



LANDFILL CLOSURE BASELINE STUDY
FORT RICHARDSON, ALASKA
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PREPARED BY THE
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MATERIALS AND INSTRUMENTATION SECTION
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TABLE OF CONTENTS

List of Acronyms	i
Executive Summary	ii
1. Introduction	1
2. Environmental Setting	2
2.1 Location	2
2.2 Landfill History	2
2.3 Area Geology	2
2.4 Groundwater	3
3. Field Activities	6
3.1 Sample Summary	6
3.2 Sampling Procedures	6
3.3 QA/QC Samples	7
4. Analytical Results	8
4.1 Chemical Analyses	8
4.2 Quality Assurance and Quality Control	8
4.2.1 Data Quality Review	8
4.2.2 Replicate Samples	10
4.3 Chemical Results	10
4.3.1 Volatile Organic Compounds.	10
4.3.2 Gasoline Range Organic Compounds:	12
4.3.3 Diesel Range Organic Compounds	12
4.3.4 Total Recoverable Petroleum Hydrocarbons.	12
4.3.5 Polynuclear Aromatic Hydrocarbons.	13
4.3.6 Chlorinated Herbicides	13
4.3.7 Organophosphorus Pesticides	13

4.3.8	Organochlorine Pesticides and PCBs	14
4.3.9	Total Metals	14
4.3.10	Dissolved Metals.	15
4.3.11	Water Quality Parameters.	16
4.3.12	Field Data	17
5.	Conclusion	18
6.	References	19

List of Appendices

Illustrations

Figure 1 Project Location

Figure 2 Well Locations

Appendix A Sample Summary Forms

Appendix B Chemical Data Tables

Table 1	Volatile Organic Compounds
Table 2	Gasoline Range Organic Compounds
Table 3	Diesel Range Organic Compounds
Table 4	Total Recoverable Petroleum Hydrocarbons
Table 5	Polynuclear Aromatic Hydrocarbons
Table 6	Chlorinated Herbicides
Table 7	Organophosphorus Pesticides
Table 8	Organochlorine Pesticides and PCBs
Table 9	Total Metals
Table 10	Dissolved Metals
Table 11	Water Quality Parameters

Appendix C Chemical Quality Assurance Report

ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AMSL	Above Mean Sea Level
AP	Auger Point
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
ft	foot
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
PAH	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
pg/L	picograms per liter; equal to 10^{-6} ug/L
ppb	parts per billion
ppm	parts per million
ppq	parts per quadrillion
QA	Quality Assurance
QC	Quality Control
RBC	Risk-based Concentration
SVOC	Semivolatile Organic Compound
TDS	Total Dissolved Solids

ACRONYMS

TOC	Total Organic Carbon
ug/L	micrograms per liter
ug/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 (CENPA-EN-G-MI) in June and early July 1996 at the Fort Richardson landfill. CENPA-EN-G-MI performed the sampling at the request of the Alaska District's Environmental Engineering Branch, Active Installations Section (CENPA-EN-EE-AI), on behalf of the Fort Richardson Department of Public Works (DPW), United States Army, Alaska (USARAK).

Water samples were collected from ten of thirteen monitoring wells located around the landfill and were analyzed for a wide variety of potential contaminants and water quality parameters. Three of the wells (AP-3011, AP-3012 and AP-3219) could not be sampled because the water table had dropped below their well screens.

Data is generally consistent with historical data for these wells. Low levels of non-fuel organic compounds were detected in several of the wells. No unexpected inorganic analytes were detected and no regulatory levels for drinking water were exceeded.

1.0 Introduction

This sampling effort represents the beginning of a five year biannual groundwater monitoring program designed to fulfill Alaska Department of Environmental Conservation (ADEC) landfill closure requirements. Water samples were collected from ten of thirteen monitoring wells located around the former Ft. Richardson landfill (see Figures 1 & 2) in June and July 1996. The samples were analyzed for volatile organic compounds (VOCs), gasoline range organic compounds (GRO), polynuclear aromatic hydrocarbons (PAH), diesel range organic compounds (DRO), total recoverable petroleum hydrocarbons (TRPH), organochlorine pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, organophosphorus pesticides, total and dissolved metals, total organic carbon (TOC), total dissolved solids (TDS), chemical oxygen demand (COD), ammonia, nitrate-nitrite, Kjeldahl nitrogen, cyanide, sulfate, chloride, alkalinity, turbidity, fecal coliform, methylene blue active substances and Langliers index. Three of the wells (AP-3011, AP-3012 and AP-3219) around the landfill 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. The most recent and relevant investigations that included these wells were performed as part of a basewide groundwater monitoring program that was implemented in 1989. Data generated during this investigation generally agree 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, paint and solvent waste, grease 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, about 60 feet high, 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 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 deposits 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 underlaid 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 Bootlegger Cove formation 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) to greater than 250 feet below ground surface among the thicker glacial deposits found in the northern section of Fort Richardson. Lenses of silt found 20 to 40 feet below ground surface 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 either by groundwater flow into Knik Arm to the west, or into streams (e.g., Ship Creek, Eagle River) that ultimately discharge into Knik Arm.

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 (AMSL). 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 AMSL within this glacial till aquifer. This aquifer is the most shallow non-perched groundwater encountered in the vicinity of the landfill. Groundwater levels measured in wells that screen this aquifer indicate that this groundwater flows

primarily to the northwest and the hydraulic gradient in the vicinity of the landfill is about 0.0025.

A third aquifer was encountered at about 204 feet AMSL 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 in this aquifer.

3.0 Field Activities

3.1. Sample Summary: Sampling began on 19 June, and was concluded on 10 July 1996. All sampling was performed by Bret Walters, chemist, CENPA-EN-G-MI. Water samples were collected from ten wells located within and around the Ft. Richardson landfill as described in the closure plan for the Ft. Richardson landfill. Three of the wells (AP-3011, AP-3012 and AP-3219) included for sampling in the closure plan could not be sampled because the water table had dropped below their well screens.

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 recharge rate and initial water volume of AP-3220 precluded the use of its dedicated submersible pump. When no water could be extracted from the well, the pump and riser were removed and the well was purged and sampled using a single-use bailer. The recharge rate of the well was about 1.5 liters per day. As a result of the low recharge rate, the well was bailed dry three consecutive times and was sampled over a period of 15 days. Data for the sample from this well should be viewed with caution.

When the dedicated pump that was installed in AP-3221 failed to function properly, it was replaced with the pump that had been removed from AP-3220. The pump was partially disassembled and thoroughly decontaminated prior to its reinstallation in AP-3221. 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

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 the individual well's Sample Summary Form provided in Appendix A.

Sampling began immediately after well stabilization. The types of containers used and the volume of sample collected met standard protocols. All containers were precleaned containers 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. Triple volumes of one sample were sent to each laboratory for use as matrix spike and matrix spike duplicate samples.

3.3 QA/QC Samples: Two 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. The triplicate samples were collected at wells AP-3222 and FR-2 and were tested for all analytes.

Trip blanks and rinsate blanks were also prepared, used and analyzed for this project, but data indicate that water used to prepare the blanks was contaminated. The water, which was obtained through a local laboratory, was found to contain some analytes at levels higher than the associated samples. The data obtained from the trip blanks and rinsate blanks could not be used to monitor for cross contamination. The procedures utilized during this investigation have proven to be effective in avoiding cross contamination during previous investigations.

4.0 Analytical Results

4.1 Chemical Analyses: Data from the chemical analyses are reported in Tables 1 through 11 (Appendix A). 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 (ug/L). One ppm is equal to 1000 ppb. Where possible, reported concentrations are compared to federal or state Maximum Contaminant Levels (MCLs) and 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 CENPA-EN-G-MI. The data and associated materials were reviewed by chemists at the Corps of Engineers North Pacific Division Laboratory (CENPP-PE-L).

CENPP-PE-L chemists performed an extensive set of procedures to assess the quality of the data. The initial inspection of the data screened for errors and inconsistencies. The CENPP chemist checked the instrument and analysis identification, sample description and identification, time and date of analysis, weight or volume of sample, units employed, dilutions, sample clean-up, and detection limits. The chemist then verified that the data were checked by the laboratory manager or quality assurance officer. Sample holding times, preservation, and storage were checked and noted.

The second step of the data verification process was an assessment of the laboratory's instrumentation procedures. The precise process varied depending on the method of analysis, but may have included inspection of instrument tuning, initial and continuing calibration procedures, example calculations, and standard solution preparation methods. Surrogate recoveries were scrutinized to

determine whether they fell within an acceptable range. Adequate surrogate recoveries indicate that sample extraction procedures were effective, and that overall instrument procedures were acceptable.

The next phase of data quality assessment was an examination of the actual data. By examining data from laboratory duplicates, blind duplicates, laboratory blanks, matrix spike samples, matrix spike duplicate samples, and field samples, the chemist can determine whether the data are of high quality.

The precision of the data was quantified by the relative percent difference (RPD) between two results obtained for the same sample. Laboratory duplicates and matrix spike duplicates were assessed by their RPD values. High RPD values indicate a lack of reproducibility, and such data are qualified or rejected. Any such results were reported in the assessment of data quality.

Data from blank samples were examined to determine if sample contamination occurred after the sample was collected in the field. Method blanks are blank samples prepared in the laboratory and analyzed along with project samples. If analytes are detected in a method blank, it is a strong indication of laboratory contamination. This would raise the possibility that project samples were contaminated in the laboratory as well.

The accuracy of the data was monitored by assessment of matrix spike (MS) and matrix spike duplicate (MSD) sample analyses. A matrix spike sample is prepared by adding a known quantity of a certain analyte to an actual sample. The matrix spike duplicate is prepared in an identical manner. Matrix spike and matrix spike duplicates must be run at least once per every twenty samples. Recovery of the matrix spike indicates the level of accuracy of the data. Comparison of the matrix spike and matrix spike duplicate results provides another indication of data precision. Chemists at NPD examined all matrix spike and matrix spike duplicate data. Low or high spike recoveries or a high RPD for duplicates are evidence of poor accuracy or low precision; all such results are reported in the quality assurance

assessment.

Laboratory data quality is summarized in the quality assurance report (QAR; attached as Appendix C). In general, the project and quality assurance data were in agreement and are acceptable. Exceptions are noted in the discussion of specific test results.

4.2.2 Replicate Samples: Blind duplicate quality control (QC) samples were submitted to the project laboratory, which analyzed the majority of the samples. Analysis of the QC duplicate samples provides a measure of intra-laboratory variations. Additional replicate samples were provided to an independent quality assurance (QA) laboratory, to provide a test of inter-laboratory accuracy. QC and QA duplicates are so noted in the data tables. A QA and QC duplicate set was submitted for each analytical method performed. Data from all replicate samples were analyzed by CENPP-PE-L as part of development of the QAR. The three sets of data were carefully compared and tabulated. Any discrepancies were noted in the QAR and are included in the discussion of specific test results.

4.3 Chemical Results:

4.3.1 Volatile Organic Compounds: All of the samples were tested for VOCs by method 8260A. Data are presented in Table 1 of Appendix B.

Volatile organic compounds were detected in nine of the wells. The vast majority of these detections were of compounds that had not been detected previously at these wells and were reported at extremely low concentrations. The laboratory was contacted to verify that they could accurately quantitate the analytes at the reported levels. The laboratory confirmed that they could not accurately quantitate at most of the reported levels. The laboratory then provided method reporting limits (MRLs) above which they can quantitate detections with acceptable accuracy. Additionally, these data are further suspect because of inconsistent low level detections in samples that were reanalyzed subsequent to dilutions. Data for analytes detected below their respective MRLs are quantitatively uncertain and are

probably qualitatively uncertain at the levels reported. Affected data have been flagged as "rejected" in the data tables and are not discussed further in the text of this report.

No VOCs, other than those attributed to laboratory contamination, were reported above MRLs in wells AP-3010, AP-3013, AP-3014 or AP-3015. All analytes reported in the samples from these wells were also detected at similar concentrations in the associated method blanks.

Acetone and dichlorodifluoromethane, common laboratory contaminants, were the only VOCs reported above MRLs in the water from wells AP-3222, FR-1, FR-2 and FR-3. Acetone was detected at up to 0.7 ppb in wells FR-1, FR-2 and FR-3. Dichlorodifluoromethane was detected at up to 5.2 ppb in wells AP-3222 and FR-3. Though the analytes were not detected in the associated method blanks, their presence at the concentrations reported, may be due to laboratory contamination. No federal or state maximum contaminant level (MCL) exists for these analytes. However, the EPA Region III risk-based concentrations (RBCs) for acetone and dichlorodifluoromethane in drinking water are 3700 and 390 ppb, respectively.

Acetone, toluene and 2-butanone were detected in AP-3220 at 19, 0.3 and 2.1 ppb, respectively. No MCL exists for 2-butanone, but the MCL for toluene is 1000 ppb. The RBCs for toluene and 2-butanone are 750 and 1900 ppb, respectively.

Acetone, dichlorodifluoromethane and toluene were detected in AP-3221 at 0.68, 3.2 and 0.27 ppb, respectively. Once again, no MCL or RBC was exceeded.

The QAR states that the primary and QA data do not agree for several analytes in each of the triplicate sets. With the exception of the methylene chloride detected in the QA sample from AP-3222, all "disagreements" are due to the much lower detection limits reported by the primary laboratory. The detection of the methylene chloride in the QA duplicate sample is likely due to laboratory contamination. All method detection limits are below applicable regulatory levels, so the data agree when evaluated with

respect to the project data quality objectives.

4.3.2 Gasoline Range Organic Compounds: All of the samples were tested for GRO by method 8015 modified (ADEC version). Data are presented in Table 2 of Appendix B. Subsequent investigations for this project will replace method 8015m with the newer method AK-101.

Very low levels of GRO were reported in the samples from AP-3010, AP-3013 and AP-3015 at 0.15 and estimated concentrations of 0.028 and 0.079 ppm, respectively. None of the chromatograms for the GRO detections resemble those representative of gasoline and what is quantitated is probably not fuel. Similar concentrations would have been detected, if present in the samples collected from these well during the Fall 1995 portion of the Ft. Richardson Groundwater Monitoring Program, but were not.

All primary and QA data agree and are comparable. No RBC or MCL exists for GRO.

4.3.3 Diesel Range Organic Compounds: All of the samples were tested for DRO by method 8100 modified (ADEC version). Data are presented in Table 3 of Appendix B. Subsequent investigations for this project will replace method 8100m with the newer method AK-102.

Very low levels of DRO were reported in the samples from AP-3014 and AP-3015 at 0.15 ppm. None of the chromatograms for the DRO detections resemble those representative of typical DRO and what is quantitated is probably not fuel. Similar concentrations would have been detected, if present in the samples collected from these well during the Fall 1995 portion of the Ft. Richardson Groundwater Monitoring Program, but were not.

All primary and QA data agree and are comparable. No RBC or MCL exists for DRO.

4.3.4 Total Recoverable Petroleum Hydrocarbons: All of the samples were tested for TRPH by method 418.1. Data are presented in Table 4 of Appendix B. Subsequent investigations for this project will replace method 418.1 with the newer method AK-103.

Very low levels of TRPH were reported in the samples from AP-3010, AP-3014, AP-3015,

AP-3220, AP-3222 and FR-1 Concentrations ranged from 0.38 to 0.59 ppm with all concentrations near the MDL and some considered estimates. Similar concentrations would have been detected, if present in the samples collected from these well during the Fall 1995 portion of the Ft. Richardson Groundwater Monitoring Program, but were not.

All primary and QA data agree and are comparable. No RBC or MCL exists for TRPH.

4.3.5 Polynuclear Aromatic Hydrocarbons: All of the samples were tested for PAHs by method 8270. Data are presented in Table 5 of Appendix B. The test performed did not meet closure plan requirements which specified method 8310 for PAHs and method 8270 for base/neutral and acid extractable organics. This discrepancy resulted in elevated detection limits for some PAHs and the missing results for non-PAH analytes. No PAHs were detected.

Samples from all of the landfill wells except AP-3220 were analyzed using both analytical methods in October 1995. The only compound detected was the common laboratory contaminant, bis(2-ethylhexyl)phthalate, which was detected for the first time in AP-3014 at concentration of 21 ppb. Future investigations for this project will utilize both methods to adhere to closure plan specifications.

4.3.6 Chlorinated Herbicides: All of the samples were tested for chlorinated herbicides by method 8150A. Data are presented in Table 6 of Appendix B.

No chlorinated herbicides were detected in any of the wells. Based on low spike recoveries, very low levels of chlorinated herbicides may not have been detected, if present, in samples from AP-3221, FR-1, FR-2 and FR-3. All primary and QA data agree and are comparable. All method detection limits are below applicable MCLs.

4.3.7 Organophosphorus Pesticides: All of the primary samples were tested for organophosphorus pesticides by method 8141 (modified). The QA duplicate samples were analyzed by method 8140. These methods are comparable and data are presented in Table 7 of Appendix B.

No organophosphorus pesticides were detected in any of the wells. All primary and QA data agree and are comparable. All method detection limits are below applicable MCLs.

4.3.8 Organochlorine Pesticides and PCBs: All of the samples were tested for organochlorine pesticides and PCBs by method 8080. Data are presented in Table 8 of Appendix B.

No organochlorine pesticides or PCBs were detected in any of the wells. All primary and QA data agree and are comparable. All method detection limits are below applicable MCLs.

4.3.9 Total Metals: Data are included in Table 9 of Appendix B. Unfiltered samples of water were analyzed for the 23 Target Analyte List (TAL) metals. Most of the metals were detected in samples from most of the wells. Detected concentrations were compared to available primary MCLs, action levels, RBCs and secondary MCLs. Primary MCLs, action levels 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, action levels and RBCs are summarized below.

Metal (Total)	MCL (ug/L)	RBC (ug/L)	Number of wells where detected/highest level detected (ug/L)	Well/level (ug/L) that exceeded MCL or RBC
Aluminum	200 ^a	37000	6/1000	AP-3015/1000 AP3220/1000 AP-3221/260 FR-3/330
Antimony	6	15	0/ND(0.6)	None
Arsenic	50	11	1/4.9	None
Barium	2000	2600	10/100	None
Beryllium	4	0.016	0/ND(3.3)	None
Cadmium	5	18	0/ND(0.2)	None
Chromium	100 ^a	180 ^b	7/18	None
Cobalt	NA	2200	2/1.3	None

Metal (Total)	MCL (ug/L)	RBC (ug/L)	Number of wells where detected/highest level detected (ug/L)	Well/level (ug/L) that exceeded MCL or RBC
Copper	1000 ^d	1500	8/3.3	None
Iron	300 ^d	11000	7/2000	AP-3015/370 AP3220/2000 AP-3221/470 FR-3/730
Lead	15 ^c	NA	6/1.8	None
Manganese	50 ^d	180	8/120	AP-3220/120
Mercury	2	11	0/ND(0.17)	None
Nickel	100	730	10/29	None
Selenium	50	180	1/7.4	None
Sodium	250000 ^d	NA	10/17000	None
Silver	100 ^d	180	1/0.41	None
Thallium	2	NA	0/ND(0.16)	None
Vanadium	NA	260	9/3.1	None
Zinc	5000 ^d	11000	6/55	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; detection limit is in parentheses.

Calcium, magnesium and potassium were detected in most of the wells at concentrations up to 110000, 29000 and 2900 ppb, respectively. These metals are not included in the table because there are no MCLs or RBCs associated with them. No primary MCLs or RBCs were exceeded in any of the samples. All method detection limits are below applicable regulatory levels.

The primary and QA data for total potassium in both triplicate samples do not agree. This discrepancy may be partially attributable to the proximity of the results to the detection limits.

4.3.10 Dissolved Metals: Data are presented in Table 10 of Appendix B. Samples were field filtered into clean containers, so detected concentrations represent the amount of dissolved metal in the sample. Manganese, detected in the sample from AP-3220 at 87 ppb, was the only metal that

exceeded a secondary MCL. No primary MCLs or RBCs were exceeded in any of the samples. All method detection limits are below applicable regulatory levels.

The primary and QA data for dissolved potassium in the sample from FR-3 do not agree. This discrepancy may be partially attributable to the proximity of the results to the detection limits.

4.3.11 Water Quality Parameters: All of the samples were also tested for group of water quality parameters required by State of Alaska solid waste management regulations (18 AAC 60). These analytes include alkalinity, chloride, chemical oxygen demand, cyanide, langliers index, methylene blue active substances (MBAS), ammonia nitrogen, total Kjeldahl nitrogen, nitrate-nitrite, sulfate, fecal coliform, total organic carbon, total dissolved solids and turbidity. Data are presented in Table 11 of Appendix B.

Primary MCLs are available for cyanide (0.2 ppm) and nitrate-nitrite (10 ppm). Secondary MCLs are available for chloride (250 ppm), MBAS (0.5 ppm), sulfate (250 ppm) and total dissolved solids (500 ppm). No primary MCLs were exceeded. The total dissolved solid concentration in the sample from AP-3014 (940 ppm) was the only detection that exceeded a secondary MCL. No ammonia nitrogen or fecal coliform were detected in any of the samples. The results for the remaining analytes are consistent with historical data generated for these wells. The data quality for turbidity, methylene blue active substances and fecal coliform could not be evaluated because the laboratory (Northern Testing Laboratories) did not submit any associated quality control data.

The primary and QA data for turbidity and MBAS at FR-2 and AP-3222, respectively, do not agree. In each case, the QA sample had exceeded recommended holding times and the primary data are accepted.

4.3.12 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 agree with field data from previous investigations and fall within expected ranges.

5.0 Conclusions

Groundwater quality in the area continues to be good. No RBCs or health-based MCLs were exceeded in any of the wells. Data generated during this investigation is consistent with historical data. When this data is combined with the data from previous investigations and the Fall 1996 sampling event, sufficient data should exist to establish a groundwater quality "baseline" under 18 AAC 60.

6.0 References

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

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

United States Environmental Protection Agency, Region III Risk-Based Concentration Table, January - June 1996.

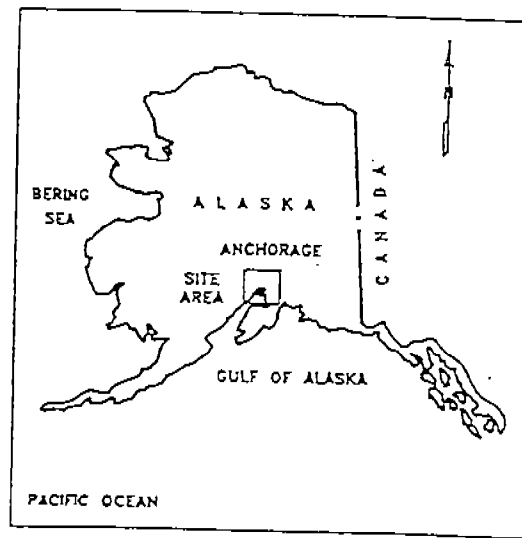
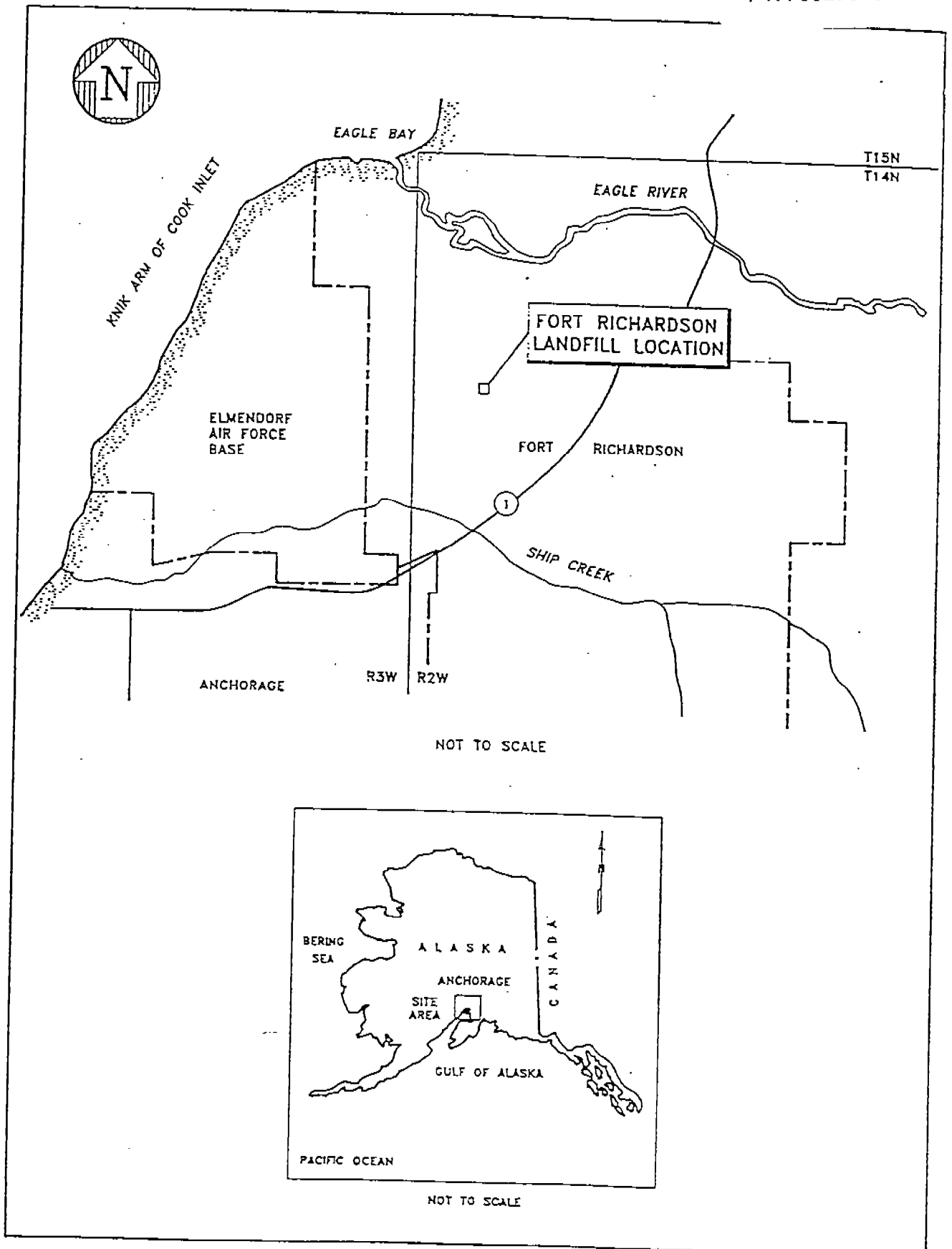


Figure 1
FORT RICHARDSON LANDFILL SITE
ANCHORAGE, ALASKA

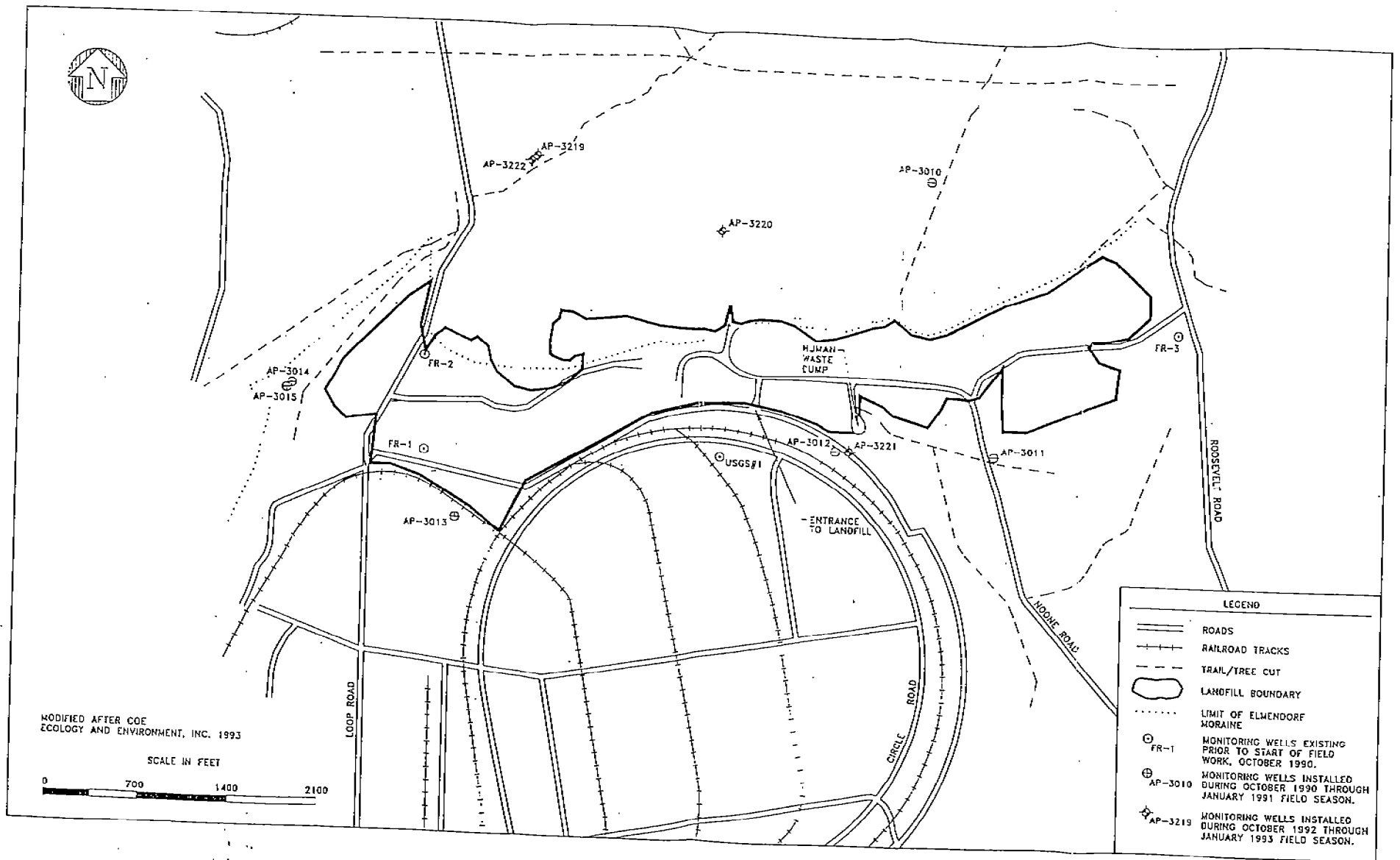


Figure 2 SITE MAP
FORT RICHARDSON LANDFILL
ANCHORAGE, ALASKA

APPENDIX A
Sample Summary Forms

AP-3013

1 July 96

Landfill Wells, Ft. Richardson

Sampling Point: 4-inch Monitoring Well**Equipment:** Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 5000 watt, 240 volt generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube.

Casing top/water: 139.04 ft

Casing top/bottom: 150.00 ft (from record)

Purge Volume: 84 L

Purge Rate: 1.05 L/min (313 Hz)

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature:	7 °C
pH:	7.55
Conductivity:	0.239 millimhos/cm
Redox Potential:	113 millivolts
Odor:	None Noticeable
Appearance:	clean

Sample Number: 96LFFR11WA

Time of Sampling: 16:15-16:50 1 July 1996

Rate of Sampling: Slowest sustainable non turbulent flow (310 Hz)

AP-3014

FTR 0027014

Landfill Wells, Ft. Richardson

19 June 95

Sampling Point: 4-inch Monitoring Well

Equipment: Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 4000 watt, 240 volt, 8 hp generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube.

Casing top/water: 19.53 ft

Casing top/bottom: 31.1 ft (from records)

Purge Volume: 103 L

Purge Rate: 1.5 L/min (103 Hz)

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.6 °C

pH: 6.53

Conductivity: 0.098 millimhos/cm

Redox Potential: 72 millivolts

Odor: None Noticeable

Appearance: clear

Sample Number: 96LFFR01WA

Time of Sampling: 15:30 - 15:55 19 June 1996

Rate of Sampling: slowest unbroken flow (less than 1L/min)

AP-3015

Landfill Wells, Ft. Richardson

19 June 1996

Sampling Point: 4-inch Monitoring Well**Equipment:** Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 4000 watt, 240 volt, 8 hp generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube.

Casing top/water: 122.94 ft

Casing top/bottom: 130.1 ft (from records)

Purge Volume: 65 L

Purge Rate: 1.5 L/min (302 Hz)

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature: 9.5 °C

pH: 7.21

Conductivity: 0.283 millimhos/cm

Redox Potential: 51 millivolts

Odor: None Noticeable

Appearance: cloudy

Sample Number: 96LFFR02WA

Time of Sampling: 16:55 - 17:25 19 June 1996

Rate of Sampling: slowest unbroken flow (less than 1L/min)

AP-3220

20 June 1996

Landfill Well, Ft. Richardson

Sampling Point: 4-inch Monitoring Well

Equipment: Dedicated 2-inch stainless steel submersible pump was removed.

Sample was collected using a disposable bailer.

Casing top/water: 231.76 ft

Casing top/bottom: 243.4 ft (from records)

Purge Volume: Bailed dry three times

Purge Rate: 1.00 L/min

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature: 6.4 °C

pH: 7.7

Conductivity: 0.302 millimhos/cm

Redox Potential: 44 millivolts

Odor: None Noticeable

Appearance: Cloudy

Sample Number: 96LFFR04WA

Time of Sampling: 14:50 on 24 June - 9:30 on 10 July 1996

Rate of Sampling: about 1.5 L/day

AP-3221

24 June 1996

Landfill Wells, Ft. Richardson**Sampling Point:** 4-inch Monitoring Well**Equipment:** Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 5000 watt, 240 volt generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube. On subsequent return to finish sampling unable to get water to the surface.

Casing top/water: 157.89 ft

Casing top/bottom: 180.00 ft (from record)

Purge Volume: 170 L

Purge Rate: 1.5 L/min (371 Hz)

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature:	13.1 °C
pH:	7.3
Conductivity:	0.524 millimhos/cm
Redox Potential:	25 millivolts
Odor:	None Noticeable
Appearance:	clear

Sample Number: 96LFFR05WA

Time of Sampling: 16:15 - 17:00 24 June 96

Rate of Sampling: Slowest sustainable non turbulent flow

AP-3222

FTR 0027018

2 July 1996

Landfill Well, Ft. Richardson

Sampling Point: 4-inch Monitoring Well

Equipment: Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 4000 watt, 240 volt generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube.

Casing top/water: 131.72 ft

Casing top/bottom: 141 ft (from records)

Purge Volume: 90 L

Purge Rate: 1.00 L/min

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature:	9.3 °C
pH:	7.36
Conductivity:	0.255 millimhos/cm
Redox Potential:	117 millivolts
Odor:	None Noticeable
Appearance:	Clear

Sample Number: 96LFFR12WA, 014WA and -15WA

Time of Sampling: 13:10 - 14:45 2July 1996

Rate of Sampling: slowest unbroken flow (less than 1L/min)

FR-1

25 June 96

Landfill Wells, Ft. Richardson**Sampling Point: 2-inch Monitoring Well****Equipment:** Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser, Homelight 5000 watt, 240 volt, generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube.

Casing top/water: 134.97 ft

Casing top/bottom: 149.00 ft (from record)

Purge Volume: 12 L

Purge Rate: 1.0 L/min (247 Hz)

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature: 9.7 °C

pH: 6.6

Conductivity: 0.251 millimhos/cm

Redox Potential: 83 millivolts

Odor: None Noticeable

Appearance: clear

Sample Number: 96LFFR06WA

Time of Sampling: 12:35 - 13:05 25 June 1996

Rate of Sampling: Slowest sustainable non turbulent flow

FR-2

26 June 96

Landfill Wells, Ft. Richardson

Sampling Point: 2-inch Monitoring Well**Equipment:** Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 5000 watt, 240 volt, generator, Grundfos BMI/MP1 voltage control box; Teflon sampling tube.

Casing top/water: 149.74 ft

Casing top/bottom: 167.0 ft (from record)

Purge Volume: 33 L

Purge Rate: 1.32 L/min

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature:	10.1 °C
pH:	6.8
Conductivity:	0.29 millimhos/cm
Redox Potential:	81 millivolts
Odor:	None Noticeable
Appearance:	clear

Sample Number: 96LFFR07WA, -09WA and -10WA

Time of Sampling: 15:45 - 16:50 26 June 1996

Rate of Sampling: Slowest sustainable non turbulent flow (150Hz)

FR-3

FTR 0027021

25 June 1996

Landfill Wells, Ft. Richardson

Sampling Point: 2-inch Monitoring Well

Equipment: Dedicated 2-inch stainless steel submersible pump (Grundfos RediFlow II); PVC riser; Homelight 4000 watt, 240 volt, 8 hp generator, Grundfos BMI/MP1 voltage control box; Teflon sampler.

Casing top/water: 148.29 ft

Casing top/bottom: 171.70 ft (from records)

Purge Volume: 45 L

Purge Rate: 1.0 L/min (284 Hz)

Sampled By: B. Walters

Physical Parameters and Observations at time of Sample Collection

Temperature:	13.4 °C
pH:	7.6
Conductivity:	0.293 millimhos/cm
Redox Potential:	42 millivolts
Odor:	None Noticeable
Appearance:	Brown/cloudy

Sample Number: 96LFFR08WA

Time of Sampling: 16:10 - 16:45 25 June 1996

Rate of Sampling: Slowest sustainable non turbulent flow (< 1L/min)

APPENDIX B
Laboratory Data

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/24/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57766-04
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	06/29/96
DATE TESTED:	06/27/96	07/15/96	06/27/96	06/27/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
1,1,1,2-Tetrachloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,1,1-Trichloroethane	ND (0.2)	ND (0.02)	ND (0.2)	ND (0.2)	ND (0.2)
1,1,2,2-Tetrachloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,1,2-Trichloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,1-Dichloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,1-Dichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,1-Dichloropropene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2,3-Trichlorobenzene	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
1,2,3-Trichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2,4-Trichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2,4-Trimethylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2-Dibromo-3-chloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2-Dibromoethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2-Dichloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,2-Dichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,3,5-Trimethylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,3-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,3-Dichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
1,4-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
2,2-Dichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
2-Butanone	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	2.1
2-Chlorotoluene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
2-Hexanone	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
4-Chlorotoluene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
4-Methyl-2-pentanone	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)

Table 1

Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

FTR 0027024

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/24/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57766-04
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	06/29/96
DATE TESTED:	06/27/96	07/15/96	06/27/96	06/27/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	0.24 B	0.49 B	ND (0.2)	ND (0.2)	19
Benzene	ND (0.2)	0.052 R	0.062 R	ND (0.2)	0.073 R
Bromobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Bromochloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Bromodichloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Bromoform	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Bromomethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Carbon disulfide	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	0.55 B
Carbon tetrachloride	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Chlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Chloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Chloroform	ND (0.2)	0.094 R	ND (0.2)	ND (0.2)	ND (0.2)
Chloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
cis-1,2-Dichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
cis-1,3-Dichloropropene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Dibromochloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Dibromomethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Dichlorodifluoromethane	ND (0.2)	0.12 R	ND (0.2)	ND (0.2)	ND (0.2)
Ethylbenzene	ND (0.2)	0.032 R	ND (0.2)	ND (0.2)	ND (0.2)
Hexachlorobutadiene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Isopropylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
m,p-Xylene (Sum of Isomers)	ND (0.2)	0.077 R	ND (0.2)	ND (0.2)	0.076 R
Methylene chloride	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
n-Butylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
n-Propylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Naphthalene	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)
o-Xylene	ND (0.2)	0.042 R	ND (0.2)	ND (0.2)	ND (0.2)
p-Isopropyltoluene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
sec-Butylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

FTR 0027025

Page 3 of 9

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/24/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57766-04
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	06/29/96
DATE TESTED:	06/27/96	07/15/96	06/27/96	06/27/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Styrene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
tert-Butylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Tetrachloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Toluene	ND (0.2)	0.088 R	ND (0.2)	ND (0.2)	0.3
trans-1,2-Dichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
trans-1,3-Dichloropropene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Trichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Trichlorofluoromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	0.066 J
Vinyl chloride	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
TIC's:	6	4	4	6	5
Total TIC Concentration:	221.8 J	3.59 J	1.77 J	100.58 J	97.17 J

SAS: Sound Analytical Services, Inc., Tacoma, WA.

R: Data is rejected.

J: Estimated Value.

B: Analyte was detected in the associated method blank.

TIC: Tentatively Identified Compounds.

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

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

			QC Dup	QA Dup	
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222	FR-1
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA	06WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	009379-03	57766-02
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96	06/29/96
DATE TESTED:	07/08/96	07/11/96	07/10/96	07/10/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
1,1,1,2-Tetrachloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1,1-Trichloroethane	ND (0.2)	0.03 R	0.027 R	ND (5)	ND (0.2)
1,1,2,2-Tetrachloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1,2-Trichloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1-Dichloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1-Dichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1-Dichloropropene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2,3-Trichlorobenzene	ND (0.3)	ND (0.3)	ND (0.3)	ND (5)	ND (0.3)
1,2,3-Trichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2,4-Trichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2,4-Trimethylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dibromo-3-chloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
1,2-Dibromoethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dichloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,3,5-Trimethylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,3-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,3-Dichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,4-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
2,2-Dichloropropane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
2-Butanone	ND (0.51)	ND (0.51)	ND (0.51)	ND (50)	ND (0.51)
2-Chlorotoluene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
2-Hexanone	ND (0.2)	ND (0.2)	ND (0.2)	ND (20)	ND (0.2)
4-Chlorotoluene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
4-Methyl-2-pentanone	ND (0.2)	ND (0.2)	ND (0.2)	ND (20)	ND (0.2)

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

			QC Dup	QA Dup	
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222	FR-1
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA	06WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	009379-03	57766-02
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96	06/29/96
DATE TESTED:	07/08/96	07/11/96	07/10/96	07/10/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	0.68	ND (0.2)	ND (0.2)	ND (50)	0.7
Benzene	ND (0.2)	ND (0.2)	0.025 R	ND (5)	ND (0.2)
Bromobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromochloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromodichloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromoform	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromomethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
Carbon disulfide	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Carbon tetrachloride	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Chlorobenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Chloroethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
Chloroform	ND (0.2)	0.12 R	0.12 R	ND (5)	0.15 R
Chloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
cis-1,2-Dichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
cis-1,3-Dichloropropene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Dibromochloromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Dibromomethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Dichlorodifluoromethane	3.2	0.34	0.34	ND (10)	0.16 R
Ethylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Hexachlorobutadiene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Isopropylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
m,p-Xylene (Sum of Isomers)	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Methylene chloride	ND (0.2)	ND (0.2)	ND (0.2)	4.5 J	ND (0.2)
n-Butylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
n-Propylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Naphthalene	ND (0.24)	ND (0.24)	ND (0.24)	ND (5)	ND (0.24)
o-Xylene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
p-Isopropyltoluene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
sec-Butylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

FTR 0027028

Page 6 of 9

			QC Dup	QA Dup	
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222	FR-1
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA	06WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	009379-03	57766-02
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96	06/29/96
DATE TESTED:	07/08/96	07/11/96	07/10/96	07/10/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Styrene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
tert-Butylbenzene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Tetrachloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Toluene	0.27	0.05 R	0.049 R	ND (5)	ND (0.2)
trans-1,2-Dichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
trans-1,3-Dichloropropene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Trichloroethene	ND (0.2)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Trichlorofluoromethane	ND (0.2)	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
Vinyl chloride	ND (0.2)	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
TIC's:	3	3	1	0	4
Total TIC Concentration:	9.31 J	1.17 J	0.56 J	0	4.51 J

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

R: Data is rejected.

J: Estimated Value.

TIC: Tentatively Identified Compounds.

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

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

FTR 0027029

		QC Dup	QA Dup	
LOCATION OF SAMPLE:	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-06	57766-07	009379-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	07/06/96	06/29/96
DATE TESTED:	07/08/96	07/08/96	07/10/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
1,1,1,2-Tetrachloroethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1,1-Trichloroethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1,2,2-Tetrachloroethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1,2-Trichloroethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1-Dichloroethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1-Dichloroethene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,1-Dichloropropene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2,3-Trichlorobenzene	ND (0.3)	ND (0.3)	ND (5)	ND (0.3)
1,2,3-Trichloropropane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2,4-Trichlorobenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2,4-Trimethylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dibromo-3-chloropropane	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
1,2-Dibromoethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dichloroethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,2-Dichloropropane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,3,5-Trimethylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,3-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,3-Dichloropropane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
1,4-Dichlorobenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
2,2-Dichloropropane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
2-Butanone	ND (0.51)	ND (0.51)	ND (50)	ND (0.51)
2-Chlorotoluene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
2-Hexanone	ND (0.2)	ND (0.2)	ND (20)	ND (0.2)
4-Chlorotoluene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
4-Methyl-2-pentanone	ND (0.2)	ND (0.2)	ND (20)	ND (0.2)

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

FTR 0027030

Page 8 of 9

		QC Dup	QA Dup	
LOCATION OF SAMPLE:	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-06	57766-07	009379-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	07/06/96	06/29/96
DATE TESTED:	07/08/96	07/08/96	07/10/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Acetone	0.53	0.54	ND (50)	0.59
Benzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromobenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromochloromethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromodichloromethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromoform	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Bromomethane	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
Carbon disulfide	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Carbon tetrachloride	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Chlorobenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Chloroethane	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
Chloroform	0.097 R	0.098 R	ND (5)	ND (0.2)
Chloromethane	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
cis-1,2-Dichloroethene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
cis-1,3-Dichloropropene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Dibromochloromethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Dibromomethane	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Dichlorodifluoromethane	0.14 R	0.14 R	ND (10)	5.2
Ethylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Hexachlorobutadiene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Isopropylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
m,p-Xylene (Sum of Isomers)	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Methylene chloride	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
n-Butylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
n-Propylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Naphthalene	ND (0.24)	ND (0.24)	ND (5)	ND (0.24)
o-Xylene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
p-Isopropyltoluene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
sec-Butylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)

Table 1
 Landfill Wells, Ft. Richardson
 Volatile Organic Compounds
 Method 8260A
 June/July, 1996

FTR 0027031

Page 9 of 9

		QC Dup	QA Dup	
LOCATION OF SAMPLE:	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-06	57766-07	009379-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	07/06/96	06/29/96
DATE TESTED:	07/08/96	07/08/96	07/10/96	07/08/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Styrene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
tert-Butylbenzene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Tetrachloroethene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Toluene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
trans-1,2-Dichloroethene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
trans-1,3-Dichloropropene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Trichloroethene	ND (0.2)	ND (0.2)	ND (5)	ND (0.2)
Trichlorofluoromethane	ND (0.2)	ND (0.2)	ND (10)	0.058 R
Vinyl chloride	ND (0.2)	ND (0.2)	ND (10)	ND (0.2)
TIC's:	4	4	0	5
Total TIC Concentration:	40.46 J	39.86 J	0	39.01 J

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

R: Data is rejected.

J: Estimated Value.

TIC: Tentatively Identified Compounds.

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

Table 2
 Landfill Wells, Ft. Richardson
 Method 8015 Modified (ADEC Version)
 Gasoline Range Organics
 June/July, 1996

FTR 0027032

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/24/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57766-04
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	06/29/96
DATE TESTED:	07/03/96	07/12/96	07/03/96	07/03/96	07/08/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	0.15 *	0.028 J, *	ND (0.0098)	0.079 J, *	ND (0.0098)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

J: Estimated Value.

*: Contaminant does not appear to be "typical" GRO.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 2
Landfill Wells, Ft. Richardson
Method 8015 Modified (ADEC Version)
Gasoline Range Organics
June/July, 1996

			QA Dup	QC Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	14WA	15WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	009379-03	57880-08
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	07/08/96	07/12/96	07/09/96	07/12/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.0098)	ND (0.0098)	ND (0.01)	ND (0.0098)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 2
 Landfill Wells, Ft. Richardson
 Method 8015 Modified (ADEC Version)
 Gasoline Range Organics
 June/July, 1996

FTR 0027034

Page 3 of 3

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/29/96	06/29/96
DATE TESTED:	07/09/96	07/09/96	07/09/96	07/08/96	07/09/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.0098)	ND (0.0098)	ND (0.0098)	ND (0.01)	ND (0.0098)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 3
Landfill Wells, Ft. Richardson
Method 8100 Modified (ADEC Version)
Diesel Range Organics
June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/24/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57766-04
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	06/29/96
DATE TESTED:	07/03/96	07/10/96	07/03/96	07/03/96	07/03/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	ND (0.098)	ND (0.096)	0.15 *	0.15 *	ND (0.1)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

*: Contaminant does not appear to be "typical" DRO.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 3
Landfill Wells, Ft. Richardson
Method 8100 Modified (ADEC Version)
Diesel Range Organics
June/July, 1996

FTR 0027036

Page 2 of 3

			QA Dup	QC Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	14WA	15WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	009379-03	57880-08
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	07/03/96	07/10/96	07/10/96	07/10/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	ND (0.098)	ND (0.1)	ND (0.016)	ND (0.1)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 3
 Landfill Wells, Ft. Richardson
 Method 8100 Modified (ADEC Version)
 Diesel Range Organics
 June/July, 1996

FTR 0027037

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/29/96	06/29/96
DATE TESTED:	07/03/96	07/03/96	07/03/96	07/08/96	07/03/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	ND (0.097)	ND (0.098)	ND (0.096)	ND (0.016)	ND (0.095)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 4
Landfill Wells, Ft. Richardson
Total Recoverable Petroleum Hydrocarbons
Method 418.1
June/July, 1996

FTR 0027038

Page 1 of 3

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	07/01/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57880-01
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/06/96
DATE TESTED:	6/28-7/18/96	7/10-7/19/96	6/28-7/18/96	6/28-7/18/96	7/10-7/19/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
TRPH:	0.59 J	ND (0.54)	0.58 J	0.58 J	0.58 J

SAS: Sound Analytical Services, Inc., Tacoma, WA.

J: Estimated Value.

TRPH: Total Recoverable Petroleum Hydrocarbons

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 4
 Landfill Wells, Ft. Richardson
 Total Recoverable Petroleum Hydrocarbons
 Method 418.1
 June/July, 1996

FTR 0027039

Page 2 of 3

			QA Dup	QC Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	14WA	15WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	009379-03	57880-08
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	7/2-7/15/96	7/10-7/19/96	7/8-7/16/96	7/10-7/19/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
TRPH:	ND (0.54)	ND (0.55)	0.38	ND (0.55)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

TRPH: Total Recoverable Petroleum Hydrocarbons

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 4
Landfill Wells, Ft. Richardson
Total Recoverable Petroleum Hydrocarbons
Method 418.1
June/July, 1996

			QC Dup	QA Dup	
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/29/96	06/29/96
DATE TESTED:	7/2-7/15/96	7/2-7/15/96	7/2-7/15/96	7/1-7/18/96	7/2-7/15/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
TRPH:	0.59	ND (0.53)	ND (0.53)	ND (0.35)	ND (0.52)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

TRPH: Total Recoverable Petroleum Hydrocarbons

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 5
 Landfill Wells, Ft. Richardson
 Polynuclear Aromatic Hydrocarbons
 Method 8270
 June/July, 1996

FTR 0027041

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57880-04
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/06/96
DATE TESTED:	06/28/96	07/09/96	06/28/96	06/28/96	07/09/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
2-Chloronaphthalene	ND (1.3)	ND (1.3)	ND (1.2)	ND (1.3)	ND (1.4)
2-Methylnaphthalene	ND (0.82)	ND (0.82)	ND (0.8)	ND (0.82)	ND (0.89)
Acenaphthene	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.2)
Acenaphthylene	ND (0.77)	ND (0.77)	ND (0.75)	ND (0.77)	ND (0.83)
Anthracene	ND (1)	ND (1)	ND (0.98)	ND (1)	ND (1.1)
Benzo(a)anthracene	ND (0.83)	ND (0.83)	ND (0.81)	ND (0.83)	ND (0.9)
Benzo(a)pyrene	ND (0.31)	ND (0.31)	ND (0.3)	ND (0.31)	ND (0.33)
Benzo(b)fluoranthene	ND (0.85)	ND (0.85)	ND (0.83)	ND (0.85)	ND (0.92)
Benzo(g,h,i)perylene	ND (0.4)	ND (0.4)	ND (0.39)	ND (0.4)	ND (0.43)
Benzo(k)fluoranthene	ND (0.72)	ND (0.72)	ND (0.71)	ND (0.72)	ND (0.79)
Chrysene	ND (0.87)	ND (0.87)	ND (0.85)	ND (0.87)	ND (0.94)
Dibenzo(a,h)anthracene	ND (0.29)	ND (0.29)	ND (0.28)	ND (0.29)	ND (0.31)
Fluoranthene	ND (0.74)	ND (0.74)	ND (0.73)	ND (0.74)	ND (0.81)
Fluorene	ND (1.6)	ND (1.6)	ND (1.5)	ND (1.6)	ND (1.7)
Indeno(1,2,3-cd)pyrene	ND (0.3)	ND (0.3)	ND (0.29)	ND (0.3)	ND (0.32)
Naphthalene	ND (0.78)	ND (0.78)	ND (0.76)	ND (0.78)	ND (0.84)
Phenanthrene	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.3)
Pyrene	ND (0.86)	ND (0.86)	ND (0.84)	ND (0.86)	ND (0.93)
TIC's:	0	0	0	0	0
Total TIC Concentration:	0	0	0	0	0

SAS: Sound Analytical Services, Inc., Tacoma, WA.

TIC: Tentatively Identified Compounds.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 5
 Landfill Wells, Ft. Richardson
 Polynuclear Aromatic Hydrocarbons
 Method 8270
 June/July, 1996

FTR 0027042

		QC Dup	QA Dup	
LOCATION OF SAMPLE:	AP-3222	AP-3222	AP-3222	AP-3221
DATE OF SAMPLE:	07/02/96	07/02/96	07/02/96	06/24/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	12WA	15WA	14WA	05WA
TESTING LABORATORY:	SAS	SAS	NPD	SAS
LABORATORY SAMPLE #:	57880-07	57880-08	96-84	57766-01
DATE RECEIVED:	07/06/96	07/06/96	07/05/96	06/29/96
DATE TESTED:	07/09/96	07/09/96	07/16/96	07/02/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
2-Chloronaphthalene	ND (1.3)	ND (1.3)	ND (1.1)	ND (1.3)
2-Methylnaphthalene	ND (0.83)	ND (0.82)	ND (1.35)	ND (0.82)
Acenaphthene	ND (1.1)	ND (1.1)	ND (1.33)	ND (1.1)
Acenaphthylene	ND (0.78)	ND (0.77)	ND (1.75)	ND (0.77)
Anthracene	ND (1)	ND (1)	ND (1.38)	ND (1)
Benzo(a)anthracene	ND (0.84)	ND (0.84)	ND (1.32)	ND (0.84)
Benzo(a)pyrene	ND (0.31)	ND (0.31)	ND (1.17)	ND (0.31)
Benzo(b)fluoranthene	ND (0.86)	ND (0.86)	ND (0.76)	ND (0.86)
Benzo(g,h,i)perylene	ND (0.41)	ND (0.4)	ND (1.47)	ND (0.4)
Benzo(k)fluoranthene	ND (0.74)	ND (0.73)	ND (0.17)	ND (0.73)
Chrysene	ND (0.89)	ND (0.88)	ND (0.63)	ND (0.88)
Dibenzo(a,h)anthracene	ND (0.29)	ND (0.29)	ND (2.23)	ND (0.29)
Fluoranthene	ND (0.76)	ND (0.75)	ND (1.02)	ND (0.75)
Fluorene	ND (1.6)	ND (1.6)	ND (1.64)	ND (1.6)
Indeno(1,2,3-cd)pyrene	ND (0.3)	ND (0.3)	ND (0.89)	ND (0.3)
Naphthalene	ND (0.79)	ND (0.78)	ND (1.08)	ND (0.78)
Phenanthrene	ND (1.2)	ND (1.2)	ND (1.52)	ND (1.2)
Pyrene	ND (0.88)	ND (0.87)	ND (1.05)	ND (0.87)
TIC's:	0	0	5	0
Total TIC Concentration:	0	0	30.63	0

SAS: Sound Analytical Services, Inc., Tacoma, WA.

NPD: North Pacific Division Laboratory, Troutdale, OR.

TIC: Tentatively Identified Compounds.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 5
 Landfill Wells, Ft. Richardson
 Polynuclear Aromatic Hydrocarbons
 Method 8270
 June/July, 1996

FTR 0027043

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	NPD	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	96-77	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/28/96	06/29/96
DATE TESTED:	07/02/96	07/02/96	07/02/96	07/11/96	07/02/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
2-Chloronaphthalene	ND (1.3)	ND (1.3)	ND (1.2)	ND (1.1)	ND (1.3)
2-Methylnaphthalene	ND (0.82)	ND (0.81)	ND (0.8)	ND (1.35)	ND (0.84)
Acenaphthene	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.33)	ND (1.1)
Acenaphthylene	ND (0.77)	ND (0.76)	ND (0.75)	ND (1.75)	ND (0.79)
Anthracene	ND (1)	ND (0.99)	ND (0.98)	ND (1.38)	ND (1)
Benzo(a)anthracene	ND (0.84)	ND (0.82)	ND (0.81)	ND (1.32)	ND (0.85)
Benzo(a)pyrene	ND (0.31)	ND (0.3)	ND (0.3)	ND (1.17)	ND (0.32)
Benzo(b)fluoranthene	ND (0.86)	ND (0.84)	ND (0.83)	ND (0.76)	ND (0.87)
Benzo(g,h,i)perylene	ND (0.4)	ND (0.39)	ND (0.39)	ND (1.47)	ND (0.41)
Benzo(k)fluoranthene	ND (0.73)	ND (0.72)	ND (0.71)	ND (0.17)	ND (0.75)
Chrysene	ND (0.88)	ND (0.86)	ND (0.85)	ND (0.63)	ND (0.89)
Dibenzo(a,h)anthracene	ND (0.29)	ND (0.28)	ND (0.28)	ND (2.23)	ND (0.29)
Fluoranthene	ND (0.75)	ND (0.74)	ND (0.73)	ND (1.02)	ND (0.77)
Fluorene	ND (1.6)	ND (1.5)	ND (1.5)	ND (1.64)	ND (1.6)
Indeno(1,2,3-cd)pyrene	ND (0.3)	ND (0.29)	ND (0.29)	ND (0.89)	ND (0.31)
Naphthalene	ND (0.78)	ND (0.77)	ND (0.76)	ND (1.08)	ND (0.8)
Phenanthrene	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.52)	ND (1.2)
Pyrene	ND (0.87)	ND (0.85)	ND (0.84)	ND (1.05)	ND (0.88)
TIC's:	0	0	0	6	0
Total TIC Concentration:	0	0	0	38.88	0

SAS: Sound Analytical Services, Inc., Tacoma, WA.

NPD: North Pacific Division Laboratory, Troutdale, OR.

TIC: Tentatively Identified Compounds.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 6
Landfill Wells, Ft. Richardson
Method 8150A
Chlorinated Herbicides
June/July, 1996

FTR 0027044

Page 1 of 3

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57880-05
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/06/96
DATE TESTED:	06/27/96	07/10/96	06/27/96	06/27/96	07/10/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
2,4,5-T	ND (0.028)	ND (0.028)	ND (0.027)	ND (0.028)	ND (0.027)
2,4,5-TP (Silvex)	ND (0.034)	ND (0.034)	ND (0.033)	ND (0.034)	ND (0.033)
2,4-D	ND (0.022)	ND (0.021)	ND (0.021)	ND (0.021)	ND (0.021)
2,4-DB	ND (0.03)	ND (0.03)	ND (0.029)	ND (0.03)	ND (0.029)
Dalapon	ND (0.052)	ND (0.051)	ND (0.05)	ND (0.051)	ND (0.051)
Dicamba	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.016)
Dichlorprop	ND (0.027)	ND (0.027)	ND (0.026)	ND (0.027)	ND (0.026)
Dinoseb	ND (0.037)	ND (0.037)	ND (0.036)	ND (0.037)	ND (0.036)
MCPA	ND (0.038)	ND (0.038)	ND (0.037)	ND (0.038)	ND (0.037)
MCPP	ND (0.034)	ND (0.034)	ND (0.033)	ND (0.034)	ND (0.033)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

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

Table 6
 Landfill Wells, Ft. Richardson
 Method 8150A
 Chlorinated Herbicides
 June/July, 1996

FTR 0027045

Page 2 of 3

			QC Dup	QA Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	009379-03
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	07/03/96	07/10/96	07/10/96	07/11/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
2,4,5-T	ND (0.028)	ND (0.028)	ND (0.027)	ND (0.068)
2,4,5-TP (Silvex)	ND (0.034)	ND (0.034)	ND (0.033)	ND (0.064)
2,4-D	ND (0.021)	ND (0.021)	ND (0.021)	ND (0.063)
2,4-DB	ND (0.03)	ND (0.03)	ND (0.029)	ND (0.058)
Dalapon	ND (0.051)	ND (0.051)	ND (0.051)	ND (0.066)
Dicamba	ND (0.016)	ND (0.016)	ND (0.016)	ND (0.059)
Dichlorprop	ND (0.027)	ND (0.027)	ND (0.026)	ND (0.071)
Dinoseb	ND (0.037)	ND (0.037)	ND (0.036)	ND (0.059)
MCPA	ND (0.038)	ND (0.038)	ND (0.037)	ND (35.1)
MCPB	ND (0.034)	ND (0.034)	ND (0.033)	ND (33.0)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

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

Table 6
 Landfill Wells, Ft. Richardson
 Method 8150A
 Chlorinated Herbicides
 June/July, 1996

FTR 0027046

Page 3 of 3

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/29/96	06/29/96
DATE TESTED:	07/03/96	07/03/96	07/03/96	07/09/96	07/03/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
2,4,5-T	ND (0.027)	ND (0.028)	ND (0.028)	ND (0.068)	ND (0.028)
2,4,5-TP (Silvex)	ND (0.033)	ND (0.034)	ND (0.034)	ND (0.064)	ND (0.034)
2,4-D	ND (0.021)	ND (0.022)	ND (0.021)	ND (0.063)	ND (0.022)
2,4-DB	ND (0.029)	ND (0.03)	ND (0.03)	ND (0.058)	ND (0.03)
Dalapon	ND (0.051)	ND (0.052)	ND (0.051)	ND (0.066)	ND (0.052)
Dicamba	ND (0.016)	ND (0.017)	ND (0.016)	ND (0.059)	ND (0.017)
Dichlorprop	ND (0.026)	ND (0.027)	ND (0.027)	ND (0.071)	ND (0.027)
Dinoseb	ND (0.036)	ND (0.038)	ND (0.037)	ND (0.059)	ND (0.038)
MCPA	ND (0.037)	ND (0.039)	ND (0.038)	ND (35.1)	ND (0.039)
MCPP	ND (0.033)	ND (0.034)	ND (0.034)	ND (33.0)	ND (0.034)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

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

Table 7
Landfill Wells, Ft. Richardson
Method 8140/8141
Organophosphorus Pesticides
June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57880-05
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/06/96
DATE TESTED:	07/09/96	07/09/96	06/26/96	07/09/96	07/09/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Azinphos methyl	ND (0.099)	ND (0.1)	ND (0.1)	ND (0.099)	ND (0.1)
Bolstar (Sulprofos)	ND (0.059)	ND (0.061)	ND (0.061)	ND (0.059)	ND (0.06)
Chlorpyrifos	ND (0.069)	ND (0.071)	ND (0.071)	ND (0.069)	ND (0.07)
Coumaphos	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)
Demeton, -O and -S	ND (0.079)	ND (0.081)	ND (0.081)	ND (0.079)	ND (0.08)
Diazinon	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)
Dichlorovos	ND (0.089)	ND (0.091)	ND (0.091)	ND (0.089)	ND (0.09)
Dimethoate	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)
Disulfoton	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
EPN	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Ethoprop	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)
Fensulfothion	ND (0.059)	ND (0.061)	ND (0.061)	ND (0.059)	ND (0.06)
Fenthion	ND (0.069)	ND (0.071)	ND (0.071)	ND (0.069)	ND (0.07)
Malathion	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
Merphos	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)
Mevinphos	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Monocrotophos	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Naled	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)
Parathion ethyl	ND (0.11)	ND (0.051)	ND (0.11)	ND (0.11)	ND (0.05)
Parathion methyl	ND (0.05)	ND (0.11)	ND (0.051)	ND (0.05)	ND (0.11)
Phorate	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Ronnel	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Sulfotep	ND (0.05)	ND (0.051)	ND (0.051)	ND (0.05)	ND (0.05)
Tetrachlorvinphos (Stirophos)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)
Tetraethyl pyrophosphate	ND (0.079)	ND (0.081)	ND (0.081)	ND (0.079)	ND (0.08)
Tokuthion (Prothiofos)	ND (0.069)	ND (0.071)	ND (0.071)	ND (0.069)	ND (0.07)
Trichloronate	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 7
 Landfill Wells, Ft. Richardson
 Method 8140/8141
 Organophosphorus Pesticides
 June/July, 1996

FTR 0027048

Page 2 of 3

			QC Dup	QA Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	009379-03
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	07/09/96	07/09/96	07/09/96	07/30/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Azinphos methyl	ND (1)	ND (0.11)	ND (0.11)	ND (1.6)
Bolstar (Sulprofos)	ND (0.61)	ND (0.063)	ND (0.063)	ND (0.23)
Chlorpyrifos	ND (0.71)	ND (0.074)	ND (0.074)	ND (0.18)
Coumaphos	ND (1.3)	ND (0.14)	ND (0.14)	ND (0.24)
Demeton, -O and -S	ND (0.82)	ND (0.084)	ND (0.084)	ND (1.72)
Diazinon	ND (1.4)	ND (0.15)	ND (0.15)	ND (0.31)
Dichlorovos	ND (0.92)	ND (0.095)	ND (0.095)	ND (0.31)
Dimethoate	ND (1.4)	ND (0.15)	ND (0.15)	NT
Disulfoton	ND (0.41)	ND (0.042)	ND (0.042)	ND (0.25)
EPN	ND (0.41)	ND (0.042)	ND (0.042)	NT
Ethoprop	ND (1.3)	ND (0.14)	ND (0.14)	ND (0.24)
Fensulfothion	ND (0.61)	ND (0.063)	ND (0.063)	ND (1.6)
Fenthion	ND (0.71)	ND (0.074)	ND (0.074)	ND (0.25)
Malathion	ND (1.1)	ND (0.12)	ND (0.12)	NT
Merphos	ND (1.7)	ND (0.18)	ND (0.18)	ND (0.32)
Mevinphos	ND (1.5)	ND (0.16)	ND (0.16)	ND (1.5)
Monocrotophos	ND (2)	ND (0.21)	ND (0.21)	NT
Naled	ND (1.7)	ND (0.18)	ND (0.18)	ND (1.5)
Parathion ethyl	ND (0.51)	ND (0.053)	ND (0.053)	NT
Parathion methyl	ND (1.1)	ND (0.12)	ND (0.12)	ND (0.21)
Phorate	ND (0.41)	ND (0.042)	ND (0.042)	ND (0.2)
Ronnel	ND (0.41)	ND (0.042)	ND (0.042)	ND (0.22)
Sulfotep	ND (0.51)	ND (0.053)	ND (0.053)	NT
Tetrachlorvinphos (Stirophos)	ND (1.4)	ND (0.15)	ND (0.15)	ND (0.3)
Tetraethyl pyrophosphate	ND (0.82)	ND (0.084)	ND (0.084)	NT
Tokuthion (Prothiofos)	ND (0.71)	ND (0.074)	ND (0.074)	ND (0.29)
Trichloronate	ND (1.6)	ND (0.17)	ND (0.17)	ND (1.0)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 7
 Landfill Wells, Ft. Richardson
 Method 8140/8141
 Organophosphorus Pesticides
 June/July, 1996

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/26/96	07/29/96
DATE TESTED:	07/09/96	07/09/96	07/09/96	07/17/96	07/09/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Azinphos methyl	ND (1)	ND (1)	ND (1)	ND (1.6)	ND (1)
Bolstar (Sulprofos)	ND (0.6)	ND (0.61)	ND (0.6)	ND (0.23)	ND (0.63)
Chlorpyrifos	ND (0.7)	ND (0.71)	ND (0.7)	ND (0.18)	ND (0.73)
Coumaphos	ND (1.3)	ND (1.3)	ND (1.3)	ND (0.24)	ND (1.4)
Demeton, -O and -S	ND (0.8)	ND (0.81)	ND (0.8)	ND (1.72)	ND (0.83)
Diazinon	ND (1.4)	ND (1.4)	ND (1.4)	ND (0.31)	ND (1.5)
Dichlorovos	ND (0.9)	ND (0.91)	ND (0.9)	ND (0.31)	ND (0.94)
Dimethoate	ND (1.4)	ND (1.4)	ND (1.4)	NT	ND (1.5)
Disulfoton	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.25)	ND (0.42)
EPN	ND (0.4)	ND (0.4)	ND (0.4)	NT	ND (0.42)
Ethoprop	ND (1.3)	ND (1.3)	ND (1.3)	ND (0.24)	ND (1.4)
Fensulfothion	ND (0.6)	ND (0.61)	ND (0.6)	ND (1.6)	ND (0.63)
Fenthion	ND (0.7)	ND (0.71)	ND (0.7)	ND (0.25)	ND (0.73)
Malathion	ND (1.1)	ND (1.1)	ND (1.1)	NT	ND (1.1)
Merphos	ND (1.7)	ND (1.7)	ND (1.7)	ND (0.32)	ND (1.8)
Mevinphos	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.6)
Monocrotophos	ND (2)	ND (2)	ND (2)	NT	ND (2.1)
Naled	ND (1.7)	ND (1.7)	ND (1.7)	ND (1.5)	ND (1.8)
Parathion ethyl	ND (0.5)	ND (0.51)	ND (0.5)	NT	ND (0.52)
Parathion methyl	ND (1.1)	ND (1.1)	ND (1.1)	ND (0.21)	ND (1.1)
Phorate	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.2)	ND (0.42)
Ronnel	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.22)	ND (0.42)
Sulfotep	ND (0.5)	ND (0.51)	ND (0.5)	NT	ND (0.52)
Tetrachlorvinphos (Stirophos)	ND (1.4)	ND (1.4)	ND (1.4)	ND (0.3)	ND (1.5)
Tetraethyl pyrophosphate	ND (0.8)	ND (0.81)	ND (0.8)	NT	ND (0.83)
Tokuthion (Prothiofos)	ND (0.7)	ND (0.71)	ND (0.7)	ND (0.29)	ND (0.73)
Trichloronate	ND (1.6)	ND (1.6)	ND (1.6)	ND (1.0)	ND (1.7)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 8
 Landfill Wells, Ft. Richardson
 Method 8080
 PCB'S & PESTICIDES
 June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	07/05/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	58009-01
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/12/96
DATE TESTED:	06/28/96	07/13/96	06/28/96	06/28/96	07/22/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
4,4'-DDD	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
4,4'-DDE	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
4,4'-DDT	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Aldrin	ND (0.0052)	ND (0.005)	ND (0.0051)	ND (0.0051)	ND (0.0051)
alpha-BHC	ND (0.0052)	ND (0.005)	ND (0.0051)	ND (0.0051)	ND (0.0051)
beta-BHC	ND (0.0052)	ND (0.005)	ND (0.0051)	ND (0.0051)	ND (0.0051)
Chlordane	ND (0.052)	ND (0.02)	ND (0.051)	ND (0.051)	ND (0.02)
delta-BHC	ND (0.0052)	ND (0.005)	ND (0.0051)	ND (0.0051)	ND (0.0051)
Dieldrin	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan I	ND (0.0052)	ND (0.005)	ND (0.0051)	ND (0.0051)	ND (0.0051)
Endosulfan II	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endosulfan sulfate	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endrin	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endrin aldehyde	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Endrin ketone	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
gamma-BHC (Lindane)	ND (0.0052)	ND (0.005)	ND (0.0051)	ND (0.0051)	ND (0.0051)
Heptachlor	ND (0.0021)	ND (0.005)	ND (0.002)	ND (0.002)	ND (0.0051)
Heptachlor epoxide	ND (0.0021)	ND (0.005)	ND (0.002)	ND (0.002)	ND (0.0051)
Methoxychlor	ND (0.052)	ND (0.05)	ND (0.051)	ND (0.051)	ND (0.051)
PCB-1016	ND (0.33)	ND (0.32)	ND (0.32)	ND (0.33)	ND (0.32)
PCB-1221	ND (0.41)	ND (0.39)	ND (0.39)	ND (0.4)	ND (0.39)
PCB-1232	ND (0.2)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
PCB-1242	ND (0.24)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)
PCB-1248	ND (0.52)	ND (0.5)	ND (0.51)	ND (0.51)	ND (0.51)
PCB-1254	ND (0.2)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
PCB-1260	ND (0.41)	ND (0.39)	ND (0.39)	ND (0.4)	ND (0.39)
Toxaphene	ND (0.99)	ND (0.95)	ND (0.96)	ND (0.97)	ND (0.96)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 8
 Landfill Wells, Ft. Richardson
 Method 8080
 PCB'S & PESTICIDES
 June/July, 1996

	AP-3221	AP-3222	QC Dup AP-3222	QA Dup AP-3222
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	009379-03
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	07/03/96	07/13/96	07/13/96	07/12/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
4,4'-DDD	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
4,4'-DDE	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
4,4'-DDT	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
Aldrin	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.008)
alpha-BHC	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.009)
beta-BHC	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.009)
Chlordane	ND (0.019)	ND (0.02)	ND (0.021)	ND (0.017)
delta-BHC	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.009)
Dieldrin	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
Endosulfan I	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.009)
Endosulfan II	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
Endosulfan sulfate	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.009)
Endrin	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
Endrin aldehyde	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.009)
Endrin ketone	ND (0.0094)	ND (0.01)	ND (0.01)	ND (0.008)
gamma-BHC (Lindane)	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.008)
Heptachlor	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.001)
Heptachlor epoxide	ND (0.0047)	ND (0.0051)	ND (0.0052)	ND (0.008)
Methoxychlor	ND (0.047)	ND (0.051)	ND (0.052)	ND (0.009)
PCB-1016	ND (0.3)	ND (0.32)	ND (0.33)	ND (0.17)
PCB-1221	ND (0.37)	ND (0.39)	ND (0.4)	ND (0.33)
PCB-1232	ND (0.18)	ND (0.19)	ND (0.2)	ND (0.16)
PCB-1242	ND (0.22)	ND (0.23)	ND (0.24)	ND (0.16)
PCB-1248	ND (0.47)	ND (0.51)	ND (0.52)	ND (0.17)
PCB-1254	ND (0.18)	ND (0.19)	ND (0.2)	ND (0.17)
PCB-1260	ND (0.37)	ND (0.39)	ND (0.4)	ND (0.17)
Toxaphene	ND (0.9)	ND (0.96)	ND (0.98)	ND (0.17)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 8
 Landfill Wells, Ft. Richardson
 Method 8080
 PCB'S & PESTICIDES
 June/July, 1996

FTR 0027052

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/29/96	06/29/96
DATE TESTED:	07/03/96	07/03/96	07/03/96	07/12/96	07/03/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
4,4'-DDD	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
4,4'-DDE	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
4,4'-DDT	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
Aldrin	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.008)	ND (0.0048)
alpha-BHC	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.009)	ND (0.0048)
beta-BHC	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.009)	ND (0.0048)
Chlordane	ND (0.019)	ND (0.019)	ND (0.02)	ND (0.017)	ND (0.019)
delta-BHC	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.009)	ND (0.0048)
Dieldrin	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
Endosulfan I	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.009)	ND (0.0048)
Endosulfan II	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
Endosulfan sulfate	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.009)	ND (0.0096)
Endrin	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
Endrin aldehyde	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.009)	ND (0.0096)
Endrin ketone	ND (0.0096)	ND (0.0094)	ND (0.0099)	ND (0.008)	ND (0.0096)
gamma-BHC (Lindane)	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.008)	ND (0.0048)
Heptachlor	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.001)	ND (0.0048)
Heptachlor epoxide	ND (0.0048)	ND (0.0047)	ND (0.005)	ND (0.008)	ND (0.0048)
Methoxychlor	ND (0.048)	ND (0.047)	ND (0.05)	ND (0.009)	ND (0.048)
PCB-1016	ND (0.31)	ND (0.3)	ND (0.32)	ND (0.17)	ND (0.31)
PCB-1221	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.33)	ND (0.38)
PCB-1232	ND (0.18)	ND (0.18)	ND (0.19)	ND (0.16)	ND (0.18)
PCB-1242	ND (0.22)	ND (0.22)	ND (0.23)	ND (0.16)	ND (0.22)
PCB-1248	ND (0.48)	ND (0.47)	ND (0.5)	ND (0.17)	ND (0.48)
PCB-1254	ND (0.18)	ND (0.18)	ND (0.19)	ND (0.17)	ND (0.18)
PCB-1260	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.17)	ND (0.38)
Toxaphene	ND (0.91)	ND (0.9)	ND (0.94)	ND (0.17)	ND (0.91)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 9
Landfill Wells, Ft. Richardson
23 Metals - Total
June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	07/05/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	58009-02
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/12/96
DATE TESTED:	07/05/96	7/18-19/96	07/05/96	07/05/96	07/19/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (100)	27	ND (100)	1000	1000
Antimony	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)
Arsenic	ND (0.8)	ND (0.8)	ND (0.8)	ND (0.8)	4.9
Barium	10	7.5	6.9	12	100
Beryllium	ND (3.3)	ND (0.66)	ND (3.3)	ND (3.3)	ND (0.66)
Cadmium	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Calcium	70000	58000	17000	60000	47000
Chromium	14	1.2	ND (8.7)	ND (8.7)	2.2
Cobalt	ND (3)	0.16	ND (3)	ND (3)	1.3
Copper	1.7	0.81	2.1	0.96	3.3
Iron	280	ND (100)	ND (100)	370	2000
Lead	1.8	0.27	ND (0.27)	1.1	1.7
Magnesium	25000	8800	5600	8800	29000
Manganese	14	3.3	7.4	8.1	120
Mercury	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)
Nickel	16	1.3	1.3	4.2	4.2
Potassium	1800	1200	1100	2300	2900
Selenium	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	7.4
Silver	ND (0.3)	ND (0.3)	0.41	ND (0.3)	ND (0.3)
Sodium	3200	2900	2900	2900	17000
Thallium	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
Vanadium	0.57	0.49	ND (0.21)	0.66	3.1
Zinc	4.2	2.8	ND (3)	5	7.3

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 9
Landfill Wells, Ft. Richardson
23 Metals - Total
June/July, 1996

			QC Dup	QA Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA
TESTING LABORATORY:	SAS	SAS	SAS	NPD
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	96-84
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	06/28/96
DATE TESTED:	07/05/96	7/18-19/96	7/18-19/96	7/20-23/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Aluminum	260	ND (4)	ND (4)	41.7 J
Antimony	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.7)
Arsenic	ND (0.8)	ND (0.8)	ND (0.8)	ND (1.0)
Barium	39	6.6	11	6.7
Beryllium	ND (3.3)	ND (0.66)	ND (0.66)	ND (0.7)
Cadmium	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.7)
Calcium	110000	59000	59000	58000.0
Chromium	18	0.94	0.99	ND (1.6)
Cobalt	ND (3)	ND (0.1)	ND (0.1)	ND (1.9)
Copper	2	ND (0.57)	ND (0.57)	ND (3.5)
Iron	470	ND (100)	ND (100)	13.2 J
Lead	0.59	ND (0.27)	ND (0.27)	ND (0.4)
Magnesium	20000	9700	9500	9200.0
Manganese	47	ND (0.2)	ND (0.2)	ND (5.0)
Mercury	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.09)
Nickel	29	1.1	1.1	ND (2.8)
Potassium	1800	ND (1000)	1200	ND (325.6)
Selenium	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.0)
Silver	ND (0.3)	ND (0.3)	ND (0.3)	ND (3.6)
Sodium	4500	2900	2800	3300.0
Thallium	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.5)
Vanadium	1.2	0.54	0.56	ND (3.5)
Zinc	ND (3)	ND (1.5)	1.7	ND (4.7)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

NPD: North Pacific Division Laboratory, Troutdale, OR.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 9
 Landfill Wells, Ft. Richardson
 23 Metals - Total
 June/July, 1996

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	NPD	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	96-77	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/28/96	06/29/96
DATE TESTED:	07/05/96	07/05/96	07/05/96	7/20-23/96	07/05/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (100)	ND (100)	ND (100)	130.0	330
Antimony	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.7)	ND (0.6)
Arsenic	ND (0.8)	ND (0.8)	ND (0.8)	ND (1.0)	ND (0.8)
Barium	5.7	7.8	7.6	7.8	13
Beryllium	ND (3.3)	ND (3.3)	ND (3.3)	ND (0.7)	ND (3.3)
Cadmium	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.7)	ND (0.2)
Calcium	54000	63000	63000	67000.0 E	52000
Chromium	ND (8.7)	ND (8.7)	ND (8.7)	12.0	11
Cobalt	ND (3)	ND (3)	ND (3)	ND (1.9)	ND (3)
Copper	ND (0.57)	0.59	ND (0.57)	ND (3.5)	2.1
Iron	ND (100)	ND (100)	ND (100)	210.0	730
Lead	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.4)	1.1
Magnesium	7700	8700	8600	9200.0 E	10000
Manganese	ND (0.2)	8.6	6.7	10.0	28
Mercury	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.09)	ND (0.17)
Nickel	1.6	6.2	5.9	ND (2.8)	14
Potassium	ND (1000)	1600	1900	ND (325.6)	1900
Selenium	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.0)	ND (1.5)
Silver	ND (0.3)	ND (0.3)	ND (0.3)	ND (3.6)	ND (0.3)
Sodium	2700	2800	2700	3100.0	1800
Thallium	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.5)	ND (0.16)
Vanadium	0.47	0.55	0.56	ND (3.5)	1.4
Zinc	ND (3)	ND (3)	ND (3)	ND (4.7)	55

SAS: Sound Analytical Services, Inc., Tacoma, WA.

NPD: North Pacific Division Laboratory, Troutdale, OR.

E: Sample > 4X spike concentration.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 10
Landfill Wells, Ft. Richardson
23 Metals - Dissolved
June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	07/05/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	58009-02
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/12/96
DATE TESTED:	07/05/96	07/18/96	07/05/96	07/05/96	07/18/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (100)	ND (4)	ND (100)	ND (100)	ND (4)
Antimony	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.6)
Arsenic	ND (0.8)	ND (0.8)	ND (0.8)	ND (0.8)	4
Barium	28	6.7	7.1	27	88
Beryllium	ND (3.3)	ND (0.66)	ND (3.3)	ND (3.3)	ND (0.66)
Cadmium	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Calcium	72000	59000	18000	62000	44000
Chromium	ND (8.7)	1.5	ND (8.7)	ND (8.7)	1
Cobalt	ND (3)	ND (0.1)	ND (3)	ND (3)	0.49
Copper	0.88	0.73	2.2	0.75	0.77
Iron	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
Lead	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
Magnesium	25000	8900	5900	8900	28000
Manganese	12	ND (0.2)	6.7	0.56	87
Mercury	ND (0.17)	0.19	ND (0.17)	ND (0.17)	ND (0.17)
Nickel	11	1.2	1.3	2.9	2.1
Potassium	1900	ND (1000)	2000	1500	2100
Selenium	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.5)	5.4
Silver	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Sodium	3400	3100	3100	3100	18000
Thallium	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
Vanadium	1.1	0.6	ND (0.21)	0.85	0.48
Zinc	8.5	3.1	3.8	7.7	2.4

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 10
 Landfill Wells, Ft. Richardson
 23 Metals - Dissolved
 June/July, 1996

			QC Dup	QA Dup
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	15WA	14WA
TESTING LABORATORY:	SAS	SAS	SAS	NPD
LABORATORY SAMPLE #:	57766-01	57880-07	57880-08	96-85
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	06/28/96
DATE TESTED:	07/05/96	07/18/96	07/18/96	7/19-23/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (100)	ND (4)	ND (4)	43.8 J
Antimony	ND (0.6)	ND (0.6)	ND (0.6)	ND (0.7)
Arsenic	ND (0.8)	ND (0.8)	ND (0.8)	ND (1.0)
Barium	56	6.6	6.6	6.7
Beryllium	ND (3.3)	ND (0.66)	ND (0.66)	ND (0.7)
Cadmium	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.7)
Calcium	110000	59000	60000	58000.0
Chromium	ND (8.7)	1.6	1.5	ND (1.6)
Cobalt	ND (3)	ND (0.1)	ND (0.1)	ND (1.9)
Copper	ND (0.57)	ND (0.57)	ND (0.57)	ND (3.5)
Iron	ND (100)	ND (100)	ND (100)	32.0
Lead	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.4)
Magnesium	21000	9600	9800	9300.0
Manganese	7.4	ND (0.2)	ND (0.2)	ND (5.0)
Mercury	ND (0.17)	0.17	ND (0.17)	ND (0.09)
Nickel	8.7	1	1	ND (2.8)
Potassium	2200	1100	ND (1000)	1300.0
Selenium	ND (1.5)	ND (1.5)	ND (1.5)	ND (1.0)
Silver	ND (0.3)	ND (0.3)	ND (0.3)	ND (3.6)
Sodium	5600	3100	3200	3200.0
Thallium	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.5)
Vanadium	1.1	0.73	0.73	ND (3.5)
Zinc	8.9	1.7	1.9	ND (4.7)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

NPD: North Pacific Division Laboratory, Troutdale, OR.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 10
Landfill Wells, Ft. Richardson
23 Metals - Dissolved
June/July, 1996

FTR 0027058

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	NPD	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	96-78	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/28/96	06/29/96
DATE TESTED:	07/05/96	07/05/96	07/05/96	7/19-23/96	07/05/96
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (100)	ND (100)	ND (100)	ND (50.0)	ND (100)
Antimony	ND (0.6)	ND (0.6)	ND (0.6)	ND (5.0)	0.88
Arsenic	ND (0.8)	ND (0.8)	ND (0.8)	ND (5.0)	ND (0.8)
Barium	24	7.6	7.6	6.9	56
Beryllium	ND (3.3)	ND (3.3)	ND (3.3)	ND (5.0)	ND (3.3)
Cadmium	ND (0.2)	ND (0.2)	ND (0.2)	ND (5.0)	ND (0.2)
Calcium	57000	66000	65000	69000.0	55000
Chromium	ND (8.7)	ND (8.7)	ND (8.7)	ND (10.0)	ND (8.7)
Cobalt	ND (3)	ND (3)	ND (3)	ND (10.0)	ND (3)
Copper	1.5	ND (0.57)	ND (0.57)	ND (10.0)	0.64
Iron	ND (100)	ND (100)	ND (100)	ND (20.0)	ND (100)
Lead	ND (0.27)	ND (0.27)	ND (0.27)	ND (2.0)	ND (0.27)
Magnesium	8600	9100	8900	9300.0	10000
Manganese	0.74	1.5	1.6	ND (5.0)	2.1
Mercury	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.2)	ND (0.17)
Nickel	2.6	4.5	4.6	ND (10.0)	5.4
Potassium	1100	1400	1600	ND (1000.0)	1400
Selenium	ND (1.5)	ND (1.5)	ND (1.5)	ND (5.0)	ND (1.5)
Silver	ND (0.3)	ND (0.3)	ND (0.3)	ND (5.0)	ND (0.3)
Sodium	3600	2900	2900	3300.0	2300
Thallium	ND (0.16)	ND (0.16)	ND (0.16)	ND (5.0)	ND (0.16)
Vanadium	0.66	0.81	0.86	ND (10.0)	0.63
Zinc	20	ND (3)	ND (3)	ND (10.0)	25

SAS: Sound Analytical Services, Inc., Tacoma, WA.

NPD: North Pacific Division Laboratory, Troutdale, OR.

J: Estimated Value.

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 11
Landfill Wells, Ft. Richardson
Parameters
June/July, 1996

LOCATION OF SAMPLE:	AP-3010	AP-3013	AP-3014	AP-3015	AP-3220
DATE OF SAMPLE:	06/20/96	07/01/96	06/19/96	06/19/96	07/01/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	03WA	11WA	01WA	02WA	04WA
TESTING LABORATORY:	SAS	SAS	SAS	SAS	SAS
LABORATORY SAMPLE #:	57588-03	57880-06	57588-01	57588-02	57880-01
DATE RECEIVED:	06/24/96	07/06/96	06/24/96	06/24/96	07/06/96
DATE TESTED:	6/28-7/18/96	7/10-7/19/96	6/28-7/18/96	6/28-7/18/96	7/10-7/19/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity	280	140	62	160	210
Chloride	1	9	2	12	6
Chemical Oxygen Demand	ND (5)	ND (5)	ND (5)	ND (5)	43
Cyanide	ND (0.04)	ND (0.04)	0.10	0.16	ND (0.04)
Langliers Index	0.4 J	0.039 J	-1.6 J	0.13 J	0.25 J
MBAS	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Nitrogen, Ammonia (as N)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)
Nitrogen, Kjeldahl, Total	ND (0.2)	0.2	ND (0.2)	ND (0.2)	1.4
Nitrogen, Nitrate-Nitrite	0.36	0.87	0.13	1.4	0.98
Sulfate	16	21	11	22	20
Fecal Coliform	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Total Organic Carbon	1.1	0.7	1.3	0.67	12
Total Dissolved Solids	290	220 J	940	240	290 J
Turbidity (NTU)	7.2	2.54	0.59	11.6	140

SAS: Sound Analytical Services, Inc., Tacoma, WA.

J: Estimated Value.

MBAS: Methylene Blue Active Substances

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 11
Landfill Wells, Ft. Richardson
Parameters
June/July, 1996

	AP-3221	AP-3222	QA Dup AP-3222	QC Dup AP-3222
LOCATION OF SAMPLE:	AP-3221	AP-3222	AP-3222	AP-3222
DATE OF SAMPLE:	06/24/96	07/02/96	07/02/96	07/02/96
TYPE OF SAMPLE:	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	05WA	12WA	14WA	15WA
TESTING LABORATORY:	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-01	57880-07	009379-03	57880-08
DATE RECEIVED:	06/29/96	07/06/96	07/06/96	07/06/96
DATE TESTED:	7/2-7/15/96	7/10-7/19/96	7/8-7/16/96	7/10-7/19/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
Alkalinity	350	150	161.0	150
Chloride	3	8	8.2	8
Chemical Oxygen Demand	ND (5)	ND (5)	ND (5.0)	ND (5)
Cyanide	ND (0.04)	ND (0.04)	ND (0.01)	ND (0.04)
Langliers Index	0.49 J	-0.038 J	0.23 J	0.024 J
MBAS	ND (0.1)	ND (0.1)	ND (0.025)	0.11
Nitrogen, Ammonia (as N)	ND (0.04)	ND (0.04)	ND (0.03)	ND (0.04)
Nitrogen , Kjeldahl, Total	0.2	ND (0.2)	ND (0.1)	0.2
Nitrogen, Nitrate-Nitrite	0.5	0.87	0.88	0.84
Sulfate	16	19	17.4	18
Fecal Coliform	ND (1.0)	ND (1.0)	ND (2.0)	ND (1.0)
Total Organic Carbon	0.74	0.6	ND (1.0)	0.66
Total Dissolved Solids	430 J	240	232.0	230
Turbidity (NTU)	44	ND (0.2)	0.06 J	ND (0.2)

SAS: Sound Analytical Services, Inc., Tacoma, WA.

J: Estimated Value.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

MBAS: Methylene Blue Active Substances

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

Table 11
Landfill Wells, Ft. Richardson
Parameters
June/July, 1996

	FR-1	FR-2	QC Dup FR-2	QA Dup FR-2	FR-3
LOCATION OF SAMPLE:	FR-1	FR-2	FR-2	FR-2	FR-3
DATE OF SAMPLE:	06/25/96	06/26/96	06/26/96	06/26/96	06/25/96
TYPE OF SAMPLE:	Water	Water	Water	Water	Water
FIELD SAMPLE #: 96LFFR-	06WA	07WA	09WA	10WA	08WA
TESTING LABORATORY:	SAS	SAS	SAS	ARDL	SAS
LABORATORY SAMPLE #:	57766-02	57766-06	57766-07	009374-01	57766-03
DATE RECEIVED:	06/29/96	06/29/96	06/29/96	06/29/96	06/29/96
DATE TESTED:	7/2-7/15/96	7/2-7/15/96	7/2-7/15/96	7/1-7/18/96	7/2-7/15/96
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity	150	170	170	183.0	160
Chloride	8	9	9	8.7	3
Chemical Oxygen Demand	ND (5)	ND (5)	ND (5)	ND (5.0)	ND (5)
Cyanide	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.005)	ND (0.04)
Langliers Index	-0.48 J	-0.17 J	-0.18 J	0.068 J	0.22 J
MBAS	ND (0.10)	ND (0.10)	ND (0.10)	0.027 J	ND (0.10)
Nitrogen, Ammonia (as N)	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.03)	ND (0.04)
Nitrogen , Kjeldahl, Total	0.3	ND (0.2)	0.2	ND (0.1)	ND (0.2)
Nitrogen, Nitrate-Nitrite	1	1.1	1.1	1.1	0.5
Sulfate	19	19	19	17.1	12
Fecal Coliform	ND (1.00)	ND (1.00)	ND (1.00)	ND (1.0)	ND (2.00)
Total Organic Carbon	ND (0.5)	0.52	0.59	ND (1.0)	0.85
Total Dissolved Solids	240	280	270	255.0	230
Turbidity (NTU)	0.50	2.9	2.87	0.45 J	60.5

SAS: Sound Analytical Services, Inc., Tacoma, WA.

ARDL: Applied Research Development Laboratory, Mt. Vernon, IL.

J: Estimated Value.

MBAS: Methylene Blue Active Substances

ND: Not Detected. (The number in parentheses is the Method Detection Limit (MDL)).

APPENDIX C
Quality Assurance Report



DEPARTMENT OF THE ARMY
 NORTH PACIFIC DIVISION LABORATORY
 CORPS OF ENGINEERS
 1491 N.W. GRAHAM ROAD
 TROUTDALE, OREGON 97060-9508

REPLY TO
 ATTENTION OF:

CENPP-PE-L (1110-1-8100c)

11 Sep 96

MEMORANDUM FOR: Commander, Alaska District, ATTN: CENPA-EN-G (Thomas)

SUBJECT: W.O. 96-0258, Results of Chemical Analysis

Project: LANDFILL WELLS, FT. RICHARDSON

Intended Use: Site Evaluation

Submitted by: Alaska District

Date Sampled: 19 Jun through 10 Jul 96 Date Received: 20 Jun through 12 Jul 96

Reference: a) DD Form 448, MIPR No. E87-96-0093 dated 4 Jun 96

b) Primary report numbers 57588, 57766, 57880, and 58009 from Sound Analytical Services, Inc., and numbers 96-3123, 96-3230, 96-3351, 96-3477, 96-3494, and 96-3497 from Northern Testing Laboratories, Inc.

c) QA report numbers 9374, 9379, and 9387 from Applied Research & Development Laboratory, Inc., and numbers H-96-0694, H-96-0713, and H-96-0736 from North Pacific Division Laboratory (CENPP-PE-L)

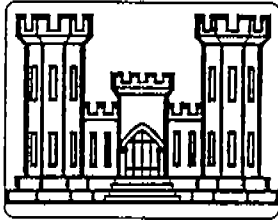
1. Enclosed is the original Chemical Quality Assurance Report, reports of QA data, and CENPP-PE-L sample cooler receipt forms, and copies of one telephone conversation record and one facsimile/verbal communication.
2. If you have any questions or comments concerning the Chemical Quality Assurance Report, please contact the author, Renee Chauvin, at (503) 669-0246 or Pamela Hertzberg at (503) 666-8143.
3. This completes all work requested for this project.

Enclosures

Timothy J. Seeman
 TIMOTHY J. SEEMAN
 Director

Copy Furnished: CEMRO-HX-C

MFR: Results for cyanide in eight samples, nitrate+nitrite in 12 samples, TDS in three samples, and Langelier's index for 12 samples are estimates. Low levels of chlorinated herbicides may not have been detected in five samples. Some minor primary/QA data discrepancies were noted. Complete copy in office file.



**U.S. Army Corps of Engineers
North Pacific Division Laboratory
Troutdale, Oregon**

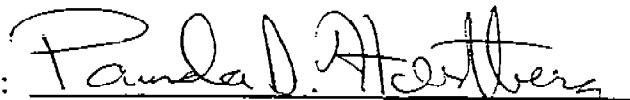
Chemical Quality Assurance Report

Landfill Wells, Ft. Richardson

NPDL Work Order Number: 96-0258

Prepared for: **Alaska District**

Approved by:



PAMELA D. HERTZBERG, Chief

Project Management and Data Evaluation Branch

CENPP-PE-L (96-0258)

11 Sep 96

CHEMICAL QUALITY ASSURANCE REPORT

LANDFILL WELLS, FT. RICHARDSON

1. SUMMARY:

1.1 The trip and rinsate blank results should be considered due to the use of contaminated water to prepare these samples. The data quality for turbidity, MBAS, and fecal coliform bacteria could not be evaluated because no quality control data was submitted. The requested methods of analysis were not used for nitrate+nitrite, chloride, and sulfate. The cyanide results for eight samples, nitrate+nitrite for all 12 samples, TDS for three samples and Langelier's index for all 12 samples should be considered estimates due to expired holding times. Based on low spike recoveries, low levels of Cl-Herb analytes may not have been detected, if present, in five samples.

1.2 The primary and quality assurance data comparisons are presented in Tables III and IV. All of the data agree except for potassium in Tables III and IV, which discrepancies could not be resolved; some VOC and metallic analytes which disagree because of differences in the laboratories' detection limits; turbidity in Table III; and MBAS in Table IV. Refer to section 8. for details.

2. **BACKGROUND:** The project samples were collected June 19, 20, 24 through 26, and July 1, 2, 5, 6, 9, and 10, 1996, and received by the analytical laboratories June 20, 21, 24 through 29, and July 2, 3, 5, 6, 10, 11, 12, and 15, 1996.

3. OBJECTIVES:

3.1 Twelve water samples (including two blind duplicate) were collected to determine the extent of the chemical contamination on the site. One rinsate blank and three trip blank samples were collected to assess field contamination during sampling and sample shipment.

3.2 Two quality assurance (QA) water samples, one rinsate blank and two trip blank samples were submitted to evaluate the primary laboratory's data.

4. PROJECT ORGANIZATION:

4.1 The project samples were collected by U.S. Army Corps of Engineers (USACE) North Pacific Division, Alaska District Office (CENPA).

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

- 4.2 The primary samples were analyzed by Sound Analytical Services, Inc. (SAS) Tacoma, Washington; and Northern Testing Laboratories, Inc. (NTL), Anchorage, Alaska.
- 4.3 The QA samples were analyzed by Applied Research & Development Laboratory, Inc. (ARDL), Mt. Vernon, Illinois; and USACE North Pacific Division Laboratory (CENPP-PE-L), Troutdale, Oregon.

5. ANALYTICAL REFERENCES:

Number	Title	Date
SW-846, Third Edition	Test Methods for Evaluating Solid Waste - Final Update II	1/95
GRO and DRO	State of Alaska Interim TPH Methods	2/92
EPA 600/4-79-020	Methods for the Chemical Analysis of Water and Wastes	3/83
EPA 600/4-91-010	Methods for the Determination of Metals in Environmental Samples	6/91
Standard Methods 19	Standard Methods for the Examination of Water and Wastewater, 19th Edition	1995

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

6. EVALUATION OF THE PRIMARY LABORATORIES' DATA:

6.1 Primary Laboratory Methods: The following is a listing of preparation and analytical methods used by the laboratory as reported in their data deliverable.

Primary Laboratory	Parameter	Preparation Method	Analytical Method
SAS	VOC	—	EPA 8260
	PAH	EPA 3510	EPA 8270
	Cl-Pest/PCB	EPA 3510	EPA 8080
	OP-Pest	EPA 6510	EPA 8141 Mod.
	Cl-Herb	method	EPA 8150 Mod.
	GRO	EPA 5030	ADEC 8015 Mod.
	DRO	EPA 3510	ADEC 8100 Mod.
	TRPH	method	EPA 418.1
	TOC		EPA 9060
	COD		EPA 410.1
	Cyanide		EPA 9010
	Ammonia		EPA 350.1
	TKN		EPA 351.2
	NO ₃ + NO ₂		EPA 300.0
	Chloride		EPA 300.0
	Sulfate		EPA 300.0
	Alkalinity		EPA 310.1
	Langelier's Index		--
	TDS		EPA 160.1
	Total Metals, ICP*	EPA 3005	EPA 6010
	Total Metals, ICP-MS**	EPA 3005	EPA 200.8
	Total Mercury	method	EPA 7470
Dissolved Metals, ICP*	none	EPA 6010	
Dissolved Metals, ICP-MS**	none	EPA 200.8	
Dissolved Mercury	method	EPA 7470	
NTL	Turbidity		EPA 180.1
	MBAS		EPA 425.1
	Fecal Coliforms		SM 9222D

*Ca, Fe, Mg, K, Na, and in some cases Al, Ba, Be, Cr -- = not reported

**As, Sb, Cd, Co, Cu, Pb, Mn, Ni, Se, Ag, Tl, V, Zn, and in some cases Al, Ba, Be, Cr

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

- 6.2 Chain of Custody Records and Sample Cooler Receipt Forms: All chain of custody (COC) records and sample shipping conditions, as documented on the sample cooler receipt (SCR) form, were evaluated according to EPA and USACE ER 1110-1-263 regulations and the following notations were made.

Two of three pages of the COC record for report 57766 did not include dates and times of sample collection. Changes and line-outs on the COC records of SAS reports 57880 and 58009 and NTL reports A145417, A145441, and A145499 were not initialed and dated. A discrepancy was noted in the collection dates shown on the COC record and some of the bottle labels for sample 96LFFR04WA (SAS report 58009), and other dating discrepancies were noted for NTL reports A145177 and A145533. The sample shipments for all four SAS reports contained multiple sample coolers, and the COC records for each shipment were placed together in one cooler rather than separated per cooler.

The temperatures of the 12 sample coolers associated with SAS reports 57766, 57880, and 58009 and the one cooler associated with NTL report A145309 ranged from -1.0 to +1.0 °C, all below the EPA recommended range of 4 ± 2 °C. There were no broken bottles noted.

- 6.3. Trip and Rinsate Blank Results: The primary trip blank and rinsate blank results are presented in Tables I-a, I-b, and II. The presence of numerous targeted analytes, some at similar or higher concentrations than were found in the field samples, prompted an inquiry into the source of the water used for preparation of the trip and rinsate blanks. It was determined that the water was filtered but not de-ionized and distilled, and the laboratory which supplied the water stated that at least one batch of this water had been found to be contaminated with metallic analytes. Refer to the telephone conversation record dated 28 Aug 96 detailing a conversation between CENPA and CENPP-PE-L personnel in regard to this water. Based on the available information about the quality of the water used for the trip and rinsate blank samples, the analytes reported in the trip and rinsate blanks of this project should be considered due to the use of contaminated water, and the results should not be used to evaluate the likelihood of cross-contamination during sampling, shipment, and storage. Furthermore, the data quality for these samples will not be evaluated in this chemical quality assurance report since the results are not useful.
- 6.4 Sample Holding Times, Reporting Limits, Laboratory Method Blanks, Accuracy and Precision: Sample holding times and detection/reporting limits were evaluated per EPA or Alaska Department of Environmental Conservation (ADEC) criteria. The laboratory method blanks were evaluated for the absence of targeted analytes. The extraction

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

efficiency, accuracy and precision of the data, as represented by surrogate, matrix spike (MS), matrix spike duplicate (MSD), blank spike (BS), and blank spike duplicate (BSD) recoveries and relative percent difference (RPD) results, were compared to EPA, ADEC, or laboratory established (LE) quality control (QC) acceptance limits for out of control results.

- 6.4.1 Volatile Organic Compounds (VOC): The presence of acetone reported in sample 96LFFR-03WA (SAS report 57588) and carbon disulfide in sample -04WA (report 57766) should be considered due to laboratory contamination since they are present in the samples at less than 10 times the concentrations reported in their respective method blanks. Carbon disulfide detected in the method blank of SAS report 57880 does not affect any sample results. Two out of five VOC BS/BSD RPD results (15% and 14%) were slightly above the EPA QC acceptance limits (13% for both) for SAS report 57588. The precision of the data is acceptable based on the remaining acceptable RPD results. Two out of ten BS/BSD recoveries (1,1-dichloroethane at 58% and 55.6%) were below the EPA acceptance limits (61-145%) for SAS report 57766. The accuracy of the analysis is acceptable based on the remaining acceptable spike recoveries.
- 6.4.2 Polynuclear Aromatic Hydrocarbons (PAH): One out of three PAH surrogate recoveries for sample 96LFFR04WA (SAS report 57880) was slightly below the EPA QC acceptance limits, noted by the laboratory as due to matrix interference. The PAH extraction efficiency for this sample is acceptable based on the remaining two acceptable surrogate recoveries. There were no further deficiencies noted in the PAH data and the data quality is acceptable.
- 6.4.3 Organochlorine Pesticides and PCB's (Cl-Pest/PCB): One out of 12 BS/BSD recoveries for SAS report 57588, one out of six RPD results for report 57588, and one out of six RPD results for report 57766 were above the QC acceptance limits. The accuracy and precision of the Cl-Pest/PCB analysis are acceptable based on the remaining acceptable recovery and RPD data.
- 6.4.4 Organophosphorus Pesticides (OP-Pest): There were no deficiencies noted in the OP-Pest data and the data quality is acceptable.
- 6.4.5 Chlorinated Herbicides (Cl-Herb): Three out of six BS/BSD recoveries for SAS report 57766 were below the QC acceptance limits, and two of the three RPD results were above the acceptance limits. The Cl-Herb analytes were reported as not detected (ND) for all samples, and the laboratory noted that there was insufficient sample volume available for re-analysis. Based on the low spike

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

recoveries, low levels of Cl-Herb analytes may not have been detected, if present, in the five associated samples: 96LFFR-05WA, -06WA, -07WA, -08WA, and -09WA. One out of three BS/BSD RPD results for report 57880 was above the QC acceptance limit. The precision of the Cl-Herb data for this report is acceptable based on the remaining acceptable blank spike and matrix spike RPD results.

- 6.4.6 Gasoline Range Organics (GRO), Diesel Range Organics (DRO), and Total Recoverable Petroleum Hydrocarbons (TRPH): There were no deficiencies noted in the data for GRO, DRO, or TRPH and the data quality for these analyses is acceptable.
- 6.4.7 Total Organic Carbon (TOC) and Chemical Oxygen Demand (COD): There were no deficiencies noted in the data for TOC or COD and the data quality for these analyses is acceptable.
- 6.4.8 Inorganics and Fecal Coliform Bacteria: The data quality for turbidity, methylene blue active substances (MBAS), and fecal coliform bacteria could not be evaluated because NTL did not submit any associated quality control data. The results for turbidity for samples 96LFFR-07WA and -09WA were reported incorrectly in the analytical report dated 11 Jul 96. The correct results are 2.9 and 2.87 NTU, respectively. Refer to facsimile/verbal communication record dated 10 Sep 96. SAS analyzed for nitrate+nitrite (NO_3+NO_2), chloride, and sulfate by EPA method 300.0 (IC) rather than using the requested bench methods 353.3, 325.1, and 375.4. The project-specified detection limits were not met for total Kjeldahl nitrogen (TKN), chloride, and sulfate, and low levels of TKN may not have been detected, if present, in samples with reported results of ND. There were no deficiencies noted in the data for alkalinity and the data quality is acceptable.

Holding times were exceeded in the following instances:

cyanide, exceeded by two to four days for samples 96LFFR-05WA, -06WA, -07WA, -08WA, -09WA, -11WA, -12WA, and -15WA

NO_3+NO_2 , exceeded by 7 to 19 days for all primary samples (-01WA, -02WA, -03WA, 04WA, -05WA, -06WA, -07WA, -08WA, -09WA, -11WA, -12WA, and -15WA)

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

total dissolved solids (TDS), exceeded by one day for samples -05WA, -04WA, and -11WA.

Also, the determination of pH, required for the calculation of Langelier's index, was evidently performed past the one-day holding time for all primary samples since the samples arrived at the laboratory from three to seven days after collection. The data for these analyses with expired holding times should be considered estimates.

The matrix spike recoveries for ammonia were below the QC acceptance limit for reports 57588 and 57766, apparently due to matrix interference since the BS recoveries were acceptable. The accuracy of the ammonia analysis is acceptable based on the acceptable BS recoveries.

- 6.4.9 Total Metals and Dissolved Metals: The project-specified detection limit for total and dissolved iron was not met, and low levels of iron may not have been detected, if present, in samples with reported results of ND. A discrepancy was noted in the sample duplicate data for dissolved mercury presented in reports 57880 and 58009. The original result for dissolved mercury in this sample, 96LFFR-15WA, was reported as ND, but the duplicate data showed the results of the original and duplicate analyses as 0.17 and 0.18 ppb, respectively. The reported RPD is incorrect as the RPD is, in fact, not calculable since one result is ND. This discrepancy does not affect evaluation of the precision of the dissolved mercury analysis since the duplicate result is within a factor of five of the detection limit (0.17 ppb).
- 6.5 Field Blind Duplicate Results: The field blind duplicate results are presented in Tables III and IV. All of the primary data agree.
- 6.6 Overall Evaluation of the Primary Laboratory's Data: Delinquencies were noted in the COC documentation. The analytes reported in the trip and rinsate blanks of this project should be considered due to the use of contaminated water to prepare these samples, and the results should not be used to evaluate the likelihood of cross-contamination during sampling, shipment, and storage. The data quality for turbidity, MBAS, and fecal coliform bacteria could not be evaluated because NTL did not submit any associated quality control data. SAS analyzed for NO_3+NO_2 , chloride, and sulfate by EPA method 300.0 rather than using the requested bench methods 353.3, 325.1, and 375.4. Data of the following analyses should be considered estimates due to expired holding times: cyanide, for samples 96LFFR-05WA, -06WA, -07WA, -08WA, -09WA, -11WA, -12WA, and -15WA; NO_3+NO_2 for all primary samples; TDS for

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

samples -05WA, -04WA, and -11WA, and Langelier's index for all primary samples. The project-specified detection limits were not met for TKN, chloride, sulfate, and total and dissolved iron. The presence of acetone in sample 96LFFR-03WA and carbon disulfide in sample -04WA should be considered due to laboratory contamination. Based on low spike recoveries, low levels of Cl-Herb analytes may not have been detected, if present, in samples -05WA, -06WA, -07WA, -08WA, and -09WA.

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

7. EVALUATION OF THE QA LABORATORIES' DATA:

7.1 QA Laboratory Methods: The following is a listing of preparation and analytical methods used by the laboratory as reported in their data deliverable.

Primary Laboratory	Parameter	Preparation Method	Analytical Method
ARDL	VOC	EPA 5030	EPA 8260
	Cl-Pest/PCB	EPA 3510	EPA 8080
	OP-Pest	EPA 6510	EPA 8140
	Cl-Herb	method	EPA 8150
	GRO	EPA 5030	ADEC 8015 Mod.
	DRO	EPA 3510	ADEC 8100 Mod.
	TRPH	method	EPA 418.1
	TOC		EPA 415.1
	COD		EPA 410.4
	Cyanide	method	EPA 9012
	Ammonia	method	EPA 350.1
	TKN	method	EPA 351.2
	NO ₃ + NO ₂	method	EPA 353.1
	Chloride		EPA 325.3
	Sulfate		EPA 375.4
	Alkalinity		EPA 310.1
	Langelier's Index		SM 2330B
	TDS		EPA 160.1
	Turbidity		EPA 180.1
	MBAS	method	SM 5540A
Fecal Coliforms		SM 9222D	
CENPP-PE-L	PAH	EPA 3520	EPA 8270B
	Total Metals, ICP*	EPA 3005	EPA 6010
	Total Metals, AA**	EPA 3020	EPA 7000 series
	Total Mercury	method	EPA 7470
	Dissolved Metals, ICP*	EPA 3005	EPA 6010
	Dissolved Metals, AA**	EPA 3020	EPA 7000 series
Dissolved Mercury	method	EPA 7470	

*Al, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Ni, K, Ag, Na, V, Zn

**Sb, As, Pb, Se, Tl,

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

- 7.2 COC Records and SCR Forms: All COC records and sample shipping conditions, as documented on the SCR form, were evaluated according to EPA and USACE ER1110-1-263 regulations and the following notations were made.

Two of three pages of the COC record for ARDL report 9374 / CENPP-PE-L report H-96-0694 did not include dates and times of sample collection. Changes and line-outs on the COC records for ARDL reports 9379 and 9387 / CENPP-PE-L reports H-96-0713 and H-96-0736 were not initialed and dated, and one page of the COC record for reports 9379 / H-96-0713 was not signed by the sampler.

For the three QA shipments, holding times for MBAS, turbidity, and fecal coliform analysis had expired before the samples were received by the laboratory, and the fecal coliform analysis was canceled for the last shipment (rinsate blank sample 96LFFR-17WA). The water collected for cyanide analysis for sample -10WA was not preserved by pH adjustment. Upon receipt at ARDL, preservative was added by laboratory personnel. Broken or cracked lids were noted for one or more bottles of samples -14WA and -17WA, and air bubbles were noted in one or more VOC and/or GRO vials for samples -10WA, -14WA, -17WA, and -23WA.

- 7.3 Trip and Rinsate Blank Results: The QA trip blank and rinsate blank results are presented in Tables I-a, I-b, and II. As discussed in section 6.3, the presence of targeted analytes is attributable to the use of contaminated water in the preparation of the trip and rinsate blanks and does not represent sample cross-contamination, and the data quality for these samples will not be evaluated in this chemical quality assurance report since the results are not useful. However, the methylene chloride which was reported only in the QA trip blank sample 96LFFR23WA and the associated QA field sample 96LFFR14WA (Table IV) is apparently due to another source of contamination since it was not detected in the primary trip blank or field samples. Although it was not detected in the method blank associated with these samples, the reported presence of methylene chloride in the samples appears to be anomalous and is probably attributable to incidental contamination.

- 7.4 Sample Holding Times, Reporting Limits, Laboratory Method Blanks, Accuracy and Precision: Sample holding times and detection/reporting limits were evaluated per EPA or ADEC criteria. The laboratory method blanks were evaluated for the absence of targeted analytes. The extraction efficiency, accuracy, and precision of the data, as represented by surrogate, MS, MSD, BS and BSD recoveries and RPD results, were compared to EPA, ADEC, or LE QC acceptance limits for out of control results.

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

- 7.4.1 Volatile Organic Compounds: The project-specified detection limits were not met for some of the VOC analytes, and low levels of these analytes may not have been detected, if present, in the samples. Three out of 12 VOC MS/MSD recoveries from ARDL report 9379 were above the EPA QC acceptance limits. The accuracy of the analysis is acceptable based on the remaining acceptable recoveries.
- 7.4.2 Polynuclear Aromatic Hydrocarbons: Some out of control BS/BSD and MS/MSD recoveries and RPD results were reported for all three CENPP-PE-L reports. However, the QC measures performed for this analysis included all of the base/neutral/acid analytes usually analyzed by EPA method 8270, and only the acidic fraction failed to meet the QC criteria. Since only the PAH analytes were requested for analysis and all of the PAH-related QC results were within acceptance limits, the data quality for PAH analysis is acceptable.
- 7.4.3 Organochlorine Pesticides and PCB's: One out of 12 BS/BSD recoveries (endrin at 54%) was below the QC acceptance limits for ARDL report 9374. The accuracy of the analysis is acceptable based on the remaining acceptable recoveries.
- 7.4.4 Organophosphorus Pesticides: For ARDL report 9374, three out of 42 OP-Pest BS/BSD recoveries were below the QC acceptance limits and five of 21 RPD results were above the acceptance limits. For report 9379, seven of 42 BS/BSD recoveries were above the QC acceptance limits. The accuracy and precision of the analysis is acceptable for both reports based on the remaining acceptable recoveries and RPD results.
- 7.4.5 Chlorinated Herbicides: Two out of six MS/MSD recoveries and one out of three BS recoveries were below the QC acceptance limits for ARDL report 9379. In all cases the analyte with the low recovery was 2,4-D. The accuracy of the analysis is generally accepted, but low levels of 2,4-D, specifically, may not have been detected, if present, in the one associated field sample, 96LFFR14WA.
- 7.4.6 Gasoline Range Organics, Diesel Range Organics, and Total Recoverable Petroleum Hydrocarbons: There were no deficiencies noted in the data for GRO or DRO and the data quality for these analyses is acceptable. Low levels of TRPH (0.32 and 0.38 ppm) were reported in the method blanks for ARDL reports 9374 and 9379. The TRPH result for sample 96LFFR-14WA (0.38

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

ppm, in report 9379) should be considered due to laboratory contamination. The result for sample -10WA (ND, in report 9374) is not affected.

- 7.4.7 Total Organic Carbon and Chemical Oxygen Demand: The project-specified detection limit for TOC was not met, and low levels of TOC may not have been detected, if present, in the samples. There were no deficiencies noted in the data for COD and the data quality is acceptable.
- 7.4.8 Inorganics and Fecal Coliform Bacteria: Holding times were exceeded in the following instances: turbidity, exceeded by 6 to 10 days for both QA samples 96LFFR-10WA and -14WA; TDS, exceeded by one day for sample -14WA; MBAS, exceeded by four to six days for samples -10WA and -14WA; and fecal coliform, exceeded by four to five days for samples -10WA and -14WA. Also, the determination of pH, required for the calculation of Langelier's index, was evidently performed past the one-day holding time for both samples since the samples arrived at the laboratory from three to four days after collection. The data for these analyses with expired holding times should be considered estimates. It was noted that, except for TDS, the expired holding times were due to receipt of the samples at the laboratory after the holding times had expired. The project-specified detection limits for TKN, chloride, and sulfate were not met, and low levels of TKN may not have been detected, if present, in the samples with reported results of ND.

One of two matrix spike recoveries for sulfate in each ARDL report 9374 and 9379 was slightly above the EPA QC acceptance limit. The accuracy of the data is acceptable based on the remaining acceptable MS and BS recoveries. The sample duplicate RPD for turbidity in report 9379 was not calculable since one of the duplicate results was ND. Data quality is not affected since the other result was less than five times the detection limit and therefore insignificant for purposes of comparison. There were no deficiencies noted in the QC data for cyanide, ammonia, NO_3+NO_2 , and alkalinity, and the data quality for these analyses is acceptable, except for cyanide in sample -10WA, for which the sample was not preserved (see section 7.2).

- 7.4.9 Total Metals and Dissolved Metals: The MSD recovery for total calcium (124%) presented in CENPP-PE-L reports H-96-0694, -0713, and -0736 was slightly above the EPA QC acceptance limits (80-120%). This result is considered insignificant since the concentration of calcium in the sample was greater than four times the amount spiked. There were no other deficiencies noted in the metals data and the data quality is acceptable.

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

- 7.5. Overall Evaluation of the QA Laboratory's Data: Delinquencies were noted in the COC documentation and sample conditions. The water collected for cyanide analysis for sample -10WA was not field-preserved by pH adjustment, and low levels of cyanide may not have been detected in this sample. The analytes reported in the trip and rinsate blanks should be considered due to the use of contaminated water to prepare these samples, and the results should not be used to evaluate the likelihood of sample cross-contamination. The methylene chloride reported in QA sample 96LFFR14WA appears to be anomalous and is probably attributable to incidental contamination. Holding times were exceeded for Langelier's index, turbidity, TDS (sample -14WA only), MBAS, and fecal coliform analysis mainly due to receipt of the samples after the holding times had already expired, and the data of these analyses should be considered estimates. The project-specified detection limits for some VOC analytes, TOC, TKN, chloride, and sulfate were not met, and low levels of these analytes may not have been detected, if present, in the samples with reported results of ND. Based on low BS and MS recoveries, low levels of 2,4-D may not have been detected, if present, in sample -14WA. The TRPH result for sample -14WA should be considered due to laboratory contamination.
8. **COMPARISON OF THE PRIMARY AND QA LABORATORIES' DATA:** The primary and QA data comparisons are presented in Tables III and IV. The analytical results presented in each table were reviewed for agreement with each other or their respective detection limits and evaluated for comparability. Because the primary laboratory reported only detection limits, the QA laboratory's detection limits, rather than reporting limits, are presented in the comparison tables. The intra- and inter-laboratory data for a sample must be within a factor of three (for water matrices) of each other to be considered in agreement. The comparison for Langelier's index is based on agreement within 0.5 units. The primary and QA laboratories' detection limits must be within a factor of 10 to be considered comparable. Estimated data (results which have been quantified below the reporting limit and qualified with a "J" flag) should not be considered significant for the purpose of data agreement. All data comparisons agree with each other and are comparable with the following exceptions.
- 8.1 Volatile Organic Compounds: The primary and QA data do not agree for three VOC analytes in Table III and six VOC analytes in Table IV. Except for methylene chloride in Table IV, the disagreements are due to the QA laboratory's higher detection limits. The methylene chloride reported in the QA sample of Table IV (96LFFR14WA) is probably due to incidental contamination (see section 7.3) and the primary results for this analyte are acceptable.

CENPP-PE-L (96-0258)
Chemical Quality Assurance Report

- 8.2 Total and Dissolved Metals: The primary and QA data do not agree for total and dissolved potassium in Table III and for total potassium in Table IV (disagreement between the QA sample and one primary sample). Since both laboratories had acceptable QC results, the discrepancies could not be resolved. The discrepancies may be partly attributable to the proximity of the results to the potassium detection limit, and it is notable that all of the potassium data would agree if the QA laboratory's reporting limit (1000 ppb), rather than the detection limit (325 ppb), was used for the comparisons. The primary and QA data do not agree for total copper, total vanadium, and dissolved vanadium in Table III and for total and dissolved vanadium in Table IV because of the laboratories' different detection limits.
- 8.3 The primary and QA data for turbidity in Table III do not agree, with the primary results being about six times higher than the QA result. Evaluation of the primary data quality for turbidity was not possible because the laboratory (NTL) did not submit QC data. The holding time for turbidity analysis was exceeded by several days for the QA sample, due partly to receiving the sample after the holding time had expired. Since the measurement of turbidity is sensitive to holding time, the QA result should be considered a low estimate, and the primary data may be more representative of the true turbidity of the samples.
- 8.4 One of the two primary results for MBAS in Table IV (for sample 96LFFR15WA) does not agree with the QA result, with the primary result being about four times higher than the QA detection limit. As no QC data was submitted by the primary laboratory (NTL), evaluation of the primary data quality was not possible. The holding time for MBAS analysis was exceeded by several days for the QA sample, due to receiving the sample after the holding time had expired, and the QA result should be considered a low estimate.

CENPP-PE-L (96-0258)
Comparison of Primary and QA Data

Landfill Wells, Ft. Richardson

		Primary Samples		QA Sample	
Matrix: water		Field Identification:	96LFFR20WA	96LFFR22WA	96LFFR21WA
		Date	6/19/96	6/24/96	6/26/96
Parameter	Units	Analytes Detected			
VOC	µg/L	Acetone	3.3	8.8	< 11
		Chloroform	0.081	< 0.023	< 0.79
		Trichloroethene	0.23	0.11	< 0.85
		Toluene	0.086	0.053	< 0.85
GRO	mg/L	GRO	< 0.0098	< 0.0098	< 0.01

Comments: The presence of VOC analytes in the primary trip blank samples is likely due to the use of contaminated water for trip blank preparation and is not indicative of sample cross-contamination. Refer to section 6.3 for details.

		Primary Sample	QA Sample	
Matrix: water		Field Identification:	96LFFR24WA	96LFFR23WA
		Date	7/1/96	7/2/96
Parameter	Units	Analytes Detected		
VOC	µg/L	Trichlorofluoromethane	0.053	< 1.4
		Acetone	12	< 11
		Chloroform	0.042	< 0.079
		Benzene	0.026	< 0.9
		Trichloroethene	0.07	< 0.85
		Toluene	0.056	< 0.85
		o-Xylene	0.027	< 0.92
		Methylene Chloride	< 0.07	5.8
GRO	mg/L	GRO	< 0.0098	< 0.01

Comments: The presence of VOC analytes in the primary trip blank samples is likely due to the use of contaminated water for trip blank preparation and is not indicative of sample cross-contamination. Refer to section 6.3 for details. The presence of methylene chloride in the QA trip blank is probably incidental contamination and indicates possible incidental contamination of the associated field sample. Refer to section 7.3 for details.

µg/L = parts per billion (ppb)

< {detection limit} = analyte not detected

NR = analysis not requested

mg/L = parts per million (ppm)

J = estimated concentration

CENPP-PE-L (96-0258)
Comparison of Primary and QA Data

Landfill Wells, Ft. Richardson

TABLE II Rinsate Blank

Matrix: water			Primary Sample	QA Sample
Field Identification:			96LFFR16WA	96LFFR17WA
Parameter	Units	Analytes Detected		
VOC	µg/L	Chloromethane	0.11	< 1.2
		Acetone	0.8	< 11
		Chloroform	0.083	< 0.79
		Toluene	0.028	< 0.85
PAH	µg/L		< [0.28-1.5]	< [0.63-2.23]
Cl-Pest/PCB	µg/L		< [0.005-0.96]	< [0.008-0.33]
OP-Pest	µg/L		< [0.041-0.18]	< [0.18-1.6]
Cl-Herb	µg/L		< [0.016-0.052]	< [0.058-35.1]
GRO	mg/L	GRO	< 0.0098	< 0.01
DRO	mg/L	DRO	< 0.097	< 0.02 J
TRPH	mg/L	TRPH	0.81	< 0.31
TOC	mg/L	TOC	0.81	< 1.0
COD	mg/L	COD	< 5	< 5.0
Inorganics	mg/L	Cyanide	< 0.04	< 0.01
	mg/L	Ammonia	< 0.04	< 0.03
	mg/L	TKN	< 0.2	< 0.1
	mg/L	NO ₃ + NO ₂	0.18	0.21
	mg/L	Chloride	1	2.1
	mg/L	Sulfate	26	24.7
	mg/L	Alkalinity	58	64.5
	mg/L	TDS	74	108
	mg/L	MBAS	< 0.10	< 0.025
Fecal Coliform	cfu/100	FC bacteria	< 1	NR

(table continues on next page)

µg/L = parts per billion (ppb)

< {detection limit} = analyte not detected

NR = analysis not requested

mg/L = parts per million (ppm)

J = estimated concentration

CENPP-PE-L (96-0258)
Comparison of Primary and QA Data

Landfill Wells, Ft. Richardson

TABLE II Rinsate Blank (continued)

Matrix: water		Field Identification:	Primary Sample	QA Sample
Parameter	Units	Analytes Detected	96LFFR16WA	96LFFR17WA
Total Metals	µg/L	Aluminum	18	46 J
		Barium	18	15
		Calcium	25,000	23,000
		Copper	15	16
		Iron	< 100	22
		Magnesium	4300	3800
		Manganese	0.26	< 0.5
		Nickel	0.77	< 2.8
		Potassium	1200	< 325
		Sodium	7600	7500
		Vanadium	0.23	< 3.5
Zinc	110	120		

Comments: The presence of targeted analytes in the primary and QA rinsate blank samples is attributable to contaminated water used in preparation of the rinsate blanks and is not indicative of sample cross-contamination. Refer to section 6.3 for details.

µg/L = parts per billion (ppb)

< {detection limit} = analyte not detected

NR = analysis not requested

mg/L = parts per million (ppm)

J = estimated concentration

CENPP-PE-L (96-0258)
Comparison of Primary and QA Data

Landfill Wells, Ft. Richardson

TABLE III

Matrix: water		Field Identification:	Primary Samples		QA Sample
Parameter	Units	Analytes Detected	96LFFR07WA	96LFFR09WA	96LFFR10WA
VOC	µg/L	Dichlorofluoromethane	0.14	0.14	< 1.4
		Acetone	0.53	0.54	< 11
		Chloroform	0.097	0.098	< 0.79
PAH	µg/L		< [0.28-1.5]	< [0.28-1.5]	< [0.63-2.23]
Cl-Pest/PCB	µg/L		< [0.0047-0.9]	< [0.005-0.94]	< [0.008-0.33]
OP-Pest	µg/L		< [0.4-1.7]	< [0.5-1.7]	< [0.18-1.6]
Cl-Herb	µg/L		< [0.017-0.052]	< [0.016-0.051]	< [0.058-35.1]
GRO	mg/L	GRO	< 0.0098	< 0.0098	< 0.01
DRO	mg/L	DRO	< 0.098	< 0.098	< 0.063
TRPH	mg/L	TRPH	< 0.53	< 0.53	< 0.35
TOC	mg/L	TOC	0.52	0.59	< 1.0
COD	mg/L	COD	< 5	< 5	< 5.0
Inorganics	mg/L	Cyanide	< 0.04	< 0.04	< 0.005
	mg/L	Ammonia	< 0.04	< 0.04	< 0.03
	mg/L	TKN	< 0.2	0.2	< 0.1
	mg/L	NO ₃ + NO ₂	1.1	1.1	1.1
	mg/L	Chloride	9	9	8.7
	mg/L	Sulfate	19	19	17.1
	mg/L	Alkalinity	170	170	183
		Langelier's Index	-0.17	-0.18	+0.068
	NTU	Turbidity	2.9	2.87	0.45
	mg/L	TDS	280	270	255
mg/L	MBAS	< 0.10	< 0.10	0.027	
Fecal Coliform	cfu/ 100mL	FC bacteria	< 1	< 1	< 1

(table continues on next page)

µg/L = parts per billion (ppb)

< {detection limit} = analyte not detected

NR = analysis not requested

mg/L = parts per million (ppm)

J = estimated concentration

CENPP-PE-L (96-0258)
Comparison of Primary and QA Data

Landfill Wells, Ft. Richardson

TABLE III (continued)

Matrix: water		Field Identification:	Primary Samples		QA Sample
Parameter	Units	Analytes Detected	96LFFR07WA	96LFFR09WA	96LFFR10WA
Total Metals	µg/L	Aluminum	< 100	< 100	130
		Barium	7.8	7.6	7.8
		Calcium	63,000	63,000	67,000
		Chromium	< 8.7	< 8.7	12.0
		Copper	0.59	< 0.57	< 3.5
		Iron	< 100	< 100	210
		Magnesium	8700	8600	9200
		Manganese	8.6	6.7	10.0
		Nickel	6.2	5.9	< 2.8
		Potassium	1600	1900	< 325
		Sodium	2800	2700	3100
		Vanadium	0.55	0.56	< 3.5
Dissolved Metals	µg/L	Barium	7.6	7.6	6.9
		Calcium	66,000	65,000	69,000
		Magnesium	9100	8900	9300
		Manganese	1.5	1.6	< 0.5
		Nickel	4.5	4.6	< 2.8
		Potassium	1400	1600	< 325
		Sodium	2900	2900	3300
				Vanadium	0.81

Comments: The primary and QA data agree except for three VOC analytes, total copper, total and dissolved potassium, and total and dissolved vanadium, due mainly to differences in the laboratories' detection limits (refer to sections 8.1 and 8.2), and for turbidity (refer to section 8.3).

µg/L = parts per billion (ppb)

< {detection limit} = analyte not detected

NR = analysis not requested

mg/L = parts per million (ppm)

J = estimated concentration