitation limits and was qualified as estimated. The 1,4-dichlorobenzene, toluene and o-xylene results for sample 98FRL23WA were below the practical quantitation limits and were qualified as estimated.

c. Total Metals:

The selenium results for samples 98FRL12WA, -14WA and -16WA were qualified as estimated high due to Rinsate Blank contamination. The arsenic results for samples 98FRL02WA, -06WA, - 07WA, -08WA and -09WA were qualified as estimated due to poor precision between the sample and sample duplicate. The selenium and silver results for samples 98FRL11WA, -12WA, -14WA, -15WA, -16WA and -17WA were qualified as

estimated due to poor precision between the sample and sample duplicate. The mercury and selenium results for sample 98FRL06WA was below the practical quantitation limits and was qualified as estimated. The chromium result for sample 98FRL11WA was below the practical quantitation limits and was qualified as estimated. The arsenic result for samples 98FRL12WA and 98FRL14WA were below the practical quantitation limits and were qualified as estimated. The potassium result for sample 98FRL15WA was below the practical quantitation limits and was qualified as estimated. The lead and chromium results for sample 98FRL16WA was below the practical quantitation limits and was qualified as estimated. The selenium result for sample 98FRL17WA was below the practical quantitation limits and was qualified as estimated. The arsenic result for sample 98FRL09WA was below the practical quantitation limits and was qualified as estimated.

d. Dissolved Metals:

The arsenic results for samples 98FRL02WA, -06WA, -07WA, -08WA, –09WA, -11WA, -12WA, -14WA, –15WA, -16WA and -17WA were qualified as estimated due to poor precision between the sample and sample duplicate. The silver results for samples 98FRL02WA, -03WA, -04WA, -05WA, -06WA, -07WA,-08WA and –09WA were qualified as estimated low due to low matrix spike recovery. The potassium results for samples 98FRL03WA, -04WA and –05WA were qualified as estimated due to poor precision between the sample and sample duplicate. The cadmium results for samples 98FRL03WA, -04WA and -05WA were qualified as estimated high due to high matrix spike recovery. The barium result for samples 98FRL02 WA and 98FRL17WA were below the practical quantitation limits and were qualified as estimated. The arsenic result for samples 98FRL03WA, -05WA, -14WA, -16WA and 98FRL09WA were below the practical quantitation limits and were qualified as estimated. The potassium result for samples 98FRL03 WA, -04WA, -05WA and -15WA were below the practical quantitation limits and were qualified as estimated. The selenium result for sample 98FRL06WA was below the practical quantitation limits and was qualified as estimated.

e. General Chemistry:

The total dissolved solids results for samples 98FRL03WA, -04WA, -05WA and 98FRL15WA were qualified as estimated low due to expired holding times. The turbidity result for sample 98FRL15WA was qualified as estimated low due to expired holding time. The total organic carbon results for samples 98FRL02WA, -03WA, -04WA, -05WA, -06WA, -07WA, -08WA, -09WA, -11WA, -12WA, -14WA, -15WA and -16WA were qualified as estimated due Rinsate Blank contamination. The nitrate + nitrite as nitrogen results for samples 98FRL03WA, -04WA, -05WA and -06WA were qualified as estimated low due to low matrix spike recovery.

4.2.2 Replicate Samples:

Blind duplicate quality control (QC) samples were submitted to the primary laboratory, which analyzed the majority of the samples. Analysis of the QC duplicate samples provide a measure of intra laboratory variations. Additional replicate samples were provided to an independent quality assurance (QA) laboratory, to provide an indicator of inter laboratory accuracy. QC and QA duplicates are so noted in the data tables. QA and QC duplicate sets were submitted for each analytical method performed. Data from all replicate samples were analyzed by ETHIX as part of development of the laboratory data quality report. The three sets of data were carefully compared and tabulated. In general, reporting limits were adequate for comparisons with project action levels. Data met completeness and comparability objectives. QA and QC replicates generally were in agreement. Data quality criteria for precision and accuracy were met with the following exceptions:

4.3 Chemical Results:

4.3.1 Volatile Aromatic Hydrocarbons:

All of the samples were tested for VOCs by method 8260B. The data are presented in Table 1 of

Appendix B. All data is usable for monitoring purposes. All samples were analyzed with the required holding time except the sample from AP-3221 which was analyzed one day late. All of the sample shipments arrived at the laboratories within the acceptable temperature range of 2°- 6°C, except for the sample from AP-3221 which were received at the primary laboratory with a temperature of 1 °C. All results were non detect except 0.31 ppb benzene in the sample from AP-3220. All results were below the practical quantitation limits and are considered estimated. All method detection limits are below applicable regulatory levels. Previous data results are in Table 6 of Appendix B and are comparable to current results.

4.3.2 Gasoline Range Organic Compounds:

All of the samples were tested for GRO by method AK-101. Data are presented in Table 2 of Appendix B. GRO was reported in several samples. The sample from AP-3010 contained the highest concentration at 0.46 ppm. The highest previous data results was 0.584 ppm from AP-3014 collected during the November 1996 sampling event. All method detection limits are below applicable regulatory levels. Previous data results are in Table 7 of Appendix B and are comparable to current results. All of the reported GRO concentrations are well below its GCS of 2 ppm no RBC or MCL exists for GRO.

4.3.3 Total Metals :

Data are included in Table 4 of Appendix B. Unfiltered water samples were analyzed for arsenic, barium, cadmium, chromium, lead, potassium, mercury, selenium, silver and sodium. Many of the metals were detected in samples from most of the wells. The primary and QA laboratories used different methods to analyze for arsenic, cadmium, lead, selenium and silver. Both methods yielded similar results and all of the duplicate data agree. All method reporting limits are below applicable regulatory levels.

Where possible, reported concentrations are compared to federal or state Maximum Contaminant Levels

(MCLs), State of Alaska Groundwater Cleanup Standards (GCS) proposed in the draft version of 18 AAC 75, or EPA Region III risk-based concentrations (RBCs). Detected concentrations were compared to available primary MCLs, GCSs, RBCs and secondary MCLs. Primary MCLs, GCSs and RBCs are intended to protect human health while secondary MCLs are intended to preserve the aesthetic quality of drinking water. Detected concentrations and available MCLs, GCSs, action levels and RBCs are summarized in the table below.

Metal (Total)	MCL (µg/L)	GCS (µg/L)	RBC (µg/L)	Number of detections	Highest level detected (µg/L)	Wells that exceeded MCL, GCS or RBC
Arsenic	50	50	11	5	12	AP-3219
Barium	2,000	2,000	2,600	10	99	None
Chromium (VI)	100[a]	100[a]	180[b]	4	28	None
Lead	15[c]	15	NA	6	15	None
Mercury	2	2	11	2	0.3	None
Selenium	50	50	180	9	17	None
Sodium	250,000[d]	NA	NA	10	3,700	None

a: Not differentiated between chromium III and chromium VI.
b: RBC is for chromium VI; RBC for chromium III is 37000 ug/L.
c: No MCL for lead; 15 ug/L is action level at the tap.
d. Secondary MCL to protect aesthetics of drinking water.

NA: not available.
ND: not detected; method reporting limit in parentheses.

Cadmium was not detected in any of the wells. Potassium was detected in two of the wells below the practical quantitation limits. This metal was not included in the table because there are no MCLs, GCSs or RBCs associated with it. It should be noted that the RBC referenced for chromium is for chromium VI. The RBC for chromium III is 37000 ppb. The analytical method used does not differentiate between chromium VI and chromium III. It is very unlikely that significant concentrations of chromium VI were present in the sample. The arsenic results for AP-3219 were 12 ppb. The only other times that the concentration of arsenic was above the

EPA Region III risk-based concentration of 11 ppb in any of the wells was in the fall of 1997 was at 19 ppb at FR-3 and in the summer of 1997 was at 15 ppb at AP-3220. Arsenic was not detected at 1 ppb in the dissolved metals results for sample AP-3219. Previous data results are in Table 8 of Appendix B and are comparable to current results.

Total metal concentrations represent the metals contained in suspended particles as well as those dissolved in the water. Though turbidity is not a direct measurement of the amount of solid material suspended in the sample, they are related, and it should be noted that the two highest turbidity readings of 150 and 36 NTUs were found at wells AP-3219 and AP-3014, respectively. The elevated metals concentrations found in some of the wells are most likely, due in part, to the increased amount of suspended material contained in the samples. This conclusion is supported by the dissolved metals results that are discussed in the subsequent section.

4.3.4 Dissolved Metals:

Data are presented in Table 4 of Appendix B. Samples were field filtered with a disposable 0.45μm cellulose nitrate filter system into clean containers. Thus, reported concentrations represent the amount of dissolved metal in the sample. Where possible, reported concentrations are compared to federal or state Maximum Contaminant Levels (MCLs), State of Alaska Groundwater Cleanup Standards (GCS) proposed in the draft version of 18 AAC 75, or EPA Region III risk-based concentrations (RBCs). No primary MCLs, GCS or RBCs were exceeded in any of the filtered samples. All method detection limits are below applicable regulatory levels.

Metal (Total)	MCL (µg/L)	GCS (µg/L)	RBC (µg/L)	Number of detections	Highest level detected (µg/L)	Wells that exceeded MCL, GCS or RBC
Arsenic	50	50	11	7	7.6	None
Barium	2,000	2,000	2,600	11	36	None
Cadmium	5	5	18	1	1.7	None
Mercury	2	2	11	2	0.53	None
Selenium	50	50	180	2	15	None
Sodium	250,000[d]	NA	NA	11	31,000	None

a: Not differentiated between chromium III and chromium VI.
b: RBC is for chromium VI; RBC for chromium III is 37000 ug/L.
c: No MCL for lead; 15 ug/L is action level at the tap.
d: Secondary MCL to protect aesthetics of drinking water.
NA: not available.
ND: not detected; method reporting limit in parentheses.

Chromium and Lead were not detected in any of the samples. Potassium was detected in four of the wells below the practical quantitation limits. Potassium was not included in the table because there are no MCLs, GCSs or RBCs associated with it. In general the levels detected in the dissolved metals samples was less than the total metals samples with the exception of sodium in sample AP-3220 which was approximately six time higher than any other sample. Previous data results are in Table 9 of Appendix B and are comparable to current results.

4.3.5 Water Quality Parameters:

Data are presented in Table 3 of Appendix B. All of the samples were also tested for a group of water quality parameters. These analytes include chloride, nitrate-nitrite, sulfate, total organic carbon, total dissolved solids and turbidity. Where possible, reported concentrations are compared to federal or state Maximum Contaminant Levels (MCLs), State of Alaska Groundwater Cleanup Standards (GCS) proposed in the draft version of 18 AAC 75, or EPA Region III risk-based concentrations (RBCs).

Water Quality Parameter	Primary MCL (mg/L)	Secondary MCL (mg/L)	Number of detections	Highest level detected (mg/L)	Wells that exceeded Primary or Secondary MCL
Chloride	NA	250	11	11	None
Nitrate-Nitrite	10	NA	10	1.1	None
Sulfate	NA	250	11	22	None
Total Dissolved Solids (TDS)	NA	500	11	400	None
Total Organic Carbon	NA	NA	11	9.5	None
Turbidity	NA	NA	11	150	None

NA: not available

No primary MCLs were exceeded. Previous data results are in Table 10 of Appendix B and are comparable to current results. Previous data results are in Table 10 of Appendix B and are comparable to current results. All primary and QA laboratory data agree and are comparable with the following exception; the QA duplicate sample data for total organic carbon the sample for AP-3013 does not agree with the primary or the QC duplicate sample data. The total organic carbon the sample for AP-3013 in the past has been 1 mg/L or less which is comparable to the primary and QC duplicate sample results. The results for the primary sample data for total organic carbon the sample for FR-1 does not agree with the QA duplicate sample or the QC duplicate sample data.

4.3.6 Field Data:

Conductivity, pH, temperature and oxidation and reduction potential were measured in the field and are included in the sample summary forms in Appendix A. Associated data generally agree with field data from previous investigations and fall within expected ranges.

5. Conclusion:

Groundwater quality in the area continues to be good. Data generated during this investigation is generally consistent with historical data generated for these wells. The arsenic results were above the EPA Region III risk-based concentrations. The arsenic result for the sample from AP-3219 was 12 ppb. The highest previous concentration of arsenic in any of the wells sampled in the summer of 1997 was at 15 ppb. Arsenic was ND(0.1) ppb in the dissolved metals results for the sample for AP-3219. No other analytes have been detected above the regulatory limits in any of the wells.

6. References:

Alaska Department of Environmental Conservation, Draft Title 18 Alaska Administrative Code Chapter 75 (18 AAC 70), Water Quality Standards, 12 November 1997.

Alaska Department of Environmental Conservation, Title 18 Alaska Administrative Code Chapter 80 (18 AAC 80), Drinking Water, 10 November 1994.

Ecology and Environment, Inc., Closure Plan, Ft. Richardson Landfill, October 1995

United States Army Corps of Engineers (USACE), memorandum CEPOA-EN-G dated 24 November 1997, subject: Final Chemical Data Report, Spring 1997, Ft. Richardson Landfill, Alaska.

USACE, memorandum CENPA-EN-G dated 13 November 1996, subject: Final Chemical Data Report, Summer 1996, Ft. Richardson Landfill, Alaska.

USACE, memorandum CENPA-EN-G dated 10 May 1996, subject: Final Chemical Data Report, Groundwater Study (Fall 1995), Ft. Richardson, Alaska.

USACE, ER 1110-1-263, Chemical Data Quality Management for Hazardous Waste Remedial Activities, April 1996.

USACE, memorandum CENPA-EN-G-MI dated 8 April 1994, subject: Work Plan, Groundwater Monitoring, Ft. Richardson, AK.

United States Environmental Protection Agency, Region III Risk-Based Concentration Table, April 1997

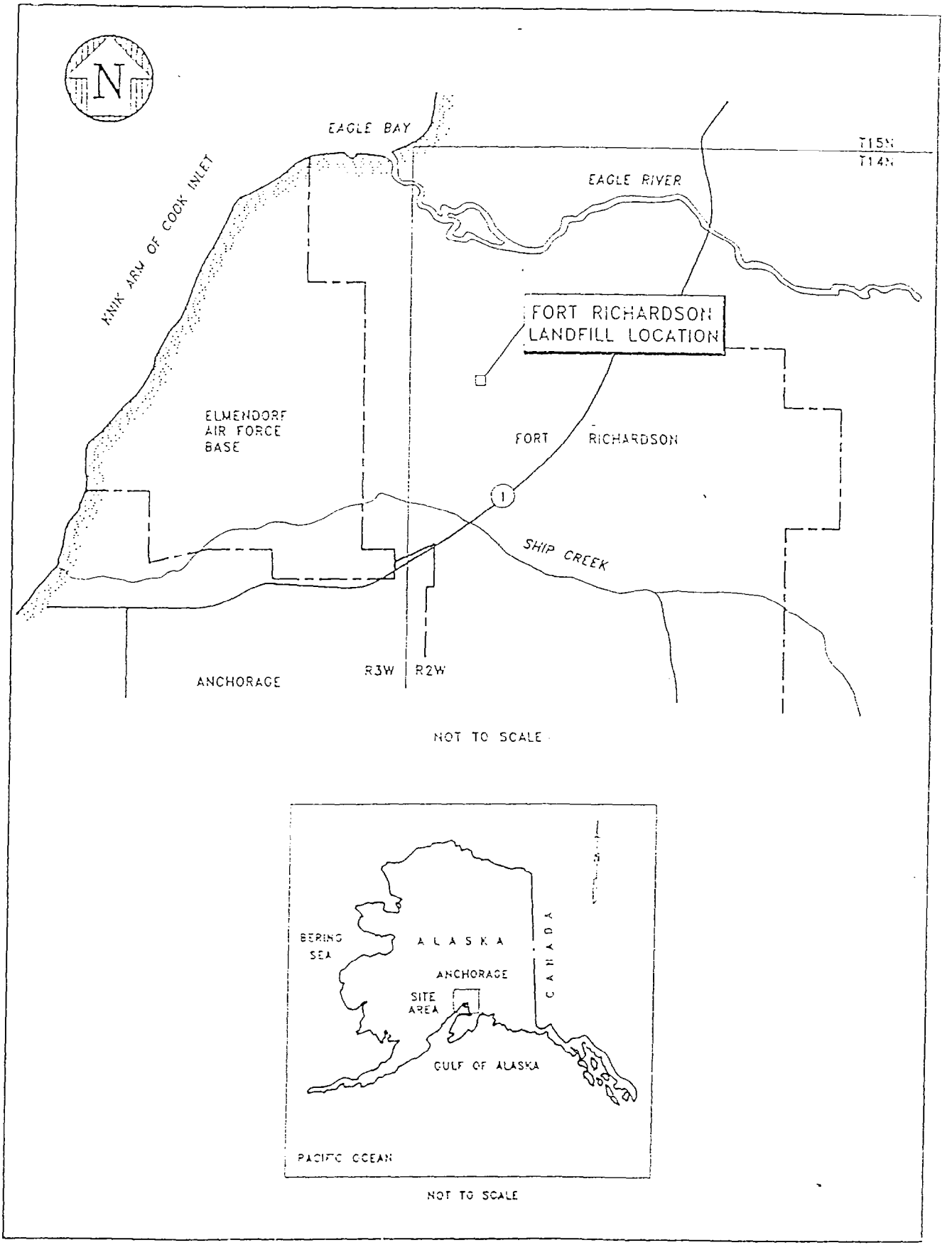
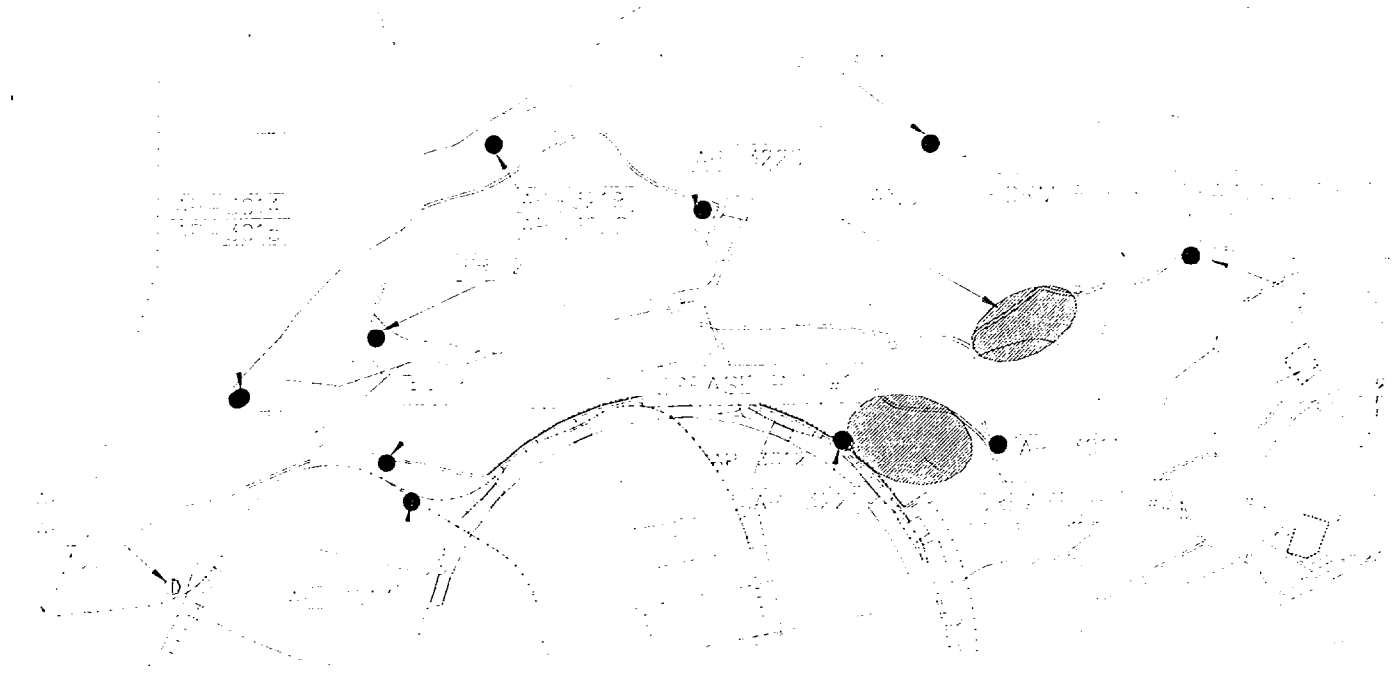


Figure 1

FORT RICHARDSON LANDFILL SITE
ANCHORAGE, ALASKA



North

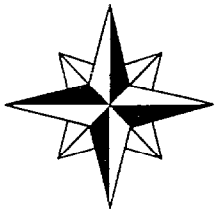


Figure 2, Site Map Fort Richardson Landfill, Anchorage, Alaska

APPENDIX A

Sample Summary Forms

AP-3010
10 November 1998
Overcast, -3°C

Casing top to water: 232.00 Feet
Casing top to bottom: 235.58 Feet
Casing volume: 2.3 Liter
Purge volume: 6.9-12 Liter
Purge rate: 368 Hz ≈ 1.0 L/min
Sample Number: 98FRL16WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1504	2	0.545	3.3	6.78	NA	Light Brown	None	None
1506	8	0.558	3.1	7.58	-45	Light Brown	None	None
1511	12	0.547	5.8	7.63	-43	Light Brown	None	None
1515	20	0.548	7.0	7.81	-40	Light Brown	None	None

Start Sampling: 1516
End Sampling: 1525

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

NA: Not Available

AP-3013
10 November 1998
Overcast, -3°C

Casing top to water: 136.00 Feet
Casing top to bottom: 150.00 Feet
Casing volume: 34 Liter
Purge volume: 104-174 Liter
Purge rate: 313 Hz ≈ 1.0 L/min
Sample Number: 98FRL12WA, -13WA, -14WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1022	5	0.436	4.0	6.14	77	Clear	None	None
1043	33	0.413	4.8	7.08	-50	Clear	None	None
1107	68	0.415	4.9	7.68	15	Clear	None	None
1130	103	0.414	5.0	7.68	38	Clear	None	None
1150	137	0.417	4.9	7.75	45	Clear	None	None

Start Sampling: 1152
End Sampling: 1210

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

AP-3014
11 December 1998
Clear Sunny, -2°C

Casing top to water: 19.50 Feet
Casing top to bottom: 31.10 Feet
Casing volume: 28 Liter
Purge volume: 86-143 Liter

Sample Number: 98FRL04WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1353	2	0.450	6.0	5.39	50	Clear w /2" sed. on bottom	None	None
1411	29	0.139	5.5	6.96	51	Cloudy	None	None
1424	58	0.140	5.3	7.11	54	Almost Clear	None	None
1513	87	0.142	5.0	7.38	46	Almost Clear	None	None
1530	116	0.143	5.0	7.42	47	Almost Clear	None	None

Start Sampling: 1530
End Sampling: 1550

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Teflon disposable bailers.

AP-3015
28 October 1998
Clear Sunny, -7°C

Casing top to water: 120.82 Feet
Casing top to bottom: 130.10 Feet
Casing volume: 23 Liter
Purge volume: 69-115 Liter
Purge rate: 235Hz ≈ 1 L/min
Sample Number: 98FRL05WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1510	4	0.446	4.5	6.75	80	Clear	None	None
1534	24	0.400	7.3	7.56	-74	Clear	None	None
1600	47	0.392	8.2	7.64	-62	Clear	None	None
1620	70	0.402	7.0	7.62	-60	Clear	None	None

Start Sampling: 1622
End Sampling: 1630

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

AP-3019
27 October 1998
Clear Sunny, 1°C

Casing top to water: 37.85 Feet
Casing top to bottom: 41.40 Feet
Casing volume: 8.7 Liter
Purge volume: 26-44 Liter

Sample Number: 98FRL02WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1430	1	0.127	2.6	5.53	-14	Light Brown	None	None
1446	10	0.078	3.0	6.15	-44	Light Brown	None	None
1510	20	0.077	3.1	6.23	-43	Light Brown	None	None
1528	30	0.076	2.8	6.37	-44	Light Brown	None	None
1550	40	0.076	3.0	6.32	-38	Light Brown	None	None

Start Sampling: 1555
End Sampling: 1610

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Teflon disposable bailers.

AP-3220
27 October 1998
Overcast, 1°C
Casing top to water: 233.50 Feet
Casing top to bottom: 243.40 Feet
Casing volume: 24 Liter
Purge volume: 73-122 Liter

Sample Number: 98FRL15WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1015	1	0.458	2.8	5.64	70	Light Brown	None	None
Bailed Dry								
1030 2 November 1998								
Bailed Dry	2.5							
0925 9 November 1998								
Bailed Dry	10							
0935 12 November 1998								
Start Sampling: 0940								
End Sampling: 1005								
1008		0.639	2.9	6.03	72	Clear	None	None

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Teflon disposable bailers.

AP-3221
2 November 1998
Light Rain, 0°C

Casing top to water: not measured
Casing top to bottom: 180.00
Casing volume:
Purge volume: Purge volume estimated from previous sampling event.
Purge rate 281Hz ≈ 1 L/min
Sample Number: 98FRL06WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1302	3	0.646	4.0	6.95	174	Clear	None	None
1326	24	0.749	9.1	6.40	150	Clear	None	None
1350	48	0.722	9.1	7.02	115	Clear	None	None
1415	72	0.711	9.5	7.10	104	Clear	None	None
1426	84	0.710	9.6	7.14	97	Clear	None	None
1439	96	0.714	9.6	7.16	94	Clear	None	None
1450	108	0.717	9.6	7.16	93	Clear	None	None

Start Sampling: 1622
End Sampling: 1630

Samples Analyzed for: 8260A (Volatile Aromatic Hydrocarbons)
8021B (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

Water depth was not taken because the interface probe would not lower all the way to the water depth.

AP-3222
28 October 1998
Clear Sunny, -1°C

Casing top to water: 129.97 Feet
Casing top to bottom: 141.00 Feet
Casing volume: 27 Liter
Purge volume: 81-135 Liter
Purge rate: 248Hz ≈ 2 L/min
Sample Number: 98FRL03WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1055	7	0.417	4.4	6.41	50	Clear	None	None
1110	27	0.409	6.8	7.35	-55	Clear	None	None
1125	Generator ran out of gas.							
1140	54	0.406	7.4	7.40	-52	Clear	None	None
1200	81	0.409	7.1	7.46	-51	Clear	None	None
1220	108	0.410	7.0	7.44	-52	Clear	None	None

Start Sampling: 1222
End Sampling: 1237

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

FR-1
3 November 1998
Partly Cloudy, 4°C

Casing top to water: 132.1 Feet
Casing top to bottom: 149.0 Feet
Casing volume: 10.4 Liter
Purge volume: 31-52 Liter
Purge rate: 249 Hz ≈ 1 L/min
Sample Number: 98FRL08WA, -09WA, -10WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1415	6	0.428	4.6	7.03	229	Clear	None	None
1424	14	0.412	7.0	7.27	210	Clear	None	None
1434	24	0.411	8.2	7.01	247	Clear	None	None
1444	34	0.417	7.3	7.35	209	Clear	None	None
1450	44	0.422	6.9	7.42	205	Clear	None	None
1458	54	0.421	7.0	7.45	202	Clear	None	None

Start Sampling: 1500
End Sampling: 1520

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

FR-2
9 November 1998
Clear, -3°C

Casing top to water: 148.50 Feet
Casing top to bottom: 167.00 Feet
Casing volume: 11.4 Liter
Purge volume: 34-57 Liter
Purge rate: 360 Hz ≈ 1.5 L/min
Sample Number: 98FRL11WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1222	2	0.512	5.7	6.44	0	Clear	None	None
1238	12	0.458	8.0	5.91	-27	Clear	None	None
1249	24	0.449	10.8	6.92	-23	Clear	None	None
1258	36	0.459	10.6	7.06	-24	Clear	None	None
1305	48	0.455	10.2	7.20	-35	Clear	None	None
1312	60	0.455	10.0	7.24	-34	Clear	None	None

Start Sampling: 1315
End Sampling: 1320

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

FR-3
3 November 1998
Overcast, 4°C

Casing top to water: 154.50 Feet
Casing top to bottom: 171.70 Feet
Casing volume: 10.6 Liter
Purge volume: 32-53 Liter
Purge rate: 300-320Hz ≈ 0.5 L/min
Sample Number: 98FRL07WA

Time	Liters	Conductivity	Temp(C°)	pH	ORP	Color	Odor	Sheen
1025	5	0.311	6.0	5.56	172	Gray	None	None
1035	Pump shut down thermal overload.							
1044	11	0.310	8.3	7.65	157	Light Gray	None	None
1118	22	0.307	11.8	7.80	145	Light Gray	None	None
1153	33	0.319	13.4	7.85	138	Light Gray	None	None
1230	44	0.318	14.2	7.93	131	Light Gray	None	None

Start Sampling: 1232
Generator ran out of gas during sampling.
End Sampling: 1300

Samples Analyzed for: 8260B (Volatile Aromatic Hydrocarbons)
8021A (BETX)
AK101 (GRO)
Dissolved Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Total Metals (As, Ba, Cd, Pb, Hg, K, Se, Ag, Na)
Nitrate / Nitrite
Sulfate
Total Organic Carbon (TOC)
Total Dissolved Solids (TDS)
Chloride

Well purged with Grunfos 2"submersible pump.

Fall 1998 sampling summery

Well Number	Date sampled	Time sampled	Weather conditions	Sample number	Purge rate/ frequency	Casing top/ water	Casing top/ bottom
AP-3010	10 Nov 98	1525	Overcast	98FRL16WA	1L/min / 368Hz	232.00'	235.58'
AP-3011	Well dry		Sunny 0°C				
AP-3012	Well dry		Cloudy			163.3'	
AP-3013	10 Nov 98	1152	Overcast	98FRL12WA, -13WA,-14WA	1L/min / 313Hz	136.00'	150.00'
AP-3014	11 Dec 98	1530	Sunny -2°C	98FRL04WA	Purged by hand	19.50'	31.10'
AP-3015	28 Oct 98	1622	Sunny -7°C	98FRL05WA	1L/min / 235Hz	120.82'	130.10'
AP-3219	27 Oct 98	1555	Sunny 1°C	98FRL02WA	Purged by hand	37.85'	41.40'
AP-3220	12 Nov 98	1005	Sunny -1°C	98FRL15WA	Purged by hand	233.50'	241.40'
AP-3221	2 Nov 98	1451	Light rain	98FRL06WA	1L/min / 281Hz	No reading could not get probe to water.	178.40'
AP-3222	28 Oct 98	1222	Sunny -1°C	98FRL03WA	2L/min / 248Hz	129.97'	141.00'
FR-1	3 Nov 98	1500	Partly cloudy 4°C	98FRL08WA, -09WA,-10WA	1L/min / 249Hz	132.10'	149.00'
FR-2	9 Nov 98	1315	Sunny -3°C	98FRL11WA	1.5L/min / 360Hz	148.50'	167.00'
FR-3	3 Nov 98	1232	Overcast 4°C	98FRL07WA	0.5L/min / 320Hz	154.50'	171.70'

Well #	Purged volume	Temperature	Conductivity µohm	pH	ORP	Color	Odor	Sheen
AP-3010	20L	7.0°C	548	7.81	-40	light brown	none	none
AP-3013	137L	4.9°C	417	7.75	45	clear	none	none
AP-3014	116L	5.0°C	143	7.42	47	almost clear	none	none
AP-3015	70L	7.0°C	402	7.62	-60	clear	none	none
AP-3219	40L	3.0°C	76	6.32	-38	light brown	none	none
AP-3220	Bailed dry three times	2.9°C	639	6.03	72	clear	none	none
AP-3221	108L	9.6°C	717	7.16	93	clear	none	none
AP-3222	108L	7.0°C	410	7.44	-52	clear	none	none
FR-1	54L	7.0°C	421	7.45	202	clear	none	none
FR-2	60L	10.0°C	455	7.24	-34	clear	none	none
FR-3	44L	14.2°C	318	7.93	131	light gray	none	none

APPENDIX B

Laboratory Data

Table 1
Ft. Richardson GW (Fall 98) Landfill
Method 8260
Volatile Aromatic Hydrocarbons
October/November 1998

			QA Dup	QC Dup	
LOCATION OF SAMPLE:	AP-3010	AP-3013	AP- 3013	AP-3013	AP-3014
DATE OF SAMPLE:	11/10/98	11/10/98	11/10/98	11/10/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	16WA	12WA	13WA	14WA	04WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	77006-03	77006-01	0633690001SA	77006-02	76704-02
DATE RECEIVED:	11/12/98	11/12/98	11/11/98	11/12/98	10/30/98
DATE ANALYZED:	11/17/98	11/17/98	11/13/98	11/17/98	11/11/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Benzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Toluene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Chlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Ethylbenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
m,p-Xylene (Sum of Isomers)	ND (0.002)	ND (0.002)	NT	ND (0.002)	ND (0.002)
o-Xylene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
Xylenes	NT	NT	ND (1.0)	NT	NT
1,3-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
1,4-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
1,2-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)

SAS: Sound Analytical Services. Tacoma. WA.
QESZ: Quanterra Environmental Services. Anchorage, AK.
NT: Not Tested.
ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 1
Ft. Richardson GW (Fall 98) Landfill
Method 8260
Volatile Aromatic Hydrocarbons
October/November 1998

LOCATION OF SAMPLE:	AP-3015	AP-3220	AP-3221	AP-3222
DATE OF SAMPLE:	10/28/98	11/12/98	11/2/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	05WA	15WA	06WA	03WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS
LABORATORY SAMPLE ID:	76704-03	77065-01	76797-01	76704-01
DATE RECEIVED:	10/30/98	11/16/98	11/4/98	10/30/98
DATE ANALYZED:	11/11/98	11/17/98	11/17/98	11/11/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
Benzene	ND (0.001)	0.00031 J	ND (0.001) J	ND (0.001)
Toluene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)
Chlorobenzene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)
Ethylbenzene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)
m,p-Xylene (Sum of Isomers)	ND (0.002)	ND (0.002)	ND (0.002) J	ND (0.002)
o-Xylene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)
Xylenes	NT	NT	NT	NT
1,3-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)
1,4-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)
1,2-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (0.001) J	ND (0.001)

SAS: Sound Analytical Services, Tacoma, WA.
J: Estimated Value.
NT: Not Tested.
ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 1
Ft. Richardson GW (Fall 98) Landfill
Method 8260
Volatile Aromatic Hydrocarbons
October/November 1998

		QC Dup	QA Dup		
LOCATION OF SAMPLE:	FR-1	FR-1	FR-1	FR-2	FR-3
DATE OF SAMPLE:	11/3/98	11/3/98	11/3/98	11/9/98	11/3/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	08WA	09WA	10WA	11WA	07WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	76833-02	76833-03	0633510001SA	76973-01	76833-01
DATE RECEIVED:	11/5/98	11/5/98	11/4/98	11/11/98	11/5/98
DATE ANALYZED:	11/17/98	11/17/98	11/13/98	11/17/98	11/17/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Benzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Toluene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Chlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Ethylbenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
m,p-Xylene (Sum of Isomers)	ND (0.002)	ND (0.002)	NT	ND (0.002)	ND (0.002)
o-Xylene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
Xylenes	NT	NT	ND (1.0)	NT	NT
1,3-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
1,4-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
1,2-Dichlorobenzene	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)

SAS: Sound Analytical Services, Tacoma, WA.
QESZ: Quanterra Environmental Services, Anchorage, AK.
NT: Not Tested.
ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 2
Ft. Richardson GW (Fall 98) Landfill
Method AK101, Gasoline Range Organics
Method 8021A, BTEX
October/November 1998

LOCATION OF SAMPLE:	AP-3010	AP-3013	QA Dup AP-3013	QC Dup AP-3013	AP-3014
DATE OF SAMPLE:	11/10/98	11/10/98	11/10/98	11/10/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	16WA	12WA	13WA	14WA	04WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	77006-03	77006-01	0633690001SA	77006-02	76704-02
DATE RECEIVED:	11/12/98	11/12/98	11/11/98	11/12/98	10/30/98
DATE ANALYZED:	11/17/98	11/17/98	11/19/98	11/17/98	11/11/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	0.46 B	ND (0.05)	ND (0.10)	ND (0.05)	ND (0.05)
Benzene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
Toluene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
Ethylbenzene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
m,p-Xylene (Sum of Isomers)	ND (0.002)	ND (0.002)	NT	ND (0.002)	ND (0.002)
o-Xylene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)

SAS: Sound Analytical Services, Tacoma, WA.
QESZ: Quanterra Environmental Services, Anchorage, AK.
B: Not Detected. (Analytes was detected in the associated method blank).
J: Estimated Value.
NT: Not Tested.
ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 2
Ft. Richardson GW (Fall 98) Landfill
Method AK101, Gasoline Range Organics
Method 8021A, BTEX
October/November 1998

LOCATION OF SAMPLE:	AP-3015	AP-3219	AP-3220	AP-3221	AP-3222
DATE OF SAMPLE:	10/28/98	10/27/98	11/12/98	11/2/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	05WA	02WA	15WA	06WA	03WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE ID:	76704-03	76666-02	77065-01	76797-01	76704-01
DATE RECEIVED:	10/30/98	10/29/98	11/16/98	11/4/98	10/30/98
DATE ANALYZED:	11/11/98	10/30/98	11/17/98	11/17/98	11/11/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	0.32	ND (0.05)	ND (0.05)	0.057 J	0.012 J
Benzene	ND (0.001)	ND (0.001)	0.0003 J	ND (0.001)	ND (0.001)
Toluene	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
Ethylbenzene	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)
m,p-Xylene (Sum of Isomers)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)	ND (0.002)
o-Xylene	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.001)

SAS: Sound Analytical Services, Tacoma, WA.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 2
Ft. Richardson GW (Fall 98) Landfill
Method AK101, Gasoline Range Organics
Method 8021A, BTEX
October/November 1998

		QC Dup	QA Dup		
LOCATION OF SAMPLE:	FR-1	FR-1	FR-1	FR-2	FR-3
DATE OF SAMPLE:	11/3/98	11/3/98	11/3/98	11/9/98	11/3/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	08WA	09WA	10WA	11WA	07WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	76833-02	76833-03	0633510001SA	76973-01	76833-01
DATE RECEIVED:	11/5/98	11/5/98	11/4/98	11/11/98	11/5/98
DATE ANALYZED:	11/17/98	11/17/98	11/9/98	11/17/98	11/17/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.05)	ND (0.05)	ND (0.1)	ND (0.05)	ND (0.05)
Benzene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
Toluene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
Ethylbenzene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)
m,p-Xylene (Sum of Isomers)	ND (0.002)	ND (0.002)	NT	ND (0.002)	ND (0.002)
o-Xylene	ND (0.001)	ND (0.001)	NT	ND (0.001)	ND (0.001)

SAS: Sound Analytical Services, Tacoma, WA.
QESZ: Quanterra Environmental Services, Anchorage, AK.
J: Estimated Value.
NT: Not Tested.
ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 3
Ft. Richardson GW (Fall 98) Landfill
Parameters
October/November 1998

LOCATION OF SAMPLE:	AP-3010	AP-3013	QA Dup AP-3013	QC Dup AP-3013	AP-3014
DATE OF SAMPLE:	11/10/98	11/10/98	11/10/98	11/10/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	16WA	12WA	13WA	14WA	04WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	77006-03	77006-01	0633690001SA	77006-02	76704-02
DATE RECEIVED:	11/12/98	11/12/98	11/11/98	11/12/98	10/30/98
DATE ANALYZED:	11/12 - 23/98	11/12 - 23/98	11/12 - 18/98	11/12 - 23/98	10/30 - 11/9/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Chloride	1.5	7.6	7.4	7.6	0.58
Nitrogen, Nitrate-Nitrite	0.31	0.87	0.88	0.86	ND (0.3) B
Sulfate	16	22	19.1	22	6.1
Total Dissolved Solids	320	210	252	250	110
Total Organic Carbon(TOC)	3.9 B	1 B	ND (1)	2.6 B	9.5 B
Turbidity(NTU)	11	1.8	ND (1)	1.6	36 J

SAS: Sound Analytical Services, Tacoma, WA.

QESZ: Quanterra Environmental Services, Anchorage, AK.

J: Estimated Value.

B: Analyte was detected in the associated method blank.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 3
Ft. Richardson GW (Fall 98) Landfill
Parameters
October/November 1998

LOCATION OF SAMPLE:	AP-3015	AP-3219	AP-3220	AP-3221	AP-3222
DATE OF SAMPLE:	10/28/98	10/27/98	11/12/98	11/2/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	05WA	02WA	15WA	06WA	03WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE ID:	76704-03	76666-02	77065-01	76797-01	76704-01
DATE RECEIVED:	10/30/98	10/29/98	11/16/98	11/4/98	10/30/98
DATE ANALYZED:	10/30 - 11/9/98	10/29 - 11/2/98	11/16 - 25/98	11/4 - 9/98	10/30 - 11/4/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Chloride	11	1	2.9	4.8 J	8.7
Nitrogen, Nitrate-Nitrite	1.1 J	0.57	0.18	0.56 J	0.78 J
Sulfate	21	4.5	15	17 J	21
Total Dissolved Solids	230	100	270 J	400 J	240
Total Organic Carbon (TOC)	0.62 B	7.3	8.4 B	2.4 B	0.88 B
Turbidity (NTU)	1.6 J	150	2.4 J	3.4 J	0.5 J

SAS: Sound Analytical Services, Tacoma, WA.

J: Estimated Value.

B: Analyte was detected in the associated method blank.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 3
Ft. Richardson GW (Fall 98) Landfill
Parameters
October/November 1998

		QC Dup	QA Dup		
LOCATION OF SAMPLE:	FR-1	FR-1	FR-1	FR-2	FR-3
DATE OF SAMPLE:	11/3/98	11/3/98	11/3/98	11/9/98	11/3/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	08WA	09WA	10WA	11WA	07WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	76833-02	76833-03	0633510001SA	76973-01	76833-01
DATE RECEIVED:	11/5/98	11/5/98	11/4/98	11/11/98	11/5/98
DATE ANALYZED:	11/5 - 9/98	11/5 - 9/98	11/5 - 18/98	11/13 - 23/98	11/5 - 9/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Chloride	8.5	8.6	7.6	11	2.7
Nitrogen, Nitrate-Nitrite	0.96	0.92	0.94	0.91	0.39
Sulfate	21	21	18.9	23	13
Total Dissolved Solids	230	240	233	250	200
Total Organic Carbon (TOC)	2.4 B	0.62 B	ND (1.0)	0.63	0.72 B
Turbidity (NTU)	1.1	1.2	ND (1.0)	4.0	15

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QESZ: Quanterra Environmental Services, Anchorage, AK.

B: Analyte was detected in the associated method blank.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 4
Ft. Richardson GW (Fall 98) Landfill
8 RCRA Metals (Total)
October/November 1998

LOCATION OF SAMPLE:	AP-3010	AP-3013	QC Dup AP-3013	QA Dup AP-3013	AP-3014
DATE OF SAMPLE:	11/10/98	11/10/98	11/10/98	11/10/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	16WA	12WA	13WA	14WA	04WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	77006-03	77006-01	0633690001SA	77006-02	76704-02
DATE RECEIVED:	11/12/98	11/12/98	11/11/98	11/12/98	10/30/98
DATE ANALYZED:	11/23 - 25/98	11/23 - 25/98	11/19 - 23/98	11/23 - 25/98	11/12 - 13/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	ND (0.002)	0.00091 J	ND (1.0)	0.00085 J	0.0057
Barium	0.012	0.0096	ND (1.0)	0.009	0.043
Cadmium	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Chromium	0.005 J	ND (0.01)	ND (1.0)	ND (0.01)	ND (0.01)
Lead	0.00031 J	ND (0.001)	ND (1.0)	ND (0.001)	0.003
Potassium	ND (5)	ND (5)	ND (1.0)	3.1 J	ND (5)
Mercury	ND (0.0002)	ND (0.0002)	ND (1.0)	ND (0.0002)	ND (0.0002)
Selenium	0.0029 J	0.0011 J,B	ND (1.0)	0.0039 J,B	0.0033
Silver	ND (0.0001)	ND (0.0001) J	ND (1.0)	ND (0.0001) J	ND (0.0005)
Sodium	3.3	3.2	ND (1.0)	3.1	5.2

SAS: Sound Analytical Services, Tacoma, WA.

QESZ: Quanterra Environmental Services, Anchorage, AK.

J: Estimated Value.

B: Analyte was detected in the associated method blank.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 4
Ft. Richardson GW (Fall 98) Landfill
8 RCRA Metals (Total)
October/November 1998

LOCATION OF SAMPLE:	AP-3015	AP-3219	AP-3220	AP-3221	AP-3222
DATE OF SAMPLE:	10/28/98	10/27/98	11/12/98	11/02/98	10/28/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	05WA	02WA	15WA	06WA	03WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE ID:	76704-03	76666-02	77065-01	76797-01	76704-01
DATE RECEIVED:	10/30/98	10/29/98	11/16/98	11/04/98	10/30/98
DATE ANALYZED:	11/12 - 13/98	11/09/98	11/23 - 25/98	11/09/98	11/12 - 13/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	ND (0.001)	0.012 J	0.0059	ND (0.005) J	ND (0.001)
Barium	0.016	0.13	0.074	0.033 J	0.0081
Cadmium	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.005) J	ND (0.001)
Chromium	ND (0.01)	0.028	ND (0.01)	ND (0.01) J	ND (0.01)
Lead	0.0011	0.01	ND (0.001)	ND (0.005) J	ND (0.001)
Potassium	ND (5)	ND (5)	2.2 J	ND (5) J	ND (5)
Mercury	ND (0.0002)	0.0019	ND (0.0002)	0.00017 J	ND (0.0002)
Selenium	ND (0.003)	0.0043	0.017	0.011 J	ND (0.003)
Silver	ND (0.0005)	0.00055	ND (0.0005)	ND (0.0025) J	ND (0.0005)
Sodium	4	1.4	31	4.5 J	3.4

SAS: Sound Analytical Services, Tacoma, WA.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 4
Ft. Richardson GW (Fall 98) Landfill
8 RCRA Metals (Total)
October/November 1998

		QC Dup	QA Dup		
LOCATION OF SAMPLE:	FR-1	FR-1	FR-1	FR-2	FR-3
DATE OF SAMPLE:	11/03/98	11/03/98	11/03/98	11/09/98	11/03/98
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	08WA	09WA	10WA	11WA	07WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	76833-02	76833-03	0633510001SA	76973-01	76833-01
DATE RECEIVED:	11/05/98	11/05/98	11/04/98	11/11/98	11/05/98
DATE ANALYZED:	11/09/98	11/09/98	11/19 - 23/98	11/23 - 25/98	11/09/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	ND (0.001) J	0.00079 J	ND (0.0020)	ND (0.001)	ND (0.001) J
Barium	0.0061	0.006	ND (0.0020)	0.0096	0.01
Cadmium	ND (0.001)	ND (0.001)	ND (0.0010)	ND (0.001)	ND (0.001)
Chromium	ND (0.01)	ND (0.01)	ND (0.0040)	0.005 J	0.015
Lead	ND (0.001)	ND (0.001)	ND (0.0012)	ND (0.001)	ND (0.001)
Potassium	ND (5)	ND (5)	ND (1.5900)	ND (5)	ND (5)
Mercury	0.00032	ND (0.0002)	ND (0.200)	ND (0.0002)	ND (0.0002)
Selenium	0.006	0.0038	ND (0.0019)	0.0038 J	0.0038
Silver	ND (0.0005)	ND (0.0005)	ND (0.0080)	0.00071 J	ND (0.0005)
Sodium	2.6	2.5	ND (0.0800)	3	1.5

SAS: Sound Analytical Services, Tacoma, WA.

QESZ: Quanterra Environmental Services, Anchorage, AK.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 5
Ft. Richardson GW (Fall 98) Landfill
8 RCRA Metals, Dissolved
October/November 1998

LOCATION OF SAMPLE:	AP-3010	AP-3013	QA Dup AP-3013	QC Dup AP-3013	AP-3014
DATE OF SAMPLE:	36109	36109	36109	36109	36096
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	16WA	12WA	13WA	14WA	04WA
TESTING LABORATORY:	SAS	SAS	QESZ	SAS	SAS
LABORATORY SAMPLE ID:	77006-03	77006-01	0633690001SA	77006-02	76704-02
DATE RECEIVED:	36111	36111	36110	36111	36098
DATE ANALYZED:	36122	11/23 - 25/98	11/19 - 23/98	11/23 - 25/98	36111
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	0.00065 J	0.0011	ND (1.0)	0.00094 J	ND (0.001)
Barium	0.011	0.0095	ND (1.0)	0.009	0.0056
Cadmium	0.0017	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Chromium	ND (0.01)	ND (0.01)	ND (1.0)	ND (0.01)	ND (0.01)
Lead	ND (0.001)	ND (0.001)	ND (1.0)	ND (0.001)	ND (0.001)
Mercury	ND (0.0002)	ND (0.0002)	ND (1.0)	ND (0.0002)	ND (0.0002)
Potassium	ND (5)	ND (5)	ND (1.0)	ND (5)	3.1 J
Selenium	ND (0.003)	ND (0.003)	ND (1.0)	ND (0.003)	ND (0.003)
Silver	0.00075	ND (0.0005)	ND (1.0)	ND (0.0005)	ND (0.0005) J
Sodium	3.3	3.2	ND (1.0)	3.1	4.3

SAS: Sound Analytical Services, Tacoma, WA.

QESZ: Quanterra Environmental Services, Anchorage, AK.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 5
Ft. Richardson GW (Fall 98) Landfill
8 RCRA Metals, Dissolved
October/November 1998

LOCATION OF SAMPLE:	AP-3015	AP-3219	AP-3220	AP-3221	AP-3222
DATE OF SAMPLE:	36096	36095	36111	36101	36096
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	05WA	02WA	15WA	06WA	03WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE ID:	76704-03	76666-02	77065-01	76797-01	76704-01
DATE RECEIVED:	36098	36097	36115	36103	36098
DATE ANALYZED:	36111	36108	11/23 - 25/98	36108	11/12 - 13/98
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	0.00079 J	ND (0.001) J	0.0076 J	ND (0.005) J	0.00074 J
Barium	0.0077	0.0022 J	0.073	0.036 J	0.0069
Cadmium	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.005) J	ND (0.001)
Chromium	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01) J	ND (0.01)
Lead	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.005) J	ND (0.001)
Mercury	ND (0.0002)	ND (0.0002)	ND (0.0002)	0.00053 J	ND (0.0002)
Potassium	2.1 J	ND (5)	2.5 J	ND (5) J	1.6 J
Selenium	ND (0.003)	ND (0.003)	0.015 J	0.0091 J	ND (0.003)
Silver	ND (0.0005) J	ND (0.0005) J	ND (0.0005) J	ND (0.0025) J	ND (0.0005) J
Sodium	3.5	1.2	31	5.2 J	2.9

SAS: Sound Analytical Services, Tacoma, WA.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 5
Ft. Richardson GW (Fall 98) Landfill
8 RCRA Metals, Dissolved
October/November 1998

		QA Dup	QC Dup		
LOCATION OF SAMPLE:	FR-1	FR-1	FR-1	FR-2	FR-3
DATE OF SAMPLE:	36102	36102	36102	36108	36102
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE ID: 98FRL-	08WA	10WA	09WA	11WA	07WA
TESTING LABORATORY:	SAS	QESZ	SAS	SAS	SAS
LABORATORY SAMPLE ID:	76833-02	0633510001SA	76833-03	76973-01	76833-01
DATE RECEIVED:	36104	36103	36104	36110	36104
DATE ANALYZED:	36108	11/19 - 20/98	36108	11/23 - 25/98	36108
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Arsenic	0.0011 J	ND (0.0020)	0.00073 J	0.001 J	ND (0.001) J
Barium	0.0073	ND (0.0020)	0.0075	0.0094	0.0087
Cadmium	ND (0.001)	ND (0.0010)	ND (0.001)	ND (0.001)	ND (0.001)
Chromium	ND (0.01)	ND (0.0040)	ND (0.01)	ND (0.01)	ND (0.01)
Lead	ND (0.001)	ND (0.0012)	ND (0.001)	ND (0.001)	ND (0.001)
Mercury	ND (0.0002)	ND (1.5900)	ND (0.0002)	ND (0.0002)	0.00034
Potassium	ND (5)	ND (0.200)	ND (5)	ND (5)	ND (5)
Selenium	ND (0.003)	ND (0.0019)	ND (0.003)	ND (0.003)	ND (0.003)
Silver	ND (0.0005) J	ND (0.0080)	ND (0.0005) J	ND (0.0005) J	ND (0.0005) J
Sodium	3	ND (0.0800)	3.1	2.9	1.8

SAS: Sound Analytical Services, Tacoma, WA.

QESZ: Quanterra Environmental Services, Anchorage, AK.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).

Table 6	VOC 8260B				1 of 2
Well Number	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenze (µg/L)	Total Xylenes (µg/L)
AP-3010	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	0.4	1.2	0.2	0.8
	Nov-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
AP-3013	Oct-95	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Jun-96	0.052	0.088	0.032	0.119
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	Jun-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
AP-3014	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	0.062	ND(0.2)	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	Jun-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
AP-3015	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	NA	NA	NA	NA
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	Jun-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
AP-3019	Oct-95	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Jun-96	NA	NA	NA	NA
	Nov-96	NA	NA	NA	NA
	May-97	NA	NA	NA	NA
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	NA	NA	NA	NA
AP-3220	Oct-95	NA	NA	NA	NA
	Jun-96	0.073	0.3	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	7.7	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	0.31	ND(1)	ND(1)	ND(1)

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 6	VOC 8260B				2 of 2
Well Number	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenze (µg/L)	Total Xylenes (µg/L)
AP-3221	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	ND(0.2)	0.27	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
AP-3222	Oct-95	ND(0.5)	0.2	ND(0.5)	ND(0.5)
	Jun-96	ND(0.2)	0.05	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
FR-1	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Nov-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
FR-2	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	May-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)
FR-3	Oct-95	ND(2)	ND(2)	ND(2)	ND(2)
	Jun-96	ND(0.2)	ND(0.2)	ND(0.2)	ND(0.2)
	Nov-96	ND(1)	ND(1)	ND(1)	ND(1)
	May-97	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
	Dec-97	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
	Jun-98	ND(1)	ND(1)	ND(1)	ND(1)
	Nov-98	ND(1)	ND(1)	ND(1)	ND(1)

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 7	Gasoline Range Organics (AK101) (mg/L)						1 of 1
Well / Date	Oct-95	Jun-96	Nov-96	May-97	Dec-97	May-98	Nov-98
AP-3010	ND(0.05)	0.15	0.040	ND(0.05)	ND(0.05)	0.058	0.46
AP-3013	ND(0.05)	0.028	ND(0.05)	ND(0.05)	ND(0.05)	ND (0.05)	ND
AP-3014	ND(0.05)	ND(0.0098)	0.584	ND(0.05)	ND(0.05)	ND(0.05)	ND
AP-3015	ND(0.05)	0.079	ND(0.05)	NA	ND(0.05)	ND(0.05)	0.32
AP-3019	ND(0.05)	NA	NA	NA	ND(0.05)	ND(0.05)	NA
AP-3220	NA	ND(0.0098)	0.026	ND(0.05)	0.03	ND(0.05)	ND
AP-3221	ND(0.05)	ND(0.0098)	0.058	ND(0.05)	ND(0.05)	0.015	0.057
AP-3222	ND(0.05)	ND(0.0098)	0.021	ND(0.05)	ND(0.05)	ND(0.05)	0.012
FR-1	ND(0.05)	ND(0.0098)	0.026	ND(0.05)	ND(0.05)	ND(0.05)	ND
FR-2	ND(0.05)	ND(0.0098)	0.025	ND(0.05)	ND(0.05)	ND(0.05)	ND
FR-3	ND(0.05)	ND(0.0098)	0.028	ND(0.05)	0.026	ND(0.05)	ND

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 8	Total Metals									1 of 2
Well Number	Date	Arsenic (µg/L)	Barium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Lead (µg/L)	Mercury (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)
AP-3010	Oct-95	ND(5)	10	ND(20)	ND(20)	4	ND(0.2)	1000	ND(5)	ND(20)	3200
	Jun-96	ND(0.8)	10	ND(0.2)	14	1.8	ND(0.17)	1800	ND(1.5)	ND(0.3)	3200
	Nov-96	2	10	ND(5)	6	2	ND	1100	ND(5)	ND(5)	3500
	May-97	3	32	ND(4)	27	14	ND(0.5)	ND(2000)	ND(5)	ND(10)	3900
	Nov-97	ND(1)	10	ND(0.5)	6	0.83	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3200
	May-98	ND(1)	14	ND(0.5)	9.7	1.8	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3600
	Nov-98	ND(2)	12	ND(1)	5	0.31	ND(0.2)	ND(1000)	2.9	ND(0.5)	3300
AP-3013	Oct-95	ND(5)	7	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	3000
	Jun-96	ND(0.8)	7.5	ND(0.2)	1.2	0.27	ND(0.17)	1200	ND(1.5)	ND(0.3)	2900
	Nov-96	2	8	ND(5)	ND(10)	ND	ND	700	ND(5)	ND(5)	3100
	May-97	1	17	ND(4)	ND(5)	1	ND(0.5)	2600	ND(5)	ND(10)	3360
	Dec-97	ND(1)	8.2	ND(0.5)	ND(10)	16	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	2900
	Jun-98	ND(1)	7.9	ND(0.5)	ND(10)	0.32	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3300
	Nov-98	0.91	9.6	ND(1)	ND(10)	ND(1)	ND(0.2)	ND(5000)	1.1	ND(0.5)	3200
AP-3014	Oct-95	ND(5)	6	ND(5)	ND(10)	ND(2)	ND(0.5)	1000	ND(5)	ND(5)	2560
	Jun-96	ND(0.8)	6.9	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	1100	ND(1.5)	0.41	2900
	Nov-96	ND(5)	7	ND(5)	ND	ND	ND	1100	ND(5)	ND(5)	2800
	May-97	9	118	ND(4)	25	10	0.2	2500	ND(5)	ND(10)	4520
	Dec-97	ND(1)	13	ND(0.5)	ND(10)	0.78	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	2700
	Jun-98	ND(1)	9.9	ND(0.5)	ND(10)	0.51	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3700
	Nov-98	5.7	43	ND(1)	ND(10)	3	ND(0.2)	ND(5000)	3.3	ND(0.5)	5200
AP-3015	Oct-95	ND(5)	63	ND(5)	10	ND(2)	7	1000	ND(5)	ND(5)	3590
	Jun-96	ND(0.8)	12	ND(0.2)	ND(8.7)	1.1	ND(0.17)	2300	ND(1.5)	ND(0.3)	2900
	Nov-96	1	14	ND(5)	8	3	ND	900	ND(5)	ND(5)	3200
	May-97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dec-97	ND(1)	9.4	ND(0.5)	ND(10)	0.71	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3100
	Jun-98	ND(1)	ND(10)	ND(0.5)	ND(10)	0.4	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3300
	Nov-98	ND(2)	16	ND(1)	ND(10)	1.1	ND(0.2)	ND(5000)	ND(3)	ND(0.5)	4000
AP-3219	Oct-95	ND(5)	24	ND(5)	ND(10)	ND(2)	ND(0.5)	500	ND(5)	ND(5)	1300
	Jun-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nov-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	May-97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dec-97	2.6	110	ND(0.5)	17	4.8	ND(0.2)	2700	ND(2)	ND(0.5)	2200
	Jun-98	ND(1)	7	ND(0.5)	ND(10)	0.42	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	1200
	Nov-98	12	130	ND(1)	2.8	10	1.9	ND(5000)	4.3	0.55	1400

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 8	Total Metals										2 of 2
Well Number	Date	Arsenic (µg/L)	Barium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Lead (µg/L)	Mercury (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)
AP-3220	Oct-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Jun-96	4.9	100	ND(0.2)	2.2	1.7	ND(0.17)	2900	7.4	ND(0.3)	17000
	Nov-96	4	78	ND(5)	4	3	ND	3600	ND(5)	ND(5)	17600
	May-97	15	221	ND(4)	32	15	ND(0.5)	4300	ND(5)	ND(10)	28000
	Dec-97	8.9	120	0.46	ND(10)	5	0.24	4900	18	ND(0.5)	17000
	May-98	8.6	150	0.68	4.8	12	0.32	2900	6.5	ND(0.5)	20000
	Nov-98	5.9	74	ND(1)	ND(10)	ND(1)	ND(0.2)	2200	17	ND(0.5)	31000
AP-3221	Oct-95	ND(5)	68	ND(5)	30	ND(2)	ND(0.5)	2000	ND(5)	ND(5)	4980
	Jun-96	ND(0.8)	39	ND(0.2)	18	0.59	ND(0.17)	1800	ND(1.5)	ND(0.3)	4500
	Nov-96	ND(5)	60	ND(5)	30	3	ND	1800	ND(5)	ND(5)	4600
	May-97	2	64	ND(4)	10	2	ND(0.5)	2100	ND(5)	ND(10)	4480
	Dec-97	0.97	43	ND(0.5)	7.7	0.59	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3700
	May-98	0.98	52	ND(0.5)	14	0.99	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	4400
	Nov-98	ND(5)	33	ND(5)	ND(10)	ND(5)	0.17	ND(5000)	11	ND(2.5)	4500
AP-3222	Oct-95	ND(5)	10	ND(5)	8	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2900
	Jun-96	ND(0.8)	6.6	ND(0.2)	0.94	ND(0.27)	ND(0.17)	ND(1000)	ND(1.5)	ND(0.3)	2900
	Nov-96	1	7	ND(5)	4	ND	ND	800	ND(5)	ND(5)	3300
	May-97	ND(5)	9	ND(4)	ND(5)	ND(2)	ND(0.5)	2000	ND(5)	ND(10)	3200
	Dec-97	0.81	6.7	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(0.5)	ND(0.5)	2900
	May-98	ND(1)	7.8	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3400
	Nov-98	ND(1)	8.1	ND(1)	ND(10)	ND(1)	ND(0.2)	ND(5000)	ND(3)	ND(0.5)	3400
FR-1	Oct-95	ND(5)	6	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2780
	Jun-96	ND(0.8)	5.7	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	ND(1000)	ND(1.5)	ND(0.3)	2700
	Nov-96	2	7	ND(5)	ND	ND	ND	700	4	ND(5)	3000
	May-97	ND(5)	9	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	3290
	Nov-97	ND(1)	7.2	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3200
	May-98	ND(1)	7.6	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3200
	Nov-98	ND(1)	6.1	ND(1)	ND(10)	ND(1)	0.32	ND(5000)	6	ND(0.5)	2600
FR-2	Oct-95	ND(5)	ND(5)	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2600
	Jun-96	ND(0.8)	7.8	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	1600	ND(1.5)	ND(0.3)	2800
	Nov-96	1	10	ND(5)	5	ND	ND	800	ND(5)	ND(5)	3100
	May-97	ND(5)	107	ND(4)	ND(5)	ND(2)	ND(0.5)	2200	ND(5)	ND(10)	3420
	Dec-97	ND(1)	9.8	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3200
	May-98	ND(1)	11	ND(0.5)	10	ND(0.5)	ND(0.2)	ND(5000)	ND(2)	ND(0.5)	3300
	Nov-98	ND(1)	9.6	ND(1)	5	ND(1)	ND(0.2)	ND(5000)	3.8	0.71	3000
FR-3	Oct-95	ND(5)	24	ND(5)	10	ND(2)	ND(0.5)	1000	ND(5)	ND(5)	2100
	Jun-96	ND(0.8)	13	ND(0.2)	11	1.1	ND(0.17)	1900	ND(1.5)	ND(0.3)	1800
	Nov-96	3	38	ND(5)	ND	4	ND	1600	ND(5)	ND(5)	2400
	May-97	8	135	ND(4)	575	17	ND(0.5)	3610	ND(5)	ND(10)	3520
	Dec-97	19	330	0.71	670	65	ND(0.2)	4400	ND(2)	1.7	3600
	Jun-98	1.8	6	ND(0.5)	160	9.4	0.2	ND(5000)	ND(2)	0.35	2500
	Nov-98	ND(1)	10	ND(1)	15	ND(1)	ND(0.2)	ND(5000)	3.8	ND(0.5)	1500

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 9	Dissolved Metals										1 of 2
Well Number	Date	Arsenic (µg/L)	Barium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Lead (µg/L)	Mercury (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)
AP-3010	Oct-95	ND(5)	10	ND(5)	ND(10)	ND(2)	ND(0.5)	1000	ND(5)	ND(5)	3200
	Jun-96	ND(0.8)	28	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	1900	ND(1.5)	ND(0.3)	3400
	Nov-96	1	16	ND(5)	ND(10)	2	ND(0.2)	1000	ND(5)	ND(5)	3400
	May-97	ND(5)	31	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	3820
	Nov-97	ND(1)	9.8	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3600
	May-98	ND(1)	9.9	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3400
	Nov-98	0.65	11	1.7	ND(10)	ND(1)	ND(0.2)	ND(5000)	ND(3)	0.75	3300
AP-3013	Oct-95	ND(5)	23	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2900
	Jun-96	ND(0.8)	6.7	ND(0.2)	1.5	ND(0.27)	0.19	ND(1000)	ND(1.5)	ND(0.3)	3100
	Nov-96	1	7	ND(5)	ND(10)	ND(2)	ND(0.2)	700	ND(5)	ND(5)	3100
	May-97	ND(5)	23	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	3140
	Dec-97	ND(1)	8.7	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3100
	Jun-98	ND(1)	8.5	ND(0.5)	ND(10)	0.27	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3300
	Nov-98	1.1	9.5	ND(1)	ND(10)	ND(1)	ND(0.2)	ND(5000)	ND(3)	ND(0.5)	3200
AP-3014	Oct-95	ND(5)	ND(5)	ND(5)	ND(10)	ND(2)	ND(0.5)	1000	ND(5)	ND(5)	2600
	Jun-96	ND(0.8)	7.1	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	2000	ND(1.5)	0.41	3100
	Nov-96	1	56	ND(5)	ND(10)	ND(2)	ND(0.2)	1100	ND(5)	ND(5)	2600
	May-97	ND(5)	49	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	4290
	Dec-97	ND(1)	5.5	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	2600
	Jun-98	ND(1)	4.8	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3600
	Nov-98	ND(1)	5.6	ND(1)	ND(10)	ND(1)	ND(0.2)	3100	ND(3)	ND(0.5)	4300
AP-3015	Oct-95	ND(5)	27	ND(5)	ND(10)	ND(0.27)	ND(0.5)	1500	ND(5)	ND(5)	3100
	Jun-96	ND(0.8)	12	ND(0.2)	ND(8.7)	1.1	ND(0.17)	2300	ND(1.5)	ND(0.3)	2900
	Nov-96	1	19	ND(5)	ND(10)	ND(2)	ND(0.2)	700	ND(5)	ND(5)	3200
	May-97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dec-97	ND(1)	8.1	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3100
	Jun-98	ND(1)	8.6	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3100
	Nov-98	0.79	7.7	ND(1)	ND(10)	ND(1)	ND(0.2)	2100	ND(3)	ND(0.5)	3500
AP-3219	Oct-95	ND(5)	2	ND(5)	ND(10)	ND(2)	ND(0.5)	600	ND(5)	ND(5)	1200
	Jun-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Nov-96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	May-97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dec-97	ND(1)	2.5	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	1400
	Jun-98	ND(1)	3.4	ND(0.5)	5.2	9.5	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	1200
	Nov-98	ND(1)	2.2	ND(1)	ND(10)	ND(1)	ND(0.2)	ND(5000)	ND(3)	ND(0.5)	1200

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 9		Dissolved Metals									2 of 2
Well Number	Date	Arsenic (µg/L)	Barium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Lead (µg/L)	Mercury (µg/L)	Potassium (µg/L)	Selenium (µg/L)	Silver (µg/L)	Sodium (µg/L)
AP-3220	Oct-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Jun-96	4	88	ND(0.2)	1	ND(0.27)	ND(0.17)	2100	5.4	ND(0.3)	18000
	Nov-96	3	63	ND(5)	ND(10)	ND(2)	ND(0.2)	1900	ND(5)	ND(5)	17200
	May-97	3	58	ND(4)	ND(5)	ND(2)	0.1	2400	ND(5)	ND(10)	28000
	Dec-97	5.5	110	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	2900	14	ND(0.5)	17000
	May-98	4.4	74	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	2500	5.4	ND(0.5)	20000
	Nov-98	7.6	73	ND(1)	ND(10)	ND(1)	ND(0.2)	2500	15	ND(0.5)	31000
AP-3221	Oct-95	ND(5)	57	ND(5)	ND(10)	ND(2)	ND(0.5)	1000	ND(5)	ND(5)	4790
	Jun-96	ND(0.8)	56	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	2200	ND(1.5)	ND(0.3)	5600
	Nov-96	ND(5)	52	ND(5)	ND(10)	ND(2)	ND(0.2)	1200	ND(5)	ND(5)	4500
	May-97	ND(5)	54	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	4220
	Dec-97	ND(1)	34	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3800
	May-98	ND(1)	36	ND(0.5)	5.6	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	4000
	Nov-98	ND(5)	36	ND(5)	ND(10)	ND(5)	0.53	ND(5000)	9.1	ND(2.5)	5200
AP-3222	Oct-95	ND(5)	6	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2900
	Jun-96	ND(0.8)	6.6	ND(0.2)	1.6	ND(0.27)	0.17	1100	ND(1.5)	ND(0.3)	3100
	Nov-96	ND(5)	6	ND(5)	ND(10)	ND(2)	ND(0.2)	700	ND(5)	ND(5)	3100
	May-97	ND(5)	25	ND(4)	ND(5)	ND(2)	ND(0.5)	2400	ND(5)	ND(10)	3470
	Dec-97	ND(1)	7	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3100
	May-98	ND(1)	7.4	ND(0.5)	5	0.36	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3200
	Nov-98	0.74	6.9	ND(1)	ND(10)	ND(1)	ND(0.2)	1600	ND(3)	ND(0.5)	2900
FR-1	Oct-95	ND(5)	6	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2750
	Jun-96	ND(0.8)	24	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	1100	ND(1.5)	ND(0.3)	3600
	Nov-96	1	8	ND(5)	ND(10)	ND(2)	ND(0.2)	700	ND(5)	ND(5)	3000
	May-97	ND(5)	11	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	3390
	Nov-97	ND(1)	7.8	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3400
	May-98	ND(1)	7	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3000
	Nov-98	1.1	7.3	ND(1)	ND(10)	ND(1)	ND(0.2)	ND(5000)	ND(3)	ND(0.5)	3000
FR-2	Oct-95	ND(5)	ND(5)	ND(5)	ND(10)	ND(2)	ND(0.5)	ND(1000)	ND(5)	ND(5)	2600
	Jun-96	ND(0.8)	7.6	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	1400	ND(1.5)	ND(0.3)	2900
	Nov-96	2	8	ND(5)	ND(10)	ND(2)	ND(0.2)	800	ND(5)	ND(5)	3000
	May-97	ND(5)	29	ND(4)	ND(5)	ND(2)	ND(0.5)	2600	ND(5)	ND(5)	3350
	Dec-97	ND(1)	9.2	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	3100
	May-98	ND(1)	13	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	3200
	Nov-98	1	9.4	ND(1)	ND(10)	ND(1)	ND(0.2)	ND(5000)	ND(3)	ND(0.5)	2900
FR-3	Oct-95	ND(5)	10	ND(5)	ND(10)	ND(2)	ND(0.5)	1000	ND(5)	ND(5)	1900
	Jun-96	ND(0.8)	56	ND(0.2)	ND(8.7)	ND(0.27)	ND(0.17)	1400	ND(1.5)	ND(0.3)	2300
	Nov-96	2	27	ND(5)	ND(10)	ND(2)	ND(0.2)	900	ND(5)	ND(5)	2100
	May-97	ND(5)	32	ND(4)	ND(5)	ND(2)	ND(0.5)	ND(2000)	ND(5)	ND(10)	2340
	Dec-97	ND(1)	65	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(1000)	ND(2)	ND(0.5)	2700
	Jun-98	ND(1)	52	ND(0.5)	ND(10)	ND(0.5)	ND(0.2)	ND(5000)	ND(0.2)	ND(0.5)	2400
	Nov-98	ND(1)	8.7	ND(1)	ND(10)	ND(1)	0.34	ND(5000)	ND(3)	ND(0.5)	1800

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 10	Water quality parameters						1 of 2
Well Number	Date	Chloride (mg/L)	Nitrate +Nitrite (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Total Organic Carbon (mg/L)	Turbidity NTU
AP-3010	Oct-95	1.8	0.3	14	299	0.8	6.8
	Jun-96	1	0.36	16	290	1.1	7.2
	Nov-96	1.8	0.3	14	265	0.9	6
	May-97	2.4	0.4	17	319	2.0	72.5
	Nov-97	1.9	0.39	16	290	1.5	4.9
	May-98	2.0	0.34	18	290	1.4	13
	Nov-98	1.5	0.31	16	320	3.9	11
AP-3013	Oct-95	7.1	1.0	18	239	0.4	ND(0.5)
	Jun-96	9	0.87	21	220	0.7	2.54
	Nov-96	8.0	0.8	17	206	0.5	3
	May-97	8.1	0.9	17	227	ND(0.05)	15.0
	Dec-97	9.3	0.97	19	210	0.55	0.60
	Jun-98	9.2	0.83	22	200	0.96	0.9
	Nov-98	7.6	0.87	22	210	1	1.8
AP-3014	Oct-95	1.1	ND(0.2)	7.4	88	ND(0.5)	1.7
	Jun-96	2	0.13	11	940	1.3	0.59
	Nov-96	1.2	0.1	8.1	43	0.7	ND(1)
	May-97	1.1	0.2	8.9	93	3.4	175
	Dec-97	0.84	0.23	6.6	95	2.1	11
	Jun-98	0.62	ND(0.3)	7.1	52	1.4	8.6
	Nov-98	0.58	ND(0.3)	6.1	110	9.5	36
AP-3015	Oct-95	9.5	1.1	17	248	ND(0.5)	76
	Jun-96	12	1.4	22	240	0.67	11.6
	Nov-96	9.3	1.2	18	211	0.5	16
	May-97	NA	NA	NA	NA	NA	NA
	Dec-97	11	1.2	20	230	0.81	3.0
	Jun-98	13	1.3	23	220	0.87	2.2
	Nov-98	11	1.1	21	230	0.62	1.6
AP-3019	Oct-95	1.0	0.5	3.1	40	1.3	60
	Jun-96	NA	NA	NA	NA	NA	NA
	Nov-96	NA	NA	NA	NA	NA	NA
	May-97	NA	NA	NA	NA	NA	NA
	Dec-97	1.2	0.79	3.7	33	2.7	3.0
	Jun-98	1.0	0.64	5.0	63	1.7	9.8
	Nov-98	1	0.57	4.5	100	7.3	150
AP-3220	Oct-95	NA	NA	NA	NA	NA	NA
	Jun-96	6	0.98	20	290	12	140
	Nov-96	2.3	ND(0.2)	11	285	8.7	1120
	May-97	2.3	0.3	15	128	9.9	7.70
	Dec-97	9.4	0.20	16	330	11	21
	May-98	3.1	0.22	16	290	3.9	54
	Nov-98	2.9	0.18	15	270	8.4	2.4

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

Table 10	Water quality parameters						2 of 2
Well Number	Date	Chloride (mg/L)	Nitrate +Nitrite (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Total Organic Carbon (mg/L)	Turbidity NTU
AP-3221	Oct-95	3.9	0.5	16	433	ND(0.5)	160
	Jun-96	3	0.5	16	430	0.74	44
	Nov-96	3.6	0.5	12	380	1	70
	May-97	4.6	0.5	16	397	ND(0.5)	16.2
	Dec-97	4.3	0.58	17	370	1.2	9.2
	May-98	4.2	0.43	17	390	1.2	47
	Nov-98	4.8	0.56	17	400	2.4	3.4
AP-3222	Oct-95	8.0	0.5	18	205	0.3	ND(0.5)
	Jun-96	8	0.87	19	240	0.6	ND(0.2)
	Nov-96	7.8	0.8	13	170	0.4	ND(1)
	May-97	8.2	0.8	17	244	ND(0.5)	0.41
	Dec-97	7.7	0.88	17	250	0.75	ND(0.2)
	May-98	9.4	0.78	18	240	0.76	0.4
	Nov-98	8.7	0.78	21	240	0.88	0.5
FR-1	Oct-95	7.5	1.0	18	211	ND(0.5)	ND(0.5)
	Jun-96	8	1	19	240	ND(0.5)	0.50
	Nov-96	7.1	0.9	12	260	0.4	ND(1)
	May-97	9.1	0.9	18.0	234	ND(0.5)	ND(2.0)
	Nov-97	8.9	0.95	19	230	0.64	ND(0.1)
	May-98	9.6	0.89	20	240	0.85	ND(0.2)
	Nov-98	8.5	0.96	21	230	2.4	1.1
FR-2	Oct-95	8.6	0.9	18	248	ND(0.5)	ND(0.5)
	Jun-96	9	1.1	19	280	0.52	2.9
	Nov-96	8.3	1.0	18	288	0.4	2
	May-97	9.6	0.9	17	294	ND(0.5)	0.27
	Dec-97	11	0.94	20	270	0.66	0.9
	May-98	11	0.88	20	270	0.9	2.5
	Nov-98	11	0.91	23	250	0.63	4.0
FR-3	Oct-95	3.2	0.5	12	348	0.2	84
	Jun-96	3	0.5	12	230	0.85	60.5
	Nov-96	2.7	ND(0.2)	11	198	1.0	660
	May-97	3.6	0.7	12	218	3.5	137
	Dec-97	3.0	0.43	13	180	18	170
	Jun-98	2.7	0.35	13	180	5.7	160
	Nov-98	2.7	0.39	13	200	0.72	15

ND: Not Detected. (The number in parentheses is the Method Reporting Limit (MRL)).
NA: Not Available (Well not sampled)

APPENDIX C

Quality Assurance Report

CEPOA-EN-G-MI 25 March 1999

MEMORANDUM THROUGH CEPOA-EN-G

CEPOA-EN-G-MI

FOR RECORD

SUBJECT: Chemical Data Quality Assessment Report, Fort Richardson GW Landfill Fall 1998.

1. **Reference:** Ethix report dated 8 February 1999 Fort Richardson GW Landfill Fall 1998 water sampling, project number 99-003.

2. **Summary:** The referenced report is enclosed. The report summarizes data quality for samples collected from 27 October to 12 November 1998 from the Fort Richardson Landfill, Fort Richardson, Alaska. Sampling was conducted by U.S. Army Corp of Engineering personnel. The primary laboratory was Sound Analytical Services.

3. **Background:** Eleven groundwater samples were collected from within and around the Fort Richardson landfill. The purpose of the sampling effort was designed to fulfill Alaska Department of Environmental Conservation (ADEC) landfill closure monitoring requirements.

4. **Data Quality Objectives:** Water data will be compared to the Alaska Department of Environmental Conservation (ADEC) landfill closure requirements.

5. **Chemical Data Quality Assessment:** Reporting limits were adequate for comparisons with project action levels. Data met completeness and comparability objectives. QA and QC replicates generally were in agreement. Data quality criteria for precision and accuracy were met with the following exceptions:

a. Gasoline Range Organics (GRO): The results for samples 98FRL06WA and 98FRL23WA were qualified as estimated low due to expired holding times. The results for sample 98FRL16WA was qualified as not detected due to Rinsate Blank contamination. The results for samples 98FRL03WA, -20WA, -23WA and -28WA were below the practical quantitation limits and were qualified as estimated.

b. Volatile Aromatic Hydrocarbons (SW8021/SW8260): The results for all compounds for samples 98FRL06WA and 98FRL23WA were qualified as estimated low due to expired holding times. The benzene result for sample 98FRL15WA was below the practical quantitation limits and was qualified as estimated. The m,p,o-xylene results for sample 98FRL17WA was below the practical quantitation limits and was qualified as estimated. The 1,4-dichlorobenzene, toluene and o-xylene results for sample 98FRL23WA were below the practical quantitation limits and were qualified as estimated.

c. Total Metals: The selenium results for samples 98FRL12WA, -14WA and -16WA were qualified as estimated high due to Rinsate Blank contamination. The arsenic results for samples 98FRL02WA, -06WA, -07WA, -08WA and -09WA were qualified as estimated due to poor precision between the sample and sample duplicate. The selenium and silver results for samples 98FRL11WA, -12WA, -14WA, -15WA, -16WA and -17WA were qualified as estimated due to poor precision between the sample and sample duplicate. The mercury and selenium results for sample 98FRL06WA was below the practical quantitation limits and was qualified as estimated. The chromium result for sample 98FRL11WA was below the practical quantitation limits and was qualified as estimated. The arsenic result for samples 98FRL12WA and 98FRL14WA were below the practical

quantitation limits and were qualified as estimated. The potassium result for sample 98FRL15WA was below the practical quantitation limits and was qualified as estimated. The lead and chromium results for sample 98FRL16WA was below the practical quantitation limits and was qualified as estimated. The selenium result for sample 98FRL17WA was below the practical quantitation limits and was qualified as estimated. The arsenic result for sample 98FRL09WA was below the practical quantitation limits and was qualified as estimated.

d. Dissolved Metals: The arsenic results for samples 98FRL02WA, -06WA, -07WA, -08WA, -09WA, -11WA, -12WA, -14WA, -15WA, -16WA and -17WA were qualified as estimated due to poor precision between the sample and sample duplicate. The silver results for samples 98FRL02WA, -03WA, -04WA, -05WA, -06WA, -07WA, -08WA and -09WA were qualified as estimated low due to low matrix spike recovery. The potassium results for samples 98FRL03WA, -04WA and -05WA were qualified as estimated due to poor precision between the sample and sample duplicate. The cadmium results for samples 98FRL03WA, -04WA and -05WA were qualified as estimated high due to high matrix spike recovery. The barium result for samples 98FRL02 WA and 98FRL17WA were below the practical quantitation limits and were qualified as estimated. The arsenic result for samples 98FRL03WA, -05WA, -14WA, -16WA and 98FRL09WA were below the practical quantitation limits and were qualified as estimated. The potassium result for samples 98FRL03 WA, -04WA, -05WA and 98FRL15WA were below the practical quantitation limits and were qualified as estimated. The selenium result for sample 98FRL06WA was below the practical quantitation limits and was qualified as estimated.

e. General Chemistry: The total dissolved solids results for samples 98FRL03WA, -04WA, -05WA and 98FRL15WA were qualified as estimated low due to expired holding times. The turbidity result for sample 98FRL15WA was qualified as estimated low due to expired holding time. The total organic carbon results for samples 98FRL02WA, -03WA, -04WA, -05WA, -06WA, -07WA, -08WA, -09WA, -11WA, -12WA, -14WA, -15WA and -16WA were qualified as estimated due Rinsate Blank contamination. The nitrate + nitrite as nitrogen results for samples 98FRL03WA, -04WA, -05WA and -06WA were qualified as estimated low due to low matrix spike recovery.

Encl

Gerald Archibald
Chemist

CF: CEPOA-EN-EE-AI
CENWO-HX-C

CHEMICAL DATA QUALITY REVIEW

Ft. Richardson GW Landfill - Fall '98

Water Sampling

Project #

99-003

Received: 1/8/99

Received 2/10/99

Prepared for

Army Corps of Engineers - Alaska Division

1.0 Introduction

This report summarizes the technical review of analytical results generated in support of the Fall 1998 water sampling event at GW Landfill, Fort Richardson, Alaska. The criteria applied for this review are consistent with analytical method protocols, in conjunction with the laboratory-established control limits. In cases where specific guidance was not available from either of these sources, the data have been evaluated using professional judgement consistent with industry standards. The review included evaluation of sample collection, holding time and summary information for blanks (to assess contamination), sample duplicates (to assess precision), laboratory control samples (to assess accuracy) and matrix spike and surrogate recoveries (to assess matrix effect). Instrument calibration review and raw data verification were not performed.

The report is arranged by method; within each method section is a sub-section addressing each data quality indicator. In situations where all applicable criteria were met, it will be stated. If criteria were not met , the non-compliance, qualifier and associated samples are listed. Appendices A and B list qualifier definitions and acronyms, respectively. Appendix C, the data summary table, displays all sample results, as well as qualifiers and descriptors that may apply. Appendix D includes a summary of all qualified data, by analytical method.

I certify that all data validation criteria described above were assessed, and any qualifications made to the data were in accordance with the cited reference documents.

Authorized Signature (209) 576-2621

2.0 Sample Collection, Handling and Preservation

Samples were collected from October 27 to November 12, 1998. Samples were received by Sound Analytical Services, Inc. (primary laboratory) within two to four days and Quanterra Environmental Services (referee laboratory) within one to four days of collection. The following samples were collected and analyzed by all applicable methods:

Laboratory: **SAS** **(Primary Laboratory)**

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
76666								
-01	98FRL20WA	Trip Blank	W	10/27/98	5	none		
-02	98FRL02WA		W	10/27/98	5	none		

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
76704								
-01	98FRL03WA		W	10/28/98	2	none		
-02	98FRL04WA		W	10/28/98	2	none		
-03	98FRL05WA		W	10/28/98	2	none		
-04	98FRL21WA	Trip Blank	W	10/28/98	2	none		

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
76797								
-01	98FRL06WA		W	11/2/98	1	J/UJ	L	t
-02	98FRL23WA	Trip Blank	W	11/2/98	1	J/UJ	L	t

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
76833								
-01	98FRL7WA		W	11/3/98	3	none		
-02	98FRL8WA	Primary Sample	W	11/3/98	3	none		
-03	98FRL9WA	QC Dup of -8WA	W	11/3/98	3	none		
-04	98FRL23WA	Trip Blank	W	11/3/98	3	none		

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
76973								
-01	98FRL11WA		W	11/9/98	2	none		
-02	98FRL19WA	Trip Blank	W	11/9/98	2	none		

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
77006								
-01	98FRL12WA	Primary Sample	W	11/10/98	2	none		
-02	98FRL14WA	QC Dup of -12WA	W	11/10/98	2	none		
-03	98FRL16WA		W	11/10/98	2	none		
-04	98FRL17WA	Rinsate Blank	W	11/11/98	2	none		
-05	98FRL28WA	Trip Blank	W	11/10/98	2	none		

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
77065								
-01	98FRL15WA		W	11/12/98	6	none		
-02	98FRL30WA	Trip Blank	W	11/12/98	6	none		

Laboratory: **QES** **(Referee Laboratory)**

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
063351								
-001SA	98FRL10WA	QA Dup of -8WA	W	11/3/98	4	none		
-002SA	98FRL24WA	Trip Blank	W	11/3/98	4	none		

Project / Lab ID	Field ID	Field QC ID	Matrix	Date Collected	Temp °C	Q [1]	Bias	RC
063369								
-001SA	98FRL13WA	QA Dup of -12WA	W	11/10/98	4.7	none		
-002SA	98FRL18WA	Trip Blank	W	11/10/98	4.7	none		

[1] According to the National Functional Guidelines for Data Review, if the sample temperature exceeds 2-6° C, for selected analytes, flag all associated positive and non-detect results as estimated (J/UJ)

All sampling and sample receipt documentation were present and reviewed and no problems were observed.

Trip blank 98FRL20WA contained headspace in all VOA vials.

3.0 Gasoline Range Organics (AK101)

3.1 Holding Time

All samples were analyzed within the required technical holding time except the following:

Laboratory: SAS

Field ID	Matrix	Collected	Prepared	Analyzed	Holding Time (Days) Analysis	RTHT[1] (Days) Analysis	Q	Bias	RC
98FRL06WA	W	11/2/98	11/16/98	11/17/98	15	14	J/UJ	L	e
98FRL23WA	W	11/2/98	11/16/98	11/17/98	15	14	J/UJ	L	e

[1] Required technical holding time established for the method

3.2 Surrogates

All surrogate recoveries were within the required limits.

3.3 Blanks

Method blanks were analyzed at the minimum required frequency. Gasoline range organics were reported as non-detect at the practical quantitation limit.

Nine trip blanks were collected for analysis by this method. All were reported as non-detect at the practical quantitation limit.

Laboratory: SAS
Date Collected: 11/10/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL28WA Trip Blank	gasoline range organics	0.013	0.05	mg/L

No sample results were affected by the above blank result

[1] According to the National Functional Guidelines for Organic Data Review, any compound detected in a blank that was also detected in an associated sample is qualified if the sample result is less than 10x the blank concentration for common laboratory contaminants, or 5x for all other analytes. The associated PQL is elevated to the sample result or the CRQL (RDL), whichever is higher. Flagging for this project modified to "B" at the amount found in the sample.

3.3 Blanks (cont.)

One field rinsate blank was collected for analysis by this method and was reported as shown below:

Laboratory: SAS
Date Collected: 11/11/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL17WA Rinsate Blank	gasoline range organics	3	0.05	mg/L

Affected samples:		Qualified Result	Bias	RC	
98FRL16WA	gasoline range organics	0.46	0.46 B	H	mg/L

[1] According to the National Functional Guidelines for Organic Data Review, any compound detected in a blank that was also detected in an associated sample is qualified if the sample result is less than 10x the blank concentration for common laboratory contaminants, or 5x for all other analytes. The associated PQL is elevated to the sample result or the CRQL (RDL), whichever is higher. Flagging for this project modified to "B" at the amount found in the sample.

3.4 Matrix Spike/Matrix Spike Duplicates

MS/MSDs were analyzed at the required frequency. Recoveries and RPDs were within the laboratory - established limits.

3.5 Laboratory Control Samples

Laboratory control samples were analyzed at the required frequency. All recoveries and RPDs were within the required limits.

3.6 Quantitation Limits

The practical quantitation limits (PQLs) achieved by the laboratories were acceptable relative to the estimated quantitation limits (EQL) suggested by this method for aqueous samples. The following positive results reported were below the quantitation limit, and are flagged "J":

Field ID	Matrix	Dil Factor	Analyte	Result	PQL	Units	Q
98FRL03WA	W	1	gasoline range organics	0.01	0.05	mg/L	J
98FRL20WA	W	1	gasoline range organics	0.01	0.05	mg/L	J
98FRL23WA	W	1	gasoline range organics	0.01	0.05	mg/L	J
98FRL28WA	W	1	gasoline range organics	0.01	0.05	mg/L	J

Results below the quantitation limit are considered qualitatively acceptable but quantitatively unreliable.

3.7 Overall Assessment

Due to holding time exceedance, two samples were qualified as estimated for gasoline range organics.

3.7 **Overall Assessment (cont.)**

Headspace was present in one trip blank; the reporting limits for all compounds were qualified as estimated. Estimated data are useable for limited purposes.

Due to trace levels detected in the rinsate blank, one sample was qualified as nondetect for gasoline range organics.

Minor and major data quality deficiencies were found, which had a slight impact to data useability. All data generated by this method, except where noted, should be considered useable as reported.

4.0 Volatile Aromatic Hydrocarbons (SW8021/SW8260)

4.1 Holding Time

All samples were analyzed within the required technical holding time except the following:

Laboratory: SAS

Field ID	Matrix	Collected	Prepared	Analyzed	Holding Time (Days) Analysis	RTHT[1] (Days) Analysis	Q	Bias	RC
98FRL06WA	W	11/2/98	11/16/98	11/17/98	15	14	J/UJ	L	e
98FRL23WA	W	11/2/98	11/16/98	11/17/98	15	14	J/UJ	L	e

[1] Required technical holding time established for the method is 14 days; according to the National Functional Guidelines for Organic Data Review

4.2 Surrogates

All surrogate recoveries were within the required limits.

4.3 Blanks

Method blanks were analyzed at the minimum required frequency. All target compounds were reported as non-detect at the practical quantitation limit.

Seven trip blanks were collected for analysis by this method. All target compounds were reported as non-detect at the practical quantitation limit except the following:

Laboratory: SAS
Date Collected: 11/3/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL23WA Trip Blank	toluene	0.00037	0.001	mg/L
	o-xylene	0.00022	0.001	mg/L
	1,4-dichlorobenzene	0.00073	0.001	mg/L

No sample results were affected by the above blank result

4.3 Blanks (cont.)

One field rinsate blank was collected for analysis by this method. All target compounds were reported as non-detect at the practical quantitation limit except the following:

Laboratory: SAS
Date Collected: 11/11/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL17WA Rinsate Blank				
	toluene	0.0037	0.001	mg/L
	m,p-xylene	0.00066	0.002	mg/L
	o-xylene	0.00027	0.001	mg/L

No sample results were affected by the above blank result

4.4 Matrix Spike/Matrix Spike Duplicates

MS/MSDs were analyzed at the required frequency. Recoveries and RPDs were within the laboratory - established limits.

4.5 Laboratory Control Samples

Laboratory control samples were analyzed at the required frequency. All recoveries were within the required limits.

4.6 Quantitation Limits

The practical quantitation limits (PQLs) achieved by the laboratories were acceptable relative to the estimated quantitation limits (EQL) suggested by this method for aqueous samples. The following positive results reported were below the quantitation limit, and are flagged "J":

Field ID	Matrix	Dil Factor	Analyte	Result	PQL	Units	Q
98FRL15WA	W	1	benzene	).0003	0.001	mg/L	J
98FRL17WA	W	1	m,p-xylene	).0007	0.002	mg/L	J
98FRL17WA	W	1	o-xylene	).0003	0.001	mg/L	J
98FRL23WA	W	1	1,4-dichlorobenzene	).0007	0.001	mg/L	J
98FRL23WA	W	1	toluene	).0004	0.001	mg/L	J
98FRL23WA	W	1	o-xylene	).0002	0.001	mg/L	J

Results below the quantitation limit are considered qualitatively acceptable but quantitatively unreliable.

4.7 Overall Assessment

Due to low temperature and holding time exceedance, two samples were qualified as estimated for all compounds.

4.7 Overall Assessment (cont.)

Headspace was present in one trip blank; the reporting limits for all compounds were qualified as estimated. Estimated data are useable for limited purposes.

Minor and major data quality deficiencies were found, which had a slight impact to data useability. All data generated by this method, except where noted, should be considered useable as reported.

5.0 Total Metals (SW6010, SW7060, SW7421, SW7470 and SW7740)

5.1 Holding Time

All samples were analyzed within the required technical holding time.

5.2 Blanks

Method blanks were analyzed at the minimum required frequency. All were reported as non-detect at the practical quantitation limit.

One field rinsate blank was collected for analysis by this method. All were reported as non-detect at the practical quantitation limit except the following:

Laboratory: SAS
Date Collected: 11/11/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL17WA Rinsate Blank	selenium	0.002489	0.003	mg/L

Affected samples:			Qualified Result		Bias	RC	RL	Units
98FRL12WA	selenium	0.0011	0.0011	B	H	k	0.003	mg/L
98FRL14WA	selenium	0.0039	0.0039	B	H	k	0.003	mg/L
98FRL16WA	selenium	0.0029	0.0029	B	H	k	0.003	mg/L

5.3 Matrix Spike/Sample Duplicates

MS/SDs were analyzed at the required frequency. Recoveries and RPDs were within the laboratory - established limits except the following:

Laboratory: SAS
Prep Date: 11/6/98
Prep Batch ID: T124
Spiked Sample: 98FRL9WA
Matrix: W
Dil Factor: 1

ANALYTE	Sample Result mg/L	Spike Conc. mg/L	% Recovery MS	% Recovery MSD	Limits [1]	MS/Dup RPD	Limit [1]	Q [2]	Bias	RC
arsenic	0.00079	4	102	NA	75 - 125	- 200	20	J/UJ	N	f

Associated Samples: 98FRL06WA, 98FRL7WA, 98FRL02WA, 98FRL8WA, 98FRL9WA

Laboratory: SAS
Prep Date: 11/23/98
Prep Batch ID: T176
Spiked Sample: 98FRL11WA
Matrix: W
Dil Factor: 1

ANALYTE	Sample Result mg/L	Spike Conc. mg/L	% Recovery MS	% Recovery MSD	Limits [1]	MS/Dup RPD	Limit [1]	Q [2]	Bias	RC
selenium	0.0038	4	115	NA	75 - 125	34	20	J/UJ	N	f
silver	0.00071	2.1	91	NA	75 - 125	200	20	J/UJ	N	f

Associated Samples: 98FRL11WA, 98FRL12WA, 98FRL15WA, 98FRL14WA, 98FRL16WA, 98FRL17WA

[1] Limits established by the laboratory

[2] If the MS or MSD recovery is < LCL apply J to all positive results, apply UJ to all non-detects; if the MS or MSD recovery is > UCL apply J to all positive results; if the MS/MSD RPD is > UCL apply J to all positive results, apply UJ to all non-detects. For metals, qualifiers will apply to all associated batch samples. For metals analyses, if the sample concentration exceeds the spike value by > 4X, guidelines do not apply

5.4 Laboratory Control Samples

Laboratory control samples were analyzed at the required frequency. All recoveries and RPDs were within the required limits.

5.5 Quantitation Limits

The practical quantitation limits (PQLs) achieved by the laboratories were acceptable relative to the estimated quantitation limits (EQL) suggested by this method for aqueous samples. The following positive results reported were below the quantitation limit, and are flagged "J":

Field ID	Matrix	Dil Factor	Analyte	Result	PQL	Units	Q
98FRL06WA	W	1	mercury	).0002	0.0002	mg/L	J
98FRL06WA	W	1	selenium	0.01	0.015	mg/L	J
98FRL11WA	W	1	chromium	0.005	0.01	mg/L	J
98FRL12WA	W	1	arsenic	).0009	0.002	mg/L	J
98FRL14WA	W	1	arsenic	).0009	0.002	mg/L	J
98FRL15WA	W	1	potassium	2.2	5	mg/L	J
98FRL16WA	W	1	lead	).0003	0.001	mg/L	J
98FRL16WA	W	1	chromium	0.005	0.01	mg/L	J
98FRL17WA	W	1	selenium	0.002	0.003	mg/L	J
98FRL9WA	W	1	arsenic	).0008	0.001	mg/L	J

Results below the quantitation limit are considered qualitatively acceptable but quantitatively unreliable.

5.6 Overall Assessment

Due to low sample temperature, one sample was qualified as estimated for all total metals.

Due to poor precision exhibited in the analytical duplicate, six samples were qualified as estimated for selenium and silver and five samples were qualified as estimated for arsenic. Estimated data are useable for limited purposes.

Minor data quality deficiencies were found, which had a slight impact to data useability. All data generated by these methods should be considered useable as reported.

6.0 Dissolved Metals (D-SW6010, D-SW7060, D-SW7421, D-SW7470 and D-SW7740)

6.1 Holding Time

All samples were analyzed within the required technical holding time.

6.2 Blanks

Method blanks were analyzed at the minimum required frequency. All were reported as non-detect at the practical quantitation limit.

One field rinsate blank was collected for analysis by this method. All were reported as non-detect at the practical quantitation limit except the following:

Laboratory: SAS
Date Collected: 11/11/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL17WA Rinsate Blank	barium	0.0004	0.005	mg/L

No sample results were affected by the above blank result

6.3 Matrix Spike/Sample Duplicates

MS/SDs were analyzed at the required frequency. Recoveries and RPDs were within the laboratory - established limits except the following:

Laboratory: SAS
Prep Date: 11/6/98
Prep Batch ID: D125
Spiked Sample: 98FRL9WA
Matrix: W
Dil Factor: 1

ANALYTE	Sample Result mg/L	Spike Conc. mg/L	% Recovery MS	% Recovery MSD	Limits [1]	MS/Dup RPD	Limit [1]	Q [2]	Bias	RC
arsenic	0.0007	4	95	NA	75 - 125	200	20	J/UJ	N	f
silver	< 0.0005	1.1	44	NA	75 - 125	0	20	J/UJ	L	c

Associated Samples: 98FRL06WA, 98FRL7WA, 98FRL02WA, 98FRL8WA, 98FRL9WA

Laboratory: SAS
Prep Date: 11/11/98
Prep Batch ID: D142
Spiked Sample: 98FRL03WA
Matrix: W
Dil Factor: 1

ANALYTE	Sample Result mg/L	Spike Conc. mg/L	% Recovery MS	% Recovery MSD	Limits [1]	MS/Dup RPD	Limit [1]	Q [2]	Bias	RC
potassium	1.6	20	93	NA	75 - 125	200	20	J/UJ	N	f
cadmium	< 0.001	0.1	145	NA	75 - 125	0	20	J/none	H	c
silver	< 0.0005	1.1	31	NA	75 - 125	0	20	J/UJ	L	c

Associated Samples: 98FRL03WA, 98FRL04WA, 98FRL05WA

Laboratory:	SAS
Prep Date:	11/23/98
Prep Batch ID:	D177
Spiked Sample:	98FRL11WA
Matrix:	W
Dil Factor:	1

ANALYTE	Sample Result mg/L	Spike Conc. mg/L	% Recovery MS	% Recovery MSD	Limits [1]	MS/Dup RPD	RPD Limit [1]	Q [2]	Bias	RC
arsenic	0.001	4	93	NA	75 - 125	45	20	J/UJ	N	f

Associated Samples: 98FRL11WA, 98FRL12WA, 98FRL15WA, 98FRL14WA, 98FRL16WA, 98FRL17WA

[1] Limits established by the laboratory

[2] If the MS or MSD recovery is < LCL apply J to all positive results, apply UJ to all non-detects; if the MS or MSD recovery is > UCL apply J to all positive results; if the MS/MSD RPD is > UCL apply J to all positive results, apply UJ to all non-detects. For metals, qualifiers will apply to all associated batch samples. For metals analyses, if the sample concentration exceeds the spike value by > 4X, guidelines do not apply

6.4 Laboratory Control Samples

Laboratory control samples were analyzed at the required frequency. All recoveries and RPDs were within the required limits.

6.5 Quantitation Limits

The practical quantitation limits (PQLs) achieved by the laboratories were acceptable relative to the estimated quantitation limits (EQL) suggested by this method for aqueous samples. The following positive results reported were below the quantitation limit, and are flagged "J":

Field ID	Matrix	Dil Factor	Analyte	Result	PQL	Units	Q
98FRL02WA	W	1	barium	0.002	0.005	mg/L	J
98FRL03WA	W	1	arsenic	0.0007	0.001	mg/L	J
98FRL03WA	W	1	potassium	1.6	5	mg/L	J
98FRL04WA	W	1	potassium	3.1	5	mg/L	J
98FRL05WA	W	1	arsenic	0.0008	0.001	mg/L	J
98FRL05WA	W	1	potassium	2.1	5	mg/L	J
98FRL06WA	W	1	selenium	0.009	0.015	mg/L	J
98FRL14WA	W	1	arsenic	0.0009	0.001	mg/L	J
98FRL15WA	W	1	potassium	2.5	5	mg/L	J
98FRL16WA	W	1	arsenic	0.0007	0.001	mg/L	J
98FRL17WA	W	1	barium	0.0004	0.005	mg/L	J
98FRL9WA	W	1	arsenic	0.0007	0.001	mg/L	J

Results below the quantitation limit are considered qualitatively acceptable but quantitatively unreliable.

6.6 Overall Assessment

Due to poor precision in the analytical duplicates, eleven samples were qualified as estimated for arsenic and three samples were qualified as estimated for potassium.

Due to low matrix spike recoveries, eight samples were qualified as estimated for silver. Estimated data are useable for limited purposes.

Minor data quality deficiencies were found, which had a significant impact to data useability. All data generated by this method, except where noted, should be considered useable as reported.

7.0 General Chemistry (E160.1, E180.1, E300.0 and E415.1)

7.1 Holding Time

All samples were analyzed within the required technical holding time except the following:

Laboratory: SAS

Field ID	Matrix	Method	Collected	Analyzed	Holding Time (Days) Analysis	RTHT[1] (Days) Analysis	Q	Bias	RC
98FRL03WA	W	E180.1	10/28/98	11/2/98	5	2	J/UJ	L	e
98FRL04WA	W	E180.1	10/28/98	11/2/98	5	2	J/UJ	L	e
98FRL05WA	W	E180.1	10/28/98	11/2/98	5	2	J/UJ	L	e
98FRL15WA	W	E180.1	11/12/98	11/16/98	4	2	J/UJ	L	e
98FRL15WA	W	E160.1	11/12/98	11/20/98	8	7	J/UJ	L	e

[1] Required technical holding time established for the method

7.2 Blanks

Method blanks were analyzed at the minimum required frequency. All were reported as non-detect at the practical quantitation limit.

7.2 Blanks (cont.)

One field rinsate blank was collected for analysis by this method. All were reported as non-detect at the practical quantitation limit except the following:

Laboratory: SAS
Date Collected: 11/11/98

Field Blank ID	ANALYTE	Result	RL	Units
98FRL17WA Rinsate Blank				
	chloride	0.39	0.3	mg/L
	turbidity	1.6	0.2	NTU
	total organic carbon	14	0.5	mg/L

Affected samples:			Qualified Result		
98FRL02WA	total organic carbon	7.3	7.3 B	0.5	mg/L
98FRL03WA	total organic carbon	0.88	0.88 B	0.5	mg/L
98FRL04WA	total organic carbon	9.5	9.5 B	0.5	mg/L
98FRL05WA	total organic carbon	0.62	0.62 B	0.5	mg/L
98FRL06WA	total organic carbon	2.4	2.4 B	0.5	mg/L
98FRL11WA	total organic carbon	0.63	0.63 B	0.5	mg/L
98FRL12WA	total organic carbon	1	1 B	0.5	mg/L
98FRL14WA	total organic carbon	2.6	2.6 B	0.5	mg/L
98FRL15WA	total organic carbon	8.4	8.4 B	0.5	mg/L
98FRL16WA	total organic carbon	3.9	3.9 B	0.5	mg/L
98FRL7WA	total organic carbon	0.72	0.72 B	0.5	mg/L
98FRL8WA	total organic carbon	2.4	2.4 B	0.5	mg/L
98FRL9WA	total organic carbon	0.62	0.62 B	0.5	mg/L

[1] According to the National Functional Guidelines for Inorganic Data Review, any compound detected in a blank that was also detected in an associated sample is qualified if the sample result is less than 5x the blank concentration. Flagging for this project modified to "B" at the amount found in the sample.

7.3 Matrix Spike/Matrix Spike Duplicates

MS/MSDs were analyzed at the required frequency. Recoveries and RPDs were within the laboratory - established limits except the following:

Laboratory: SAS

Prep Batch ID: 1008
Spiked Sample: 98FRL03WA
Matrix: W
Dil Factor: 1

ANALYTE	Sample Result mg/L	Spike Conc. mg/L	% Recovery MS	% Recovery MSD	Limits [1]	MS/Dup RPD	Limit [1]	Q	Bias	RC
nitrate+nitrite as nitrogen	0.78	4	79	NA	80 - 120	3.7	20	J/UJ	L	c

Associated Samples: 98FRL03WA, 98FRL05WA, 98FRL06WA, 98FRL04WA

[1] Limits established by the laboratory

[2] If the MS or MSD recovery is < LCL apply J to all positive results, apply UJ to all non-detects; if the MS or MSD recovery is > UCL apply J to all positive results; if the MS/MSD RPD is > UCL apply J to all positive results, apply UJ to all non-detects. For this review, qualifiers will apply to all associated batch samples

7.4 Laboratory Control Samples

Laboratory control samples were analyzed at the required frequency. All recoveries and RPDs were within the required limits.

7.5 Quantitation Limits

The practical quantitation limits (PQLs) achieved by the laboratories were acceptable relative to the estimated quantitation limits (EQL) suggested by this method for aqueous samples. All positive results reported were above the quantitation limit.

7.6 Overall Assessment

Due to holding time exceedance, four samples were qualified as estimated for total dissolved solids and one sample was qualified as estimated for turbidity.

Due to matrix spike recovery exceedance, four samples were qualified as estimated for nitrate+nitrite as nitrogen. Estimated data are useable for limited purposes.

Due to field blank contamination, thirteen samples were qualified as estimated for total organic carbon.

Major and minor data quality deficiencies were found, which had a slight impact to data useability. All data generated by this method, except where noted, should be considered useable as reported.

8.0 Field Duplicates

Two sets of QA/QC duplicates were collected for analysis by all applicable methods. Results reported by the primary and referee laboratories were in agreement except the following:

Matrix: W	Primary	QC Dup	QA Dup	
Laboratory:	SAS	SAS	QES	
Project ID:	77006	77006	063369	
Field ID:	98FRL12WA	98FRL14WA	98FRL13WA	
	Result Q	**Result Q**	**Result Q**	**Disagreement**
Dissolved Metals	***mg/L***	***mg/L***	***mg/L***	
arsenic	0.0011	0.00094 J	0.01 U	NQ
barium	0.0095	0.009	0.2 U	NQ
sodium	3.2	3.1	5 U	NQ
General Chemistry	***NTU***	***NTU***	***NTU***	
turbidity	1.8	1.6	1 U	NQ
total organic carbon	1 B	2.6 B	1 U	NQ
Total Metals	***mg/L***	***mg/L***	***mg/L***	
arsenic	0.00091 J	0.00085 J	0.01 U	NQ
barium	0.0096	0.009	0.2 U	NQ
selenium	0.0011 BJ	0.0039 BJ	0.005 U	NQ
sodium	3.2	3.1	5 U	NQ
silver	0.0001 UJ	0.0001 UJ	0.01 U	NQ

The potential for false positive or false negative results exists for the listed analytes.

Matrix: W	Primary	QC Dup	QA Dup	
Laboratory:	SAS	SAS	QES	
Project ID:	76833	76833	063351	
Field ID:	98FRL8WA	98FRL9WA	98FRL10WA	
	Result Q	Result Q	Result Q	Disagreement
Dissolved Metals	***mg/L***	***mg/L***	***mg/L***	
arsenic	0.0011 J	0.00073 J	0.01 U	NQ
barium	0.0073	0.0075	0.2 U	NQ
sodium	3	3.1	5 U	NQ
General Chemistry	***NTU***	***NTU***	***NTU***	
turbidity	1.1	1.2	1 U	NQ
total organic carbon	2.4 B	0.62 B	1 U	NQ
Total Metals	***mg/L***	***mg/L***	***mg/L***	
arsenic	0.001 UJ	0.00079 J	0.01 U	NQ
barium	0.0061	0.006	0.2 U	NQ
mercury	0.00032	0.0002 U	0.0002 U	NQ
selenium	0.006	0.0038	0.005 U	NQ
sodium	2.6	2.5	5 U	NQ
silver	0.0005 U	0.0005 U	0.01 U	NQ

The potential for false positive or false negative results exists for the listed analytes.

The RLs reported by the referee laboratory (QES) for arsenic and silver were considerably higher than those reported by the primary laboratory (SAS).

9.0 References

"USEPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods", July 1992 (SW-846)

"Methods for Chemical Analysis of Water and Wastes", March 1983 (EPA-600)

"National Functional Guidelines for Organic Data Review", February, 1994

"National Functional Guidelines for Inorganic Data Review", February, 1994

"State of Alaska Method AK101, Determination of Gasoline Range Organics"

Appendix A

Qualifier Definitions

B	The sample result is less than 5 or 10 times (for common laboratory contaminants) the associated blank contamination.
U	The analyte was analyzed for, but was not detected above the reported quantitation limit.
J	The analyte was not detected above the reported quantitation limit. However, the reported quantitation is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
J+	Sample results for the analyte are estimated for positive results; results reported below the quantitation limit are not qualified (high bias).
J-	Sample results for the analyte are estimated for both positive results and results reported below the quantitation limit (low bias).
R	The sample results are rejected for both positive results and results reported below the quantitation limit due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Appendix B

Acronyms

CRQL -	Contract Required Quantitation Limit
H -	High Bias
L -	Low Bias
LCL -	Lower Control Limit
LCS/LCSD -	Laboratory Control Sample/Laboratory Control Sample Duplicate
MB -	Method Blank
MDL -	Method Detection Limit
MS/MSD -	Matrix Spike/Matrix Spike Duplicate
N -	No Bias Determined
NA -	Not Applicable
NE -	Not Established
NR -	Not Reported
PQL -	Practical Quantitation Limit
Q -	Qualifier
QA -	Quality Assurance
QC -	Quality Control
QES -	Quanterra Environmental Services
RPD -	Relative Percent Difference
RRL -	Required Reporting Limit
RSD -	Relative Standard Deviation
RTHT -	Required Technical Holding Time
S -	Soil (solid) matrix
SAS -	Sound Analytical Services, Inc.
SD -	Sample Duplicate
SW-846 -	EPA Test Methods for Evaluating Solid Waste
UCL -	Upper Control Limit
W -	Water (aqueous) matrix

Appendix D

Data Quality Summary

by Analysis Type

Data Quality Summary

Gasoline Range Organics

		Data Points	% of Data	% of Qualified Data	Bias (low/none/high)
TOTAL DATA POINTS:		25	-	-	-
TOTAL QUALIFIED DATA POINTS:		7	28.0%	-	-
TOTAL REJECTED DATA POINTS:		0	0.0%	-	-
Qualified/Rejected as a result of:					
e,t	Multiple Reasons	2	8.0%	28.6%	L
k	The analyte was found in the field blank	1	4.0%	14.3%	H
m	Numerical value is between the MDL and RL	3	12.0%	42.9%	N
m,p	Multiple Reasons	1	4.0%	14.3%	L

Data Quality Summary

Volatile Aromatic Hydrocarbons

	Data Points	% of Data	% of Qualified Data	Bias (low/none/high)
TOTAL DATA POINTS:	250	-	-	
TOTAL QUALIFIED DATA POINTS:	29	11.6%	-	
TOTAL REJECTED DATA POINTS:	0	0.0%	-	
Qualified/Rejected as a result of:				
e,t - Multiple Reasons	18	7.2%	62.1%	L
m - Numerical value is between the MDL and RL	6	2.4%	20.7%	N
p - Sample was not properly collected, preserved or shipped	5	2.0%	17.2%	L

Data Quality Summary

Total Metals

		Data Points	% of Data	% of Qualified Data	Bias (low/none/high)
TOTAL DATA POINTS:		160	-	-	-
TOTAL QUALIFIED DATA POINTS:		32	20.0%	-	-
TOTAL REJECTED DATA POINTS:		0	0.0%	-	-
Qualified/Rejected as a result of:					
m	Numerical value is between the MDL and RL	3	1.9%	9.4%	N
t	Sample temperature outside acceptance criteria	4	2.5%	12.5%	L
f	Laboratory duplicate failed precision criteria	11	6.9%	34.4%	N
f,k	Multiple Reasons	3	1.9%	9.4%	H
f,m	Multiple Reasons	2	1.3%	6.3%	N
f,t	Multiple Reasons	1	0.6%	3.1%	L
m	Numerical value is between the MDL and RL	3	1.9%	9.4%	N
m,t	Multiple Reasons	1	0.6%	3.1%	L
t	Sample temperature outside acceptance criteria	3	1.9%	9.4%	L
m,t	Multiple Reasons	1	0.6%	3.1%	L

Data Quality Summary

Dissolved Metals

		Data Points	% of Data	% of Qualified Data	Bias (low/none/high)
TOTAL DATA POINTS:		160	-	-	
TOTAL QUALIFIED DATA POINTS:		33	20.6%	-	
TOTAL REJECTED DATA POINTS:		0	0.0%	-	
Qualified/Rejected as a result of:					
c	- MS/MSD recovery outside control limits	7	4.4%	21.2%	L
c,f,t	- Multiple Reasons	1	0.6%	3.0%	L
f	- Laboratory duplicate failed precision criteria	6	3.7%	18.2%	N
f,m	- Multiple Reasons	3	1.9%	9.1%	N
f,m,t	- Multiple Reasons	1	0.6%	3.0%	L
f,t	- Multiple Reasons	8	5.0%	24.2%	L
m	- Numerical value is between the MDL and RL	7	4.4%	21.2%	N

Data Quality Summary

General Chemistry

		Data Points	% of Data	% of Qualified Data	Bias (low/none/high)
TOTAL DATA POINTS:		98	-	-	
TOTAL QUALIFIED DATA POINTS:		26	26.5%	-	
TOTAL REJECTED DATA POINTS:		0	0.0%	-	
Qualified/Rejected as a result of:					
c	- MS/MSD recovery outside control limits	3	3.1%	11.5%	L
c,t	- Multiple Reasons	1	1.0%	3.8%	N
e	- Holding time exceeded	5	5.1%	19.2%	L
k	- The analyte was found in the field blank	12	12.2%	46.2%	H
k,t	- Multiple Reasons	1	1.0%	3.8%	N
t	- Sample temperature outside acceptance criteria	4	4.1%	15.4%	L

Appendix C

Data Summary Table

QUALIFIER REASON CODES

a - The analyte was found in the method blank

a- - Negative drift observed in instrument calibration blanks

b - Surrogate spike recovery outside control limits

c - Matrix Spike/Matrix Spike Duplicate (MS/MSD) recovery outside control limits

d - Laboratory Control Sample (LCS) recovery outside control limits

e - Holding time exceeded

f - MS/LCS sample duplicate failed precision criteria

h - Second column results indicate that the environmental results were not confirmed

i - Instrument Calibration outside control limits

k - The analyte was found in the field blank

m - Numerical value between the MDL and PQL

n - Laboratory care narrative related issues

p - Sample was not properly collected, preserved or shipped

s - Internal Standard outside control limits

t - Sample temperature outside acceptance criteria

(Note: Where multiple qualifiers have been applied the first qualifier corresponds to the first reason code)

Dissolved Metals

DATA SUMMARY TABLE

	Sample ID	-001SA			-001SA		
	Field ID	98FRL10WA			98FRL10WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/3/98			11/3/98		
	Units	µg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC
arsenic					0.01	U	
barium					0.2	U	
cadmium					0.005	U	
chromium					0.01	U	
lead					0.003	U	
mercury		0.2	U				
potassium					5	U	
selenium					0.005	U	
silver					0.01	U	
sodium					5	U	

Gasoline Range Organics

DATA SUMMARY TABLE

Sample ID	-001SA			-002SA							
Field ID	98FRL10WA			98FRL24WA							
Matrix	W			W							
Dil Factor	1			1							
Date Collected	11/3/98			11/3/98							
Units	mg/L			mg/L							
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**					
gasoline range organics	0.1	U		0.1	U						

General Chemistry

DATA SUMMARY TABLE

Sample ID	-001SA			-001SA		
Field ID	98FRL10WA			98FRL10WA		
Matrix	W			W		
Dil Factor	1			1		
Date Collected	11/3/98			11/3/98		
Units	mg/L			NTU		
Analyte	RESULT	Q	RC	RESULT	Q	RC
chloride	7.6					
total dissolved solids	233					
nitrogen, nitrate (as N)	0.94					
nitrogen, nitrite	0.05	U				
sulfate	18.9					
turbidity				1	U	
total organic carbon	1	U				

Total Metals

DATA SUMMARY TABLE

	Sample ID	-001SA		
	Field ID	98FRL10WA		
	Matrix	W		
	Dil Factor	1		
	Date Collected	11/3/98		
	Units	mg/L		
Analyte		RESULT	Q	RC
arsenic		0.01	U	
barium		0.2	U	
cadmium		0.005	U	
chromium		0.01	U	
lead		0.003	U	
mercury		0.0002	U	
potassium		5	U	
selenium		0.005	U	
silver		0.01	U	
sodium		5	U	

Volatile Organic Compounds by GC/MS

DATA SUMMARY TABLE

	Sample ID	-001SA			-002SA		
	Field ID	98FRL10WA			98FRL24WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/3/98			11/3/98		
	Units	µg/L			µg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC
benzene		1	U		1	U	
chlorobenzene		1	U		1	U	
1,2-dichlorobenzene		1	U		1	U	
1,3-dichlorobenzene		1	U		1	U	
1,4-dichlorobenzene		1	U		1	U	
ethylbenzene		1	U		1	U	
toluene		1	U		1	U	
xylenes		1	U		1	U	

Dissolved Metals

DATA SUMMARY TABLE

	Sample ID	-001SA			-001SA		
	Field ID	98FRL13WA			98FRL13WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/10/98			11/10/98		
	Units	µg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC
arsenic					0.01	U	
barium					0.2	U	
cadmium					0.005	U	
chromium					0.01	U	
lead					0.003	U	
mercury		0.2	U				
potassium					5	U	
selenium					0.005	U	
silver					0.01	U	
sodium					5	U	

Gasoline Range Organics

DATA SUMMARY TABLE

Sample ID	-001SA			-002SA							
Field ID	98FRL13WA			98FRL18WA							
Matrix	W			W							
Dil Factor	1			1							
Date Collected	11/10/98			11/10/98							
Units	mg/L			mg/L							
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**					
gasoline range organics	0.1	U		0.1							

General Chemistry

DATA SUMMARY TABLE

	Sample ID	-001SA			-001SA		
	Field ID	98FRL13WA			98FRL13WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/10/98			11/10/98		
	Units	mg/L			NTU		
Analyte		RESULT	Q	RC	RESULT	Q	RC
chloride		7.4					
total dissolved solids		252					
nitrogen, nitrate (as N)		0.88					
nitrogen, nitrite		0.05	U				
sulfate		19.1					
turbidity					1	U	
total organic carbon		1	U				

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2/8/99

Ft. Richardson GW Landfill - Fall '98
SDG: 063369

Total Metals

DATA SUMMARY TABLE

	Sample ID	-001SA		
	Field ID	98FRL13WA		
	Matrix	W		
	Dil Factor	1		
	Date Collected	11/10/98		
	Units	mg/L		
Analyte		RESULT	Q	RC
arsenic		0.01	U	
barium		0.2	U	
cadmium		0.005	U	
chromium		0.01	U	
lead		0.003	U	
mercury		0.0002	U	
potassium		5	U	
selenium		0.005	U	
silver		0.01	U	
sodium		5	U	

Volatile Organic Compounds by GC/MS

DATA SUMMARY TABLE

	Sample ID	-001SA			-002SA		
	Field ID	98FRL13WA			98FRL18WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/10/98			11/10/98		
	Units	µg/L			µg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC
benzene		1	U		1	U	
chlorobenzene		1	U		1	U	
1,2-dichlorobenzene		1	U		1	U	
1,3-dichlorobenzene		1	U		1	U	
1,4-dichlorobenzene		1	U		1	U	
ethylbenzene		1	U		1	U	
toluene		1	U		1	U	
xylenes		1	U		1	U	

Dissolved Metals

DATA SUMMARY TABLE

	Sample ID	-02		
	Field ID	98FRL02WA		
	Matrix	W		
	Dil Factor	1		
	Date Collected	10/27/98		
	Units	mg/L		
Analyte		RESULT	Q	RC
arsenic		0.001	UJ	f
barium		0.0022	J	m
cadmium		0.001	U	
chromium		0.01	U	
lead		0.001	U	
mercury		0.0002	U	
potassium		5	U	
selenium		0.003	U	
sodium		1.2		
silver		0.0005	UJ	c

Gasoline Range Organics

DATA SUMMARY TABLE

Sample ID	-01			-02		
Field ID	98FRL20WA			98FRL02WA		
Matrix	W			W		
Dil Factor	1			1		
Date Collected	10/27/98			10/27/98		
Units	mg/L			mg/L		
Analyte	RESULT	Q	RC	RESULT	Q	RC
gasoline range organics	0.01	J	m,p	0.05	U	

Total Metals

DATA SUMMARY TABLE

Analyte	Sample ID: -02 Field ID: 98FRL02WA Matrix: W Dil Factor: 1 Date Collected: 10/27/98 Units: mg/L RESULT	Q	RC
arsenic	0.012	J	f
barium	0.13		
cadmium	0.001	U	
chromium	0.028		
lead	0.01		
mercury	0.0019		
potassium	5	U	
selenium	0.0043		
sodium	1.4		
silver	0.00055		

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

Sample ID	-01			-02						
Field ID	98FRL20WA			98FRL02WA						
Matrix	W			W						
Dil Factor	1			1						
Date Collected	10/27/98			10/27/98						
Units	mg/L			mg/L						
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**				
benzene	0.001	UJ	p	0.001	U					
toluene	0.001	UJ	p	0.001	U					
ethylbenzene	0.001	UJ	p	0.001	U					
m,p-xylene	0.002	UJ	p	0.002	U					
o-xylene	0.001	UJ	p	0.001	U					

Dissolved Metals

DATA SUMMARY TABLE

Sample ID	-01			-02			-03		
Field ID	98FRL03WA			98FRL04WA			98FRL05WA		
Matrix	W			W			W		
Dil Factor	1			1			1		
Date Collected	10/28/98			10/28/98			10/28/98		
Units	mg/L			mg/L			mg/L		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
arsenic	0.00074	J	m	0.001	U		0.00079	J	m
barium	0.0069			0.0056			0.0077		
cadmium	0.001	U		0.001	U		0.001	U	
chromium	0.01	U		0.01	U		0.01	U	
lead	0.001	U		0.001	U		0.001	U	
mercury	0.0002	U		0.0002	U		0.0002	U	
potassium	1.6	J	f	3.1	J	f,m	2.1	J	f,m
selenium	0.003	U		0.003	U		0.003	U	
sodium	2.9			4.3			3.5		
silver	0.0005	UJ	c	0.0005	UJ	c	0.0005	UJ	c

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2/8/99

Gasoline Range Organics

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03			-04				
	Field ID	98FRL03WA			98FRL04WA			98FRL05WA			98FRL21WA				
	Matrix	W			W			W			W				
	Dil Factor	1			1			1			1				
	Date Collected	10/28/98			10/28/98			10/28/98			10/28/98				
	Units	mg/L			mg/L			mg/L			mg/L				
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC		
gasoline range organics		0.012	J	m	0.05	U		0.32			0.05	U			

General Chemistry

DATA SUMMARY TABLE

Sample ID	-01			-01			-02			-02			-03			-03		
Field ID	98FRL03WA			98FRL03WA			98FRL04WA			98FRL04WA			98FRL05WA			98FRL05WA		
Matrix	W			W			W			W			W			W		
Dil Factor	1			1			1			1			1			1		
Date Collected	10/28/98			10/28/98			10/28/98			10/28/98			10/28/98			10/28/98		
Units	mg/L			NTU			mg/L			NTU			mg/L			NTU		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
chloride	8.7						0.58						11					
nitrate+nitrite as nitrogen	0.78	J	c				0.3	UJ	c				1.1	J	c			
sulfate	21						6.1						21					
total dissolved solids	240						110						230					
turbidity				0.5	J	e				36	J	e				1.6	J	e
total organic carbon	0.88	B	k				9.5	B	k				0.62	B	k			

Total Metals

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03		
	Field ID	98FRL03WA			98FRL04WA			98FRL05WA		
	Matrix	W			W			W		
	Dil Factor	1			1			1		
	Date Collected	10/28/98			10/28/98			10/28/98		
	Units	mg/L			mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC
arsenic		0.001	U		0.0057			0.001	U	
barium		0.0081			0.043			0.016		
cadmium		0.001	U		0.001	U		0.001	U	
chromium		0.01	U		0.01	U		0.01	U	
lead		0.001	U		0.003			0.0011		
mercury		0.0002	U		0.0002	U		0.0002	U	
potassium		5	U		5	U		5	U	
selenium		0.003	U		0.0033			0.003	U	
sodium		3.4			5.2			4		
silver		0.0005	U		0.0005	U		0.0005	U	

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03			-04		
	Field ID	98FRL03WA			98FRL04WA			98FRL05WA			98FRL21WA		
	Matrix	W			W			W			W		
	Dil Factor	1			1			1			1		
	Date Collected	10/28/98			10/28/98			10/28/98			10/28/98		
	Units	mg/L			mg/L			mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC
benzene		0.001	U		0.001	U		0.001	U		0.001	U	
toluene		0.001	U		0.001	U		0.001	U		0.001	U	
chlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	
ethylbenzene		0.001	U		0.001	U		0.001	U		0.001	U	
m,p-xylene		0.002	U		0.002	U		0.002	U		0.002	U	
o-xylene		0.001	U		0.001	U		0.001	U		0.001	U	
1,3-dichlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	
1,4-dichlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	
1,2-dichlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	

Dissolved Metals

DATA SUMMARY TABLE

	Sample ID	-01		
	Field ID	98FRL06WA		
	Matrix	W		
	Dil Factor	1		
	Date Collected	11/2/98		
	Units	mg/L		
Analyte		RESULT	Q	RC
arsenic		0.005	UJ	f,t
barium		0.036	J	f,t
cadmium		0.005	UJ	f,t
chromium		0.01	UJ	f,t
lead		0.005	UJ	f,t
mercury		0.00053	J	f,t
potassium		5	UJ	f,t
selenium		0.0091	J	f,m,t
sodium		5.2	J	f,t
silver		0.0025	UJ	c,f,t

D-SW6020 Dil Factor = 5

Gasoline Range Organics

DATA SUMMARY TABLE

Sample ID	-01			-02		
Field ID	98FRL06WA			98FRL23WA		
Matrix	W			W		
Dil Factor	1			1		
Date Collected	11/2/98			11/2/98		
Units	mg/L			mg/L		
Analyte	RESULT	Q	RC	RESULT	Q	RC
gasoline range organics	0.057	J	e,t	0.05	UJ	e,t

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2/8/99

Ft. Richardson GW Landfill - Fall '98
SDG: 76797

General Chemistry

DATA SUMMARY TABLE

Sample ID	-01			-01		
Field ID	98FRL06WA			98FRL06WA		
Matrix	W			W		
Dil Factor	1			1		
Date Collected	11/2/98			11/2/98		
Units	mg/L			NTU		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
chloride	4.8	J	t			
nitrate+nitrite as nitrogen	0.56	J	c,t			
sulfate	17	J	t			
total dissolved solids	400	J	t			
turbidity				3.4	J	t
total organic carbon	2.4	BJ	k,t			

FTR 41371

Total Metals

DATA SUMMARY TABLE

Analyte	Sample ID	Field ID	Matrix	Dil Factor	Date Collected	Units	RESULT	Q	RC
	-01	98FRL06WA	W	1	11/2/98	mg/L			
arsenic							0.005	UJ	f,t
barium							0.033	J	t
cadmium							0.005	UJ	t
chromium							0.01	UJ	t
lead							0.005	UJ	t
mercury							0.00017	J	m,t
potassium							5	UJ	t
selenium							0.011	J	m,t
sodium							4.5	J	t
silver							0.0025	UJ	t

SW6020 Dil Factor = 5

FTR 41372

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

	Sample ID	-01			-02						
	Field ID	98FRL06WA			98FRL23WA						
	Matrix	W			W						
	Dil Factor	1			1						
	Date Collected	11/2/98			11/2/98						
	Units	mg/L			mg/L						
Analyte		RESULT	Q	RC	RESULT	Q	RC				
benzene		0.001	UJ	e,t	0.001	UJ	e,t				
toluene		0.001	UJ	e,t	0.001	UJ	e,t				
chlorobenzene		0.001	UJ	e,t	0.001	UJ	e,t				
ethylbenzene		0.001	UJ	e,t	0.001	UJ	e,t				
m,p-xylene		0.002	UJ	e,t	0.002	UJ	e,t				
o-xylene		0.001	UJ	e,t	0.001	UJ	e,t				
1,3-dichlorobenzene		0.001	UJ	e,t	0.001	UJ	e,t				
1,4-dichlorobenzene		0.001	UJ	e,t	0.001	UJ	e,t				
1,2-dichlorobenzene		0.001	UJ	e,t	0.001	UJ	e,t				

Dissolved Metals

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03		
	Field ID	98FRL7WA			98FRL8WA			98FRL9WA		
	Matrix	W			W			W		
	Dil Factor	1			1			1		
	Date Collected	11/3/98			11/3/98			11/3/98		
	Units	mg/L			mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC
arsenic		0.001	UJ	f	0.0011	J	f	0.00073	J	f,m
barium		0.0087			0.0073			0.0075		
cadmium		0.001	U		0.001	U		0.001	U	
chromium		0.01	U		0.01	U		0.01	U	
lead		0.001	U		0.001	U		0.001	U	
mercury		0.00034			0.0002	U		0.0002	U	
potassium		5	U		5	U		5	U	
selenium		0.003	U		0.003	U		0.003	U	
sodium		1.8			3			3.1		
silver		0.0005	UJ	c	0.0005	UJ	c	0.0005	UJ	c

FTR 41374

Gasoline Range Organics

DATA SUMMARY TABLE

Sample ID	-01			-02			-03			-04				
Field ID	98FRL7WA			98FRL8WA			98FRL9WA			98FRL23WA				
Matrix	W			W			W			W				
Dil Factor	1			1			1			1				
Date Collected	11/3/98			11/3/98			11/3/98			11/3/98				
Units	mg/L			mg/L			mg/L			mg/L				
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**		
gasoline range organics	0.05	U		0.05	U		0.05	U		0.011	J	m		

General Chemistry

DATA SUMMARY TABLE

Sample ID	-01			-01			-02			-02			-03			-03		
Field ID	98FRL7WA			98FRL7WA			98FRL8WA			98FRL8WA			98FRL9WA			98FRL9WA		
Matrix	W			W			W			W			W			W		
Dil Factor	1			1			1			1			1			1		
Date Collected	11/3/98			11/3/98			11/3/98			11/3/98			11/3/98			11/3/98		
Units	mg/L			NTU			mg/L			NTU			mg/L			NTU		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
chloride	2.7						8.5						8.6					
nitrate+nitrite as nitrogen	0.39						0.96						0.92					
sulfate	13						21						21					
total dissolved solids	200						230						240					
turbidity				15						1.1						1.2		
total organic carbon	0.72	B	k				2.4	B	k				0.62	B	k			

FTR 41376

Total Metals

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03		
	Field ID	98FRL7WA			98FRL8WA			98FRL9WA		
	Matrix	W			W			W		
	Dil Factor	1			1			1		
	Date Collected	11/3/98			11/3/98			11/3/98		
	Units	mg/L			mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC
arsenic		0.001	UJ	f	0.001	UJ	f	0.00079	J	f,m
barium		0.01			0.0061			0.006		
cadmium		0.001	U		0.001	U		0.001	U	
chromium		0.015			0.01	U		0.01	U	
lead		0.001	U		0.001	U		0.001	U	
mercury		0.0002	U		0.00032			0.0002	U	
potassium		5	U		5	U		5	U	
selenium		0.0038			0.006			0.0038		
sodium		1.5			2.6			2.5		
silver		0.0005	U		0.0005	U		0.0005	U	

FTR 41377

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03			-04		
	Field ID	98FRL7WA			98FRL8WA			98FRL9WA			98FRL23WA		
	Matrix	W			W			W			W		
	Dil Factor	1			1			1			1		
	Date Collected	11/3/98			11/3/98			11/3/98			11/3/98		
	Units	mg/L			mg/L			mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC
benzene		0.001	U		0.001	U		0.001	U		0.001	U	
toluene		0.001	U		0.001	U		0.001	U		0.00037	J	m
chlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	
ethylbenzene		0.001	U		0.001	U		0.001	U		0.001	U	
m,p-xylene		0.002	U		0.002	U		0.002	U		0.002	U	
o-xylene		0.001	U		0.001	U		0.001	U		0.00022	J	m
1,3-dichlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	
1,4-dichlorobenzene		0.001	U		0.001	U		0.001	U		0.00073	J	m
1,2-dichlorobenzene		0.001	U		0.001	U		0.001	U		0.001	U	

FTR 41378

Dissolved Metals

DATA SUMMARY TABLE

Analyte	Sample ID	Field ID	Matrix	Dil Factor	Date Collected	Units	RESULT	Q	RC
arsenic	-01	98FRL11WA	W	1	11/9/98	mg/L	0.001	J	f
barium							0.0094		
cadmium							0.001	U	
chromium							0.01	U	
lead							0.001	U	
mercury							0.0002	U	
potassium							5	U	
selenium							0.003	U	
sodium							2.9		
silver							0.0005	U	

Gasoline Range Organics

DATA SUMMARY TABLE

	Sample ID	-01			-02		
	Field ID	98FRL11WA			98FRL19WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/9/98			11/9/98		
	Units	mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC
gasoline range organics		0.05	U		0.05	U	

Prepared by ETHIX

2/8/99

Ft. Richardson GW Landfill - Fall '98

SDG: 76973

General Chemistry

DATA SUMMARY TABLE

Analyte	Sample ID	Field ID	Matrix	Dil Factor	Date Collected	Units	RESULT	Q	RC
chloride	-01	98FRL11WA	W	1	11/9/98	mg/L	11		
nitrate+nitrite as nitrogen							0.91		
sulfate							23		
total dissolved solids							250		
turbidity	-01	98FRL11WA	W	1	11/9/98	NTU	4		
total organic carbon						mg/L	0.63	B	k

Total Metals

DATA SUMMARY TABLE

Sample ID	-01							
Field ID	98FRL11WA							
Matrix	W							
Dil Factor	1							
Date Collected	11/9/98							
Units	mg/L							
Analyte	**RESULT**	**Q**	**RC**					
arsenic	0.001	U						
barium	0.0096							
cadmium	0.001	U						
chromium	0.005	J	m					
lead	0.001	U						
mercury	0.0002	U						
potassium	5	U						
selenium	0.0038	J	f					
sodium	3							
silver	0.00071	J	f					

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

	Sample ID	-01			-02		
	Field ID	98FRL11WA			98FRL19WA		
	Matrix	W			W		
	Dil Factor	1			1		
	Date Collected	11/9/98			11/9/98		
	Units	mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC
benzene		0.001	U		0.001	U	
toluene		0.001	U		0.001	U	
chlorobenzene		0.001	U		0.001	U	
ethylbenzene		0.001	U		0.001	U	
m,p-xylene		0.002	U		0.002	U	
o-xylene		0.001	U		0.001	U	
1,3-dichlorobenzene		0.001	U		0.001	U	
1,4-dichlorobenzene		0.001	U		0.001	U	
1,2-dichlorobenzene		0.001	U		0.001	U	

Dissolved Metals

DATA SUMMARY TABLE

Sample ID	-01			-02			-03			-04		
Field ID	98FRL12WA			98FRL14WA			98FRL16WA			98FRL17WA		
Matrix	W			W			W			W		
Dil Factor	1			1			1			1		
Date Collected	11/10/98			11/10/98			11/10/98			11/11/98		
Units	mg/L			mg/L			mg/L			mg/L		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
arsenic	0.0011			0.00094	J	m	0.00065	J	m	0.001	U	
barium	0.0095			0.009			0.011			0.0004	J	m
cadmium	0.001	U		0.001	U		0.0017			0.001	U	
chromium	0.01	U		0.01	U		0.01	U		0.01	U	
lead	0.001	U		0.001	U		0.001	U		0.001	U	
mercury	0.0002	U		0.0002	U		0.0002	U		0.0002	U	
potassium	5	U		5	U		5	U		5	U	
selenium	0.003	U		0.003	U		0.003	U		0.003	U	
sodium	3.2			3.1			3.3			0.5	U	
silver	0.0005	U		0.0005	U		0.00075			0.0005	U	

Gasoline Range Organics

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03			-04			-05			
	Field ID	98FRL12WA			98FRL14WA			98FRL16WA			98FRL17WA			98FRL28WA			
	Matrix	W			W			W			W			W			
	Dil Factor	1			1			1			1			1			
	Date Collected	11/10/98			11/10/98			11/10/98			11/11/98			11/10/98			
	Units	mg/L			mg/L			mg/L			mg/L			mg/L			
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	
gasoline range organics		0.05	U		0.05	U		0.46	B	k	3			0.013	J	m	

Prepared by ETHIX
2/8/99

Ft. Richardson GW Landfill - Fall '98
SDG: 77006

General Chemistry

DATA SUMMARY TABLE

Sample ID	-01			-01			-02			-02			-03			-03		
Field ID	98FRL12WA			98FRL12WA			98FRL14WA			98FRL14WA			98FRL16WA			98FRL16WA		
Matrix	W			W			W			W			W			W		
Dil Factor	1			1			1			1			1			1		
Date Collected	11/10/98			11/10/98			11/10/98			11/10/98			11/10/98			11/10/98		
Units	mg/L			NTU			mg/L			NTU			mg/L			NTU		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
chloride	7.6						7.6						1.5					
nitrate+nitrite as nitrogen	0.87						0.86						0.31					
sulfate	22						22						16					
total dissolved solids	210						250						320					
turbidity				1.8						1.6						11		
total organic carbon	1	B	k				2.6	B	k				3.9	B	k			

General Chemistry

DATA SUMMARY TABLE

Sample ID	-04			-04							
Field ID	98FRL17WA.			98FRL17WA							
Matrix	W			W							
Dil Factor	1			1							
Date Collected	11/11/98			11/11/98							
Units	mg/L			NTU							
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**					
chloride	0.39										
nitrate+nitrite as nitrogen	0.3	U									
sulfate	0.3	U									
total dissolved solids	10	U									
turbidity				1.6							
total organic carbon	14										

Total Metals

DATA SUMMARY TABLE

	Sample ID	-01			-02			-03			-04		
	Field ID	98FRL12WA			98FRL14WA			98FRL16WA			98FRL17WA		
	Matrix	W			W			W			W		
	Dil Factor	1			1			1			1		
	Date Collected	11/10/98			11/10/98			11/10/98			11/11/98		
	Units	mg/L			mg/L			mg/L			mg/L		
Analyte		RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC	RESULT	Q	RC
arsenic		0.00091	J	m	0.00085	J	m	0.002	U		0.002	U	
barium		0.0096			0.009			0.012			0.005	U	
cadmium		0.001	U		0.001	U		0.001	U		0.001	U	
chromium		0.01	U		0.01	U		0.005	J	m	0.01	U	
lead		0.001	U		0.001	U		0.00031	J	m	0.001	U	
mercury		0.0002	U		0.0002	U		0.0002	U		0.0002	U	
potassium		5	U		5	U		5	U		5	U	
selenium		0.0011	BJ	f,k	0.0039	BJ	f,k	0.0029	BJ	f,k	0.00249	J	f,m
sodium		3.2			3.1			3.3			0.5	U	
silver		0.0001	UJ	f	0.0001	UJ	f	0.0001	UJ	f	0.0001	UJ	f

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

Sample ID	-01			-02			-03			-04			-05		
Field ID	98FRL12WA			98FRL14WA			98FRL16WA			98FRL17WA			98FRL28WA		
Matrix	W			W			W			W			W		
Dil Factor	1			1			1			1			1		
Date Collected	11/10/98			11/10/98			11/10/98			11/11/98			11/10/98		
Units	mg/L			mg/L			mg/L			mg/L			mg/L		
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**
benzene	0.001	U		0.001	U		0.001	U		0.001	U		0.001	U	
toluene	0.001	U		0.001	U		0.001	U		0.0037			0.001	U	
chlorobenzene	0.001	U		0.001	U		0.001	U		0.001	U		0.001	U	
ethylbenzene	0.001	U		0.001	U		0.001	U		0.001	U		0.001	U	
m,p-xylene	0.002	U		0.002	U		0.002	U		0.00066	J	m	0.002	U	
o-xylene	0.001	U		0.001	U		0.001	U		0.00027	J	m	0.001	U	
1,3-dichlorobenzene	0.001	U		0.001	U		0.001	U		0.001	U		0.001	U	
1,4-dichlorobenzene	0.001	U		0.001	U		0.001	U		0.001	U		0.001	U	
1,2-dichlorobenzene	0.001	U		0.001	U		0.001	U		0.001	U		0.001	U	

Dissolved Metals

DATA SUMMARY TABLE

	Sample ID	-01		
	Field ID	98FRL15WA		
	Matrix	W		
	Dil Factor	1		
	Date Collected	11/12/98		
	Units	mg/L		
Analyte		RESULT	Q	RC
arsenic		0.0076	J	f
barium		0.073		
cadmium		0.001	U	
chromium		0.01	U	
lead		0.001	U	
mercury		0.0002	U	
potassium		2.5	J	m
selenium		0.015		
sodium		31		
silver		0.0005	U	

Gasoline Range Organics

DATA SUMMARY TABLE

Sample ID	-01			-02							
Field ID	98FRL15WA			98FRL30WA							
Matrix	W			W							
Dil Factor	1			1							
Date Collected	11/12/98			11/12/98							
Units	mg/L			mg/L							
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**					
gasoline range organics	0.05	U		0.05	U						

FTR 41391

General Chemistry

DATA SUMMARY TABLE

Sample ID	-01			-01											
Field ID	98FRL15WA			98FRL15WA											
Matrix	W			W											
Dil Factor	1			1											
Date Collected	11/12/98			11/12/98											
Units	mg/L			NTU											
Analyte	**RESULT**	**Q**	**RC**	**RESULT**	**Q**	**RC**									
chloride	2.9														
nitrate+nitrite as nitrogen	0.18														
sulfate	15														
total dissolved solids	270	J	e												
turbidity				2.4	J	e									
total organic carbon	8.4	B	k												

Total Metals

DATA SUMMARY TABLE

Analyte	Sample ID: -01 Field ID: 98FRL15WA Matrix: W Dil Factor: 1 Date Collected: 11/12/98 Units: mg/L RESULT	Q	RC
arsenic	0.0059		
barium	0.074		
cadmium	0.001	U	
chromium	0.01	U	
lead	0.001	U	
mercury	0.0002	U	
potassium	2.2	J	m
selenium	0.017	J	f
sodium	31		
silver	0.0005	UJ	f

Volatile Aromatic Hydrocarbons

DATA SUMMARY TABLE

	Sample ID	-01			-02						
	Field ID	98FRL15WA			98FRL30WA						
	Matrix	W			W						
	Dil Factor	1			1						
	Date Collected	11/12/98			11/12/98						
	Units	mg/L			mg/L						
Analyte		RESULT	Q	RC	RESULT	Q	RC				
benzene		0.00031	J	m	0.001	U					
toluene		0.001	U		0.001	U					
chlorobenzene		0.001	U		0.001	U					
ethylbenzene		0.001	U		0.001	U					
m,p-xylene		0.002	U		0.002	U					
o-xylene		0.001	U		0.001	U					
1,3-dichlorobenzene		0.001	U		0.001	U					
1,4-dichlorobenzene		0.001	U		0.001	U					
1,2-dichlorobenzene		0.001	U		0.001	U					