

CHEMICAL DATA REPORT
GROUNDWATER STUDY (SPRING 1994)
FORT RICHARDSON, ALASKA

PREPARED BY THE
ALASKA DISTRICT ARMY CORPS OF ENGINEERS
GEOTECHNICAL BRANCH
MATERIALS AND INSTRUMENTATION SECTION
JULY 19, 1994

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Executive Summary

This chemical data report has been prepared by the Materials and Instrumentation Section of the U.S. Army Corps of Engineers, Alaska District (CENPA-EN-G-MI), to present the results of an investigation of the groundwater quality at Fort Richardson, Alaska. The investigation was performed at the request of the Alaska District Environmental Engineering Branch, Active Installations (CENPA-EN-EE-AI), and the Fort Richardson Department of Public Works (DPW).

Water samples from twenty-six supply and monitoring wells were collected and submitted for laboratory analysis for gasoline-range organics, diesel-range organics, volatile organic organics, and total and dissolved metals. Additionally, selected wells were sampled for analysis for polychlorinated biphenyls (PCBs) and landfill water quality parameters.

Significant contamination by diesel or gasoline-range organics (greater than 0.1 ppm) was detected in samples from six wells, most of which had a previous history of fuel contamination. Very low levels of diesel-range organics were reported in a number of other wells, but may have been in fact due to laboratory contamination or unknown non-fuel organic compounds.

No significant contamination by volatile organic compounds was discovered other than that associated with fuel contamination (e.g., benzene, xylene). A chlorinated solvent, 1,2-dichloroethane, was present at extremely low concentrations in a number of unrelated samples, and is thought to most likely be a field or transport contaminant.

Wide ranges of total metals concentrations were reported in the samples, due primarily to varying amounts of sediment in the unfiltered samples. The dissolved metals concentrations in the filtered samples were generally very low, with the exception of the expected native dissolved metals such as calcium and magnesium, and not obviously indicative of contamination.

No PCBs were detected in any sample.

Chemical Data Report

1. Background Information

1.1 **General Geology:** Fort Richardson is located primarily within an area locally referred to as the Anchorage Bowl. The Anchorage Bowl is located within the Cook Inlet-Susitna Lowland Section of the Coastal Trough Physiographic Province of Alaska, and generally is bordered by the Chugach Mountains on the east, Turnagain Arm on the south, Knik Arm on the west and the Elmendorf Moraine on the north. The Cook Inlet-Susitna Lowlands are characterized by glacial features including ground moraines, drumlins, eskers and outwash plains. Five major glacial advances of the Quaternary Period (Pleistocene and Holocene or Recent) can be recognized in the Cook Inlet-Susitna Lowlands section (Karlstrom 1957). These glacial advances are discussed further in the following paragraph. Most of Fort Richardson lies less than 300 feet above sea level.

The Anchorage Bowl is near the east border of a deep structural trough filled with moderately consolidated Tertiary rocks that underlie Cook Inlet and extend northeastward toward Mount McKinley (Capps, 1940). These Tertiary rocks are overlain by Pleistocene deposits as a result of repeated glacial advances during that epoch. These deposits accumulated to a thickness of 600 feet and more and appear to thicken westward from the mountain front toward Cook Inlet. They consist chiefly of three categories of material: 1) glaciofluvial consisting primarily of outwash sands and gravels, 2) proglacial silty clays of estuarine-marine or lacustrine-estuarine origin (including Bootlegger Cove Clay), and 3) glacial till deposited as ground moraine. Most of the Anchorage Bowl is overlain by relatively clean coarse-grain soils derived from outwash and glacial debris deposited in front of the youngest Pleistocene glacier (Naptowne-Wisconsin) that migrated into the area. This glacier produced a large east-west end moraine (Elmendorf moraine) across Fort Richardson. Outwash from this glacier spread southward across the Anchorage Bowl and buried ground moraine and the proglacial silty clays. The thickness of the outwash is thought to be about 60 feet under most of Fort Richardson, but is not everywhere constant (Cederstrom and Trainer 1953). The outwash thins toward the west and south away from its source and tends to become coarser toward the mountains, grading laterally into cobble and boulder sizes. The silty clays below the outwash are interbedded with silt and fine sand. The clay deposit extends to depths on the order of 200 to 250 feet within the Anchorage Bowl and "pinches-out" on the east near the Chugach Mountains and on

the north near a line connecting Dishno Pond and Six Mile Lake. Glacial till, consisting of boulders, cobbles, gravels, sand, and fine-grain soils, underlies the silty clays (where encountered) and extends to the Tertiary rock. Ground moraine of the Naptown glaciation overlies the advance outwash of that glaciation and glacial till of the earlier Knik glaciation to the north of the Elmendorf moraine (refs. 5d, 5f, 5g, 5h).

1.2 Groundwater: The hydrogeology of Fort Richardson is a subject of continuing study by the Alaska District Corps of Engineers, but at present is not fully understood. More is known of the more orderly system that underlies most of the Anchorage Bowl to the south and southwest. This system consists of a shallow, unconfined aquifer, a confining layer (Bootlegger Cove clay), and a deeper confined aquifer. This clay confining layer encroaches upon the southern reaches of Fort Richardson, but pinches out as described above. It has been suggested that along the perimeter of this system a confining layer consisting predominantly of till and till-like deposits exist, but the extent is not known. Additionally, perched groundwater is common on Fort Richardson, due to the random nature of the glacial deposits, which results in discontinuous units of permeable and impermeable materials. 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. Snowmelt and rainfall infiltrate to the groundwater. Streams feed groundwater in areas where the elevation of the streambed is above the water table. Discharge is either by groundwater flow into Knik Arm or by groundwater flow into streams that consequently discharge into Knik Arm. Wells indicate that the depth of the groundwater table varies from near the surface in the vicinity of Ship Creek to an excess of 200 feet within the northern and western portions of Fort Richardson. Groundwater is typically thought to flow in a westerly and northwesterly direction, roughly parallel to Ship Creek (ref. 5d).

1.3 Well Histories: Available information on the wells that were sampled is summarized in Section 3.1 of the Sampling and Analysis Plan (ref. 5c).

2. Field Activities

2.1 Sampling Objectives: The purpose of this sampling effort was to collect samples of groundwater for chemical analysis, and to gather data on groundwater depth and physical parameters.

2.2 Summary of Field Activities: Sampling activities began on 14 March 1994, and were concluded on 3 April 1994. A total of twenty-six supply and monitoring wells on Fort Richardson were sampled. Water samples were collected and measurements of groundwater depth and physical parameters (temperature, pH, conductivity, and oxidation-reduction potential) were performed by chemist Chris Floyd, CENPA-EN-G-MI. Chemist Serena Wolery, CENPA-EN-G-MI, and student-employee Elaine Hourigan, CENPA-EN-EE-AI, assisted with the sampling of wells AP-2974, AP-2982, AP-2985, and AP-3231. Driller helper Richard Sorensen, CENPA-EN-G-SG, assisted with the operation of electrical generators and snowmachines, and the mobilization of sampling equipment to isolated locations. Field observations and sampling information collected at each well are shown in Appendix A. A map of well locations is provided as Figure 1.

Sampling was performed in accordance with the Sampling and Analysis Plan, with some minor modifications dictated by constraints of time and equipment. Several wells with extraordinarily large standing water volumes (e.g., TW-1, AK-2127) had less than three standing water volumes removed during purging; such wells had at least 1.5 volumes of water removed, and were purged until the clarity and physical parameters of the well had stabilized. Purge volumes for each well are shown in Appendix A. The flow rates of the wells with 4-inch submersible pumps (TW-1, A-1, A-6, AK-2127, and Well B) could not be controlled to any appreciable extent, due to the absence of applicable voltage control equipment. Sampling was performed at purge flow rates; the water did not appear to be charged with air in any of these wells, and samples collected for volatiles analysis are not thought to have been unduly affected.

At well ADFG K, the pressure in the well's manifold feeder pipe was noted to be below optimum by Alaska Department of Fish and Game personnel, and the sample taken from the sampling point in this pipe may contain water from wells other than ADFG K.

Water samples from each well were submitted for analysis by the methods listed in Appendix A.

2.3 Summary of Observations: Field observations and sampling information for each well can be found in Appendix A.

2.4 Investigation Derived Waste: The purge water from each well was handled as described in the Sampling and Analysis Plan (ref. 5c). The purge water from the active supply wells and converted monitoring wells with no history of contamination (see Sections 3.1, 3.2, and 3.3) were discharged onto the ground in the vicinity of the well at the time of purging. The purge water from all other wells was containerized and held at a secured Corps of Engineers waste holding facility pending the results of sample analysis. A review of the complete data package showed

that none of the containerized purge water could be considered "hazardous waste" under the Resource Conservation and Recovery Act (RCRA). Containerized purge water containing no petroleum product and containing no compounds or analytes above EPA drinking water Maximum Contaminant Levels (MCLs; see Section 3 and Table I) was discharged onto the ground in the vicinity of the well that produced that water. Containerized purge water containing petroleum product but no compounds or analytes above MCLs will be discharged to an oil/water separator. The purge water from four wells contain both petroleum, and high levels of sediment that cause the total metals concentrations in the water to lie above the MCLs; this purge water will be disposed of as soon as a proper means of disposal is determined.

The means of disposal of purge water from each well is described in Appendix A.

3. **Results of Chemical Analyses:** Tables of chemical data are shown in Appendix B. The chemical data for each of the twenty-six wells are summarized in following subsections.

Table I outlines selected Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) established for drinking water by the U.S. Environmental Protection Agency, and the Alaska Department of Environmental Conservation (refs. 5i, 5j). Where federal and state levels differ, the lowest level is shown. This table is provided solely as a reference for the interpretation of this project's data, and is not intended as a complete listing of all relevant points of compliance. Generally speaking, MCLs are established to protect human health, while SMCLs are established to ensure the aesthetic quality (taste, color, odor, etc.) of a water supply. In some cases, these regulatory levels may be higher than proposed risk-based concentrations (RBCs).

It should also be noted that the MCLs and SMCLs pertain to drinking water (which presumably would be rather low in sediment) and are perhaps best compared to the data for dissolved metals rather than total metals. Analyses for metals of unfiltered (total) water samples quantitate both dissolved metals and metals that are suspended in the water as sediment. Comparisons of the data for total metals versus dissolved (filtered) metals for each well indicate that the bulk of the metal concentrations reported in the total metals samples are due to the metallic elements entrained in the sediment; with the exceptions of calcium, magnesium, potassium, and sodium, only very low concentrations of metals were detected in most of the filtered samples. No metal with an MCL was detected in any filtered groundwater sample at a concentration above the MCL. Calcium, magnesium, potassium, and sodium, are very common constituents of the earth's crust and of groundwater, and their presence in the water samples is almost certainly due to natural sources. The high aluminum

concentrations reported in many unfiltered samples are likewise due to the abundant aluminosilicate minerals that no doubt comprise much of the sediment in the sample.

No federal or state drinking water standards exist for diesel-range organics (DRO) or gasoline-range organics (GRO). Water quality standards established by the state of Alaska in 18 AAC 70, December 1989, describe a number of different allowable limits for "petroleum hydrocarbons, oils, and greases", depending upon the use of the water supply. Some samples contained organic constituents that were quantitated and reported as "DRO", but may not in fact be diesel fuel. These instances are described in detail below.

Tables of the chemical analytical results are presented in Appendix B. Sections 3.1 through 3.7 below summarize for each well the chemical results thought to be most significant. "Notable chemical results" include any compound or analyte that is present at a concentration above or approaching an MCL or SMCL, DRO and GRO at any reported concentration, and any other analyte or compound thought to be significant. Ubiquitous analytes and compounds (e.g., calcium, magnesium, total aluminum, etc.), and those for which there appear to be no established health standards (e.g., vanadium, cobalt), are generally not discussed below.

3.1 Active Supply Wells; these samples were collected from spigots installed in water mains or distribution systems.

- (1) **Well 1**
Sample No: 94FRGW04WA
Date Sampled: 15 March 1994
Notable Chemical Results:
1.4 ug/L 1,2-dichloroethane.
- (2) **Well 3**
Sample No: 94FRGW05WA
Date Sampled: 15 March 1994
Notable Chemical Results:
1.5 ug/L 1,2-dichloroethane.
- (3) **Otter Lake Lodge**
Sample No: 94FRGW42WA
Date Sampled: 1 April 1994
Notable Chemical Results: None

The concentrations of 1,2-dichloroethane are below the MCL of 5.0 ug/L. This compound was detected in a number of samples from unrelated wells, and is most likely a field contaminant. Acetone was reported in -04WA and -05WA, but is attributed to laboratory contamination (ref. 5a).

TABLE I

Federal and State MCLs and SMCLs

	Maximum Contaminant Level (MCL; ug/L)	Secondary MCL (SMCL; ug/L)
Organic Compounds:		
1,2-Dichloroethane.....	5.0	
1,1,1-Trichloroethane.....	200.0	
Trichloroethene.....	5.0	
Carbon Tetrachloride.....	5.0	
Chloromethane.....	100.0	
Dichlorodifluoromethane.....	100.0	
Benzene.....	5.0	
Toluene.....	1,000.0	
Xylenes.....	10,000.0	
Ethylbenzene.....	700.0	
Metals:		
Aluminum.....		50.0
Antimony.....	6.0	
Arsenic.....	50.0	
Barium.....	2,000.0	
Beryllium.....	4.0	
Cadmium.....	5.0	
Chromium.....	100.0	
Copper.....		1,000.0
Iron.....		300.0
Lead.....	15.0	
Manganese.....		50.0
Mercury.....	2.0	
Nickel.....	100.0	
Selenium.....	50.0	
Silver.....		100.0
Sodium.....		250,000.0
Thallium.....	5.0	
Zinc.....		5,000.0
Other Inorganics:		
Chloride.....	(MCL; mg/L)	(SMCL; mg/L)
Nitrate.....	10.0	250.0
Sulfate.....		250.0
Total Diss. Solids.....		500.0
Turbidity.....		5 NTU*

* NTU = Nephelometric Turbidity Units

3.2 Hatchery Supply Wells, Alaska Department of Fish and Game; these samples were collected from spigots installed in water mains.

- (4) **ADFG C**
 Sample No: 94FRGW01WA
 Date Sampled: 14 March 1994
 Notable Chemical Results:
 2 ug/L diss. lead,
 0.6 ug/L 1,2-dichloroethane.
- (5) **ADFG E**
 Sample No: 94FRGW02WA
 Date Sampled: 14 March 1994
 Notable Chemical Results:
 6 ug/L diss. lead (4 ug/L total lead),
 0.6 ug/L 1,2-dichloroethane.
- (6) **ADFG K**
 Sample No: 94FRGW03WA
 Date Sampled: 14 March 1994
 Notable Chemical Results:
 2 ug/L diss. lead,
 1120 ug/L total iron (22 ug/L diss. iron),
 1.9 ug/L 1,2-dichloroethane.
- (7) **ADFG 9**
 Sample No: 94FRGW43WA
 Date Sampled: 1 April 1994
 Notable Chemical Results:
 5 ug/L diss. lead (5 ug/L total lead).

Low to moderate levels of dissolved lead have been detected in these wells in the past (refs. 5c, 5e, 5f), but appear to be decreasing over time (see Sampling and Analysis Plan, ref. 5c). The water flushed from the sampling point of ADFG K was observed to contain considerable rust, and the relatively high total iron concentration is likely due to particles of rust included in the sample. The concentrations of 1,2-dichloroethane are below the MCL of 5.0 ug/L. This compound was detected in a number of samples from unrelated wells, and may be a field contaminant. Acetone was reported in -01WA, -02WA, and -03WA, but is attributed to laboratory contamination (ref. 5a).

3.3 "Converted" Supply and Test Wells; former supply wells, test wells, or piezometers that are now used as monitoring wells.

- (8) **TW-1 (Test Well 1)**
 Sample No: 94FRGW17WA
 Date Sampled: 23 March 1994
 Notable Chemical Results:
 0.051 mg/L "DRO",
 1890 ug/L total iron (<20 ug/L diss. iron),
- (9) **A-1**
 Sample No: 94FRGW19WA
 Date Sampled: 23 March 1994
 Notable Chemical Results:
 246 ug/L total iron (<20 ug/L diss. iron),
- (10) **A-6**
 Sample No: 94FRGW18WA
 Date Sampled: 23 March 1994
 Notable Chemical Results:
 0.071 mg/L "DRO",
 392 ug/L total iron (52 ug/L diss. iron),
- (11) **W-B (Well B)**
 Sample No: 94FRGW25WA
 Date Sampled: 25 March 1994
 Notable Chemical Results:
 315 ug/L total iron (<20 ug/L diss. iron),
- (12) **AK-2127**
 Sample No: 94FRGW26WA
 Date Sampled: 25 March 1994
 Notable Chemical Results:
 0.052 mg/L "DRO",
 7 ug/L total cadmium (<3 ug/L diss. cadmium),
 409 ug/L total iron (<20 ug/L diss. iron),
 0.5 ug/L 1,2-dichloroethane

The diesel-range organics (DRO) reported in these wells are thought to not be truly diesel fuel, but some non-fuel organic compounds that are quantitated by the DRO analytical method (ref. 4a). The Quality Assurance Report (ref. 5a) states that the DRO may be considered to be due to laboratory contamination, because of contamination in the laboratory method blank. This unknown contaminant also appeared to be present in a rinsate of the Tygon tubing that was used to direct the water stream from these wells. This Tygon tubing was made of a hospital-grade silicone rubber that was thoroughly decontaminated before each use, but apparently may have leached some organic constituent into the water passing through it; this tubing will not be used in any future groundwater investigation.

The casings of these wells are thought to be made of steel pipe; the relatively high total iron content in the samples may be due to chemical or microbiological deterioration of the steel.

The initial purge water from these wells tended to have a dark brown or black tint, perhaps suggesting the formation of iron sulfides, and the water from A-6 had a distinct sulfide odor (see Appendix A). These wells have not been tested for iron concentrations in the past.

The water from AK-2127 was reported to contain total cadmium at a concentration slightly above the MCL; no dissolved cadmium was detected. The depth of this well (thought to be screened from 180 to 190 feet bgs) and its location (in a fairly isolated training area at the base of the Chugach Mountain foothills) make it unlikely that the cadmium is the result of man-made contamination. Mineral sources of cadmium are rare in this part of Alaska. It is possible that the cadmium is either a laboratory artifact, or the result of fine particles of paint or metal plating from the well apparatus entering the water stream at some point.

3.4 Building 987 Monitoring Wells: These two monitoring wells were installed in September-October 1993, as part of an investigation of POL contamination from a former overflow UST at the Building 987 fuel pump station.

(13) **AP-3233**

Sample No: 94FRGW44WA
 Date Sampled: 1 April 1994
 Notable Chemical Results:
 2.28 mg/L GRO
 13.6 mg/L DRO
 22 ug/L benzene
 3.8 ug/L 1,2-dichloroethane
 61 ug/L 1,3,5-trimethylbenzene
 84 ug/L 1,2,4-trimethylbenzene
 17 ug/L total lead (no diss. lead detected)
 19,700 ug/L total iron (1,060 ug/L diss. iron)
 2030 ug/L total manganese (1620 ug/L diss. Mn)

(14) **AP-3235**

Sample No: 94FRGW20WA, 21WA (QC dup), 22WA (QA dup)
 Date Sampled: 24 March 1994
 Notable Chemical Results:
 0.496-0.64 mg/L GRO
 4.25-8.39 mg/L DRO
 4.0-5.4 ug/L benzene
 <0.9-2.4 ug/L 1,2-dichloroethane
 28-32 ug/L total lead (<2-6 ug/L diss. lead)
 65,000-74,700 ug/L total iron (500 ug/L diss. iron)
 2200-2450 ug/L total manganese (889 ug/L diss. Mn)
 93-109 ug/L total chromium (no diss. Cr detected)
 121-150 ug/L total nickel (no diss. Ni detected)

Of the aromatic volatile constituents of fuel detected in the water samples, only benzene appeared at concentrations above its MCL. Xylenes, toluene, and ethylbenzene were detected at concentrations well below MCLs. 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene are aromatic constituents of diesel fuel that do not have established MCLs, but have been assigned Risk-Based Concentrations (RBCs) of 3 ug/L and 2.4 ug/L, respectively, for non-carcinogenic toxicity in "tap water" (ref. 5k). The concentrations of these compounds in the samples from AP-3233 are far above these RBCs, but the groundwater at this site is not used as a source of drinking water.

The relatively high concentrations of such a wide variety of metals are somewhat difficult to explain. CENPA-EN-G-SG geologist Pat Galbraith suggests that the high iron, chromium, and nickel may be due to the presence of old vehicle bodies or other metal objects buried nearby, as well as mineral sources.

The concentrations of 1,2-dichloroethane are below the MCL of 5.0 ug/L. This compound was detected in a number of samples from unrelated wells, and may be a field contaminant. Acetone was reported in the samples from AP-3235, but is attributed to laboratory contamination (ref. 5a).

The QAR (Appendix C) advises that, due to high surrogate recoveries, the values reported for ethylbenzene and xylene in -20WA and -21WA should be considered high estimates. The DRO values for the same samples should be regarded as low estimates, due to low laboratory control recoveries.

3.5 Building 35-752 (High Frequency Transmitter Station) Monitoring Wells: Installed in August 1990 and September 1993, as part of an investigation of POL and PCB contaminated soils at the site of a 1990 waste-oil UST removal.

(15) **AP-2982**

Sample No: 94FRGW11WA

Date Sampled: 18 March 1994

Notable Chemical Results:

0.508 mg/L "DRO"

4.5 ug/L benzene

0.6 ug/L 1,1-dichloroethane

1.2 ug/L 1,2-dichloroethane

0.6 ug/L trichloroethene

5.4 ug/L 1,1,1-trichloroethane

1 ug/L total mercury (no diss. mercury detected)

5380 ug/L total iron (108 ug/L diss. iron)

814 ug/L total manganese (815 ug/L diss. Mn)

(16) AP-2985

Sample No: 94FRGW13WA

Date Sampled: 18 March 1994

Notable Chemical Results:

0.067 mg/L "DRO"

10,900 ug/L total iron (no diss. iron detected)

391 ug/L total manganese (20 ug/L diss. Mn)

(17) AP-3231

Sample No: 94FRGW12WA

Date Sampled: 18 March 1994

Notable Chemical Results:

0.085 mg/L "DRO"

2.5 ug/L 1,2-dichloroethane

1.4 ug/L trichloroethene

46 ug/L total arsenic (no diss. arsenic detected)

1.3 ug/L total mercury (no diss. mercury detected)

54 ug/L total lead (no diss. lead detected)

139 ug/L total chromium (no diss. Cr detected)

126,000 ug/L total iron (no diss. iron detected)

4760 ug/L total manganese (no diss. Mn detected)

The DRO levels in these water samples are again attributed by the laboratory to traces of non-fuel organic compounds. Disposable Teflon bailers were used to collect these samples, so no rinsate data are available. The chromatograms of these samples do not appear to be similar to those of the samples from wells A-1, A-6, Well B, and AK-2127.

Each of these wells produced very turbid water, even after extensive purging. The high total metals values but generally very low dissolved metals values suggests that the metals present in these water samples are due almost entirely to the sediment in the water; the dissolved iron and magnesium in AP-2982 are exceptions. Naturally occurring sources of mercury are not generally found in south-central Alaska, and the low levels detected in wells AP-2982 and AP-3231 could conceivably be due to man-made contamination. The levels of mercury detected are below MCLs, and do not in of themselves pose any threat to health.

The benzene concentration detected in AP-2982 (4.5 ppb) is much reduced from benzene levels reported in that well in 1993 (25 ppb) and 1990 (620 ppb; ref. 5c). All other volatile organic compounds are present at concentrations below MCLs, and may be due to laboratory contamination or analytical artifacts. 1,1-dichloroethane has no MCL, but does have a RBC of 810 ug/L for "tap water" (ref. 5k). The laboratory stated that its analysis of the volatiles sample from AP-2985 "did not meet...QA criteria"; the volatiles data for that sample should be viewed with skepticism.

PCBs (polychlorinated biphenyls) are a contaminant of concern at this site. Water samples were submitted from these three wells for analysis for PCBs, with a detection limit of 0.02 ug/L requested. The laboratory achieved detection limits only of 0.1 ug/L; no PCBs were detected above this detection limit.

The QAR (Appendix C) advises that the DRO data of samples -11WA, -12WA, and -13WA could not be evaluated completely, as the project laboratory did not submit the proper internal quality control data.

3.6 Power Plant Monitoring Well: Installed as part of a 1990 investigation of UST contaminated soils at the Fort Richardson power plant, Building 35-012.

(18) **AP-2974**

Sample No: 94FRGW06WA, 07WA (QC dup), 08WA (QA dup)

Date Sampled: 15 March 1994

Notable Chemical Results:

0.092-0.109 mg/L "DRO"

0.8-0.9 ug/L 1,2-dichloroethane

0.4 ug/L carbon tetrachloride

0.3 ug/L trichloroethene

5-6 ug/L total lead (no diss. lead detected)

14,400-16,100 ug/L total iron (no diss. Fe detected)

479-545 ug/L total manganese (no diss. Mn detected)

The DRO values in these samples are attributed by the laboratory to non-diesel compounds. The chromatograms of these samples do resemble those of petroleum hydrocarbons heavier than diesel. Heavy hydrocarbons have been reported in this well in the past as 0.36 mg/L "bunker oil" (ref. 5c).

All volatile compounds are present at concentrations below MCLs, and may in fact be due to laboratory contamination or analytical artifacts (ref. 5a).

The values reported for total metals are most likely due to the high level of sediment in the unfiltered sample.

3.7 Landfill Monitoring Wells: The water from these wells were analyzed by the same methods as the other wells, plus PCBs and a variety of landfill water quality parameters (see Table 7, Appendix B) specified by the Alaska Department of Environmental Conservation regulations 18 AAC 60 (ref. 51). These samples were intended to be analyzed for pesticides as well as PCBs (Method 8080), but a failure in communications resulted in the project laboratory analyzing the samples for PCBs only.

- (19) **AP-3010**
Sample No: 94FRGW35WA
Date Sampled: 31 March 1994
Notable Chemical Results:
450 ug/L total iron (33 ug/L diss. iron)
- (20) **AP-3013**
Sample No: 94FRGW32WA, 33WA (QC dup), 34WA (QA dup)
Date Sampled: 29 March 1994
Notable Chemical Results:
0.4-1.3 ug/L 1,2-dichloroethane
200-400 ug/L total iron (no diss. iron detected)
- (21) **AP-3014**
Sample No: 94FRGW28WA
Date Sampled: 28 March 1994
Notable Chemical Results:
1.1 ug/L 1,2-dichloroethane
2030 ug/L total manganese (2110 ug/L diss. Mn)
- (22) **AP-3015**
Sample No: 94FRGW31WA
Date Sampled: 28 March 1994
Notable Chemical Results:
0.8 ug/L 1,2-dichloroethane
16 ug/L total lead (no diss. lead detected)
2510 ug/L total iron (no diss. iron detected)
- (23) **AP-3221**
Sample No: 94FRGW36WA
Date Sampled: 30 March 1994
Notable Chemical Results:
0.071 mg/L DRO
2.9 ug/L dichlorodifluoromethane
8 ug/L total lead (no diss. lead detected)
24,500 ug/L total iron (39 ug/L diss. Fe detected)
526 ug/L total manganese (17 ug/L diss. manganese)
- (24) **FR-1**
Sample No: 94FRGW37WA
Date Sampled: 31 March 1994
Notable Chemical Results:
8.06 mg/L DRO
3910 ug/L total iron (22 ug/L diss. iron)
153 ug/L total manganese (no diss. Mn detected)

(25) FR-2

Sample No: 94FRGW39WA

Date Sampled: 3 April 1994

Notable Chemical Results:

0.530 mg/L GRO

3.14 mg/L DRO

3820 ug/L total iron (no diss. iron detected)

270 ug/L total manganese (no diss. Mn detected)

(26) FR-3

Sample No: 94FRGW38WA

Date Sampled: 3 April 1994

Notable Chemical Results:

4.02 mg/L DRO

3.8 ug/L dichlorodifluoromethane

33 ug/L total lead (no diss. lead detected)

59,100 ug/L total iron (no diss. iron detected)

1280 ug/L total manganese (no diss. Mn detected)

1300 ug/L total zinc (no diss. zinc detected)

FR-2 and FR-3 have a history of contamination with low levels of fuel products (ref. 5c). FR-1 has not previously been shown to be contaminated. AP-3013 is located only a hundred feet or so southeast of FR-1, and is screened at a similar depth; no DRO or GRO was detected in the samples from AP-3013. The chromatograms of the DRO in FR-1, FR-2, and FR-3 are all suggestive of a petroleum product heavier than diesel fuel.

The concentrations of 1,2-dichloroethane are below the MCL of 5.0 ug/L. This compound was detected in a number of samples from unrelated wells, and may be a field contaminant. Acetone and dichlorodifluoromethane (freon) were reported in several samples, but their presence is attributed to laboratory contamination (ref. 5a).

The values reported for total metals are most likely due to the varying levels of sediment in the unfiltered samples.

No PCBs were detected in any landfill well above a detection limit of 0.2 ug/L; no pesticides were detected in the quality assurance sample (-34WA) collected at AP-3013.

Table 7 in Appendix B lists the results of various analyses performed at the landfill wells to satisfy state solid waste management requirements. These analyses include inorganic parameters such as nitrates, chloride, sulfate, alkalinity, and total dissolved solids, as well as total organic carbon, total recoverable petroleum hydrocarbons (TRPH), and biological oxygen demand (BOD). The TRPH data essentially reflects the DRO data for the same wells, and the turbidity values parallel the values for total metals. The remainder of the results are unremarkable from an environmental or health standpoint. Dissolved oxygen,

conductivity, oxidation-reduction potential, temperature, and pH were measured in the field, and presented for each well in Appendix A.

4. Data Quality Review: The complete chemical data package, including the laboratories' internal quality control reports, is 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 (CENPD-PE-GE-L), and evaluated in their Quality Assurance Report (QAR, ref. 5a). Laboratory data is summarized in Appendix B, and a copy of the QAR is provided in Appendix C.

CENPD-PE-GT-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 CENPD 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, standard solution preparation methods, and identification criteria including quantification and confirmation of ions. Surrogate recoveries were scrutinized to ensure 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 involved examination of the actual data. This phase of the data quality assessment is by far the most time-intensive, requiring the chemist to examine all the data produced by the laboratory. By examining data from laboratory duplicates, blind duplicates, trip blanks, laboratory blanks, matrix spike and matrix spike duplicate samples, and field samples, the chemist determined 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 were 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 analysis of matrix spike and matrix spike duplicate 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.

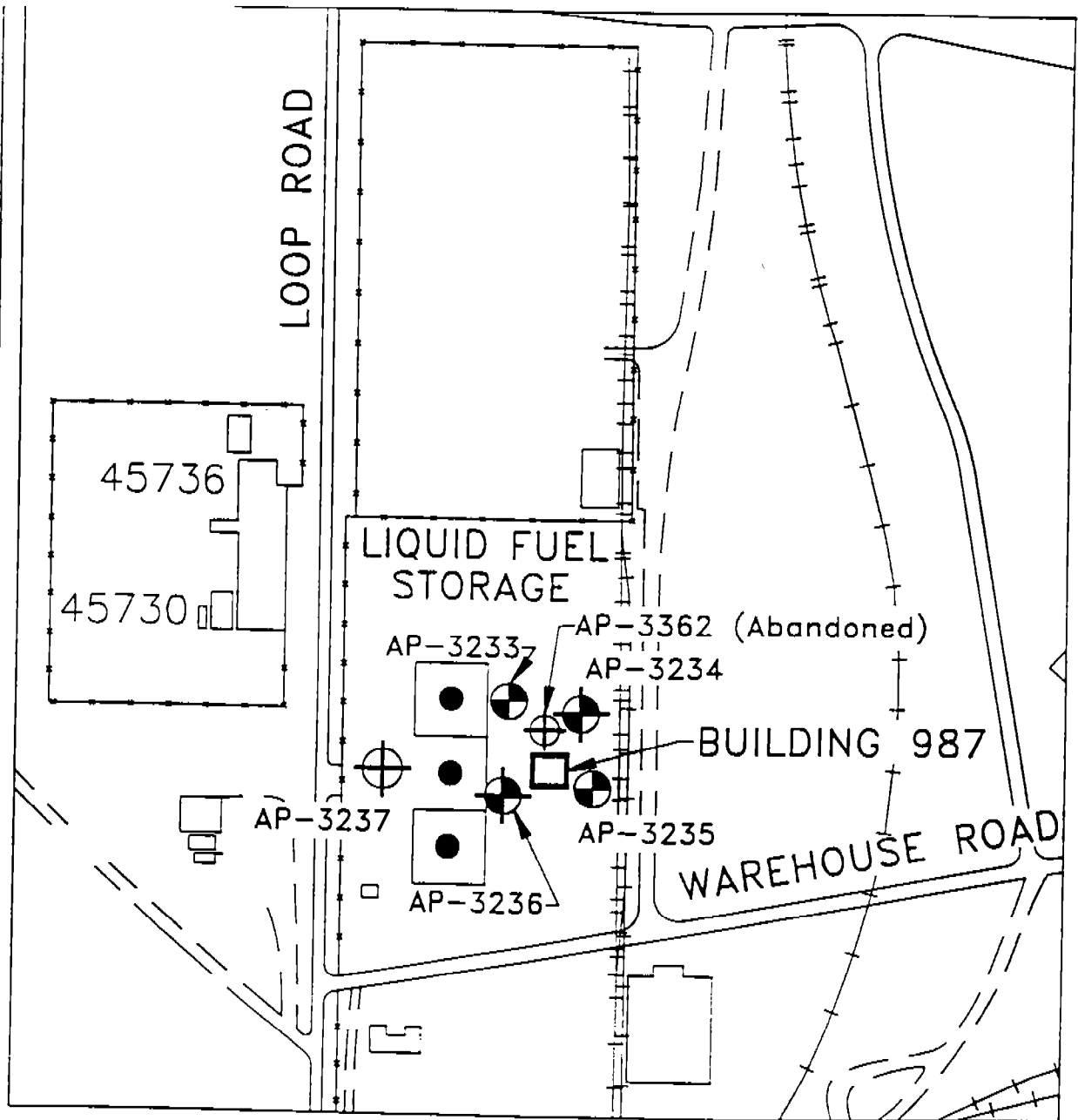
Blind duplicate quality control (QC) samples were submitted to the project laboratory, which analyzed the majority of the samples. Analysis of QC duplicate samples provides a measure of intra-laboratory variations. Additional replicate samples were provided to an independent quality assurance (QA) laboratory, to provide a test of inter-laboratory accuracy. Approximately 20% of the samples were QA or QC replicates that effectively provide triplicate analysis on approximately 10% of the samples. QC and QA duplicates are so noted in the data tables.

Data from all replicate samples were analyzed by CENPD-PE-GT-L as part of development of the QAR. Of each triplicate set, two samples were analyzed at the project laboratory, and the third was analyzed at the QA laboratory. The three sets of data for each set were carefully compared and tabulated. Any discrepancies were noted in the QAR. If results for a given analyte did not agree within a factor of three between the data sets, the data were rejected. If two of three data sets agreed, each laboratory's internal QA/QC data were reassessed to determine which set of data is the most accurate. Data from related analyses may have been inspected to determine which set of data was more accurate.

In general, the project and QA data were in agreement and are acceptable; specific instances where discrepancies in data quality control may affect the usefulness of the data are described after the discussion of that data in Section 3 above.

5. References

- a. Memorandum CENPD-PE-GT-L dated 6 June 1994, subject: W.O. 94-251, Results of Chemical Analysis, Ft. Richardson Groundwater Study - Spring 1994.
- b. Memorandum CENPA-EN-G-MI dated 22 April 1994, subject: Trip Report, Groundwater Study (Spring 1994), Fort Richardson, AK (FTR-079).
- c. Memorandum CENPA-EN-G-MI dated 8 April 1994, subject: Sampling and Analysis Plan, Groundwater Monitoring, Fort Richardson, Alaska.
- d. U.S. Army Corps of Engineers, Alaska District, Geotechnical Branch, Geotechnical Report for Groundwater Monitoring Network, Fort Richardson, Alaska, April 1994.
- e. Memorandum CENPA-EN-G-MI dated 11 February 1994, subject: Proposed Scope of Sampling, Groundwater Monitoring, Fort Richardson, Alaska.
- f. ENSR Consulting and Engineering, Sampling Report for Groundwater Monitoring Network at Fort Richardson, Alaska (Document No. 5583-061-600), January 1994.
- g. U.S. Army Corps of Engineers, Alaska District, Geotechnical Branch, Geotechnical Report for Groundwater Monitoring Network, Fort Richardson, Alaska, August 1992.
- h. U.S. Army Corps of Engineers, Alaska District, Geotechnical Branch, Geotechnical Report for Groundwater Monitoring Network, Fort Richardson, Alaska, 1991.
- i. Code of Federal Regulations, Title 40, Part 141, Sections 11 and 12 (40 CFR 141.11 and 40 CFR 141.12).
- j. Alaska Department of Environmental Conservation, Drinking Water Regulations, 18 AAC 80, 18 March 1993.
- k. U.S. Environmental Protection Agency, Region III, Risk-Based Concentration Table, First Quarter 1994, 7 January 1994.
- l. Alaska Department of Environmental Conservation, Solid Waste Management 18 AAC 60, Proposed Regulations, 7 September 1993.



NOT TO SCALE




-  BIOVENT
-  BORING
-  MONITORING WELL



FIGURE 2

Building 987 Well Locations



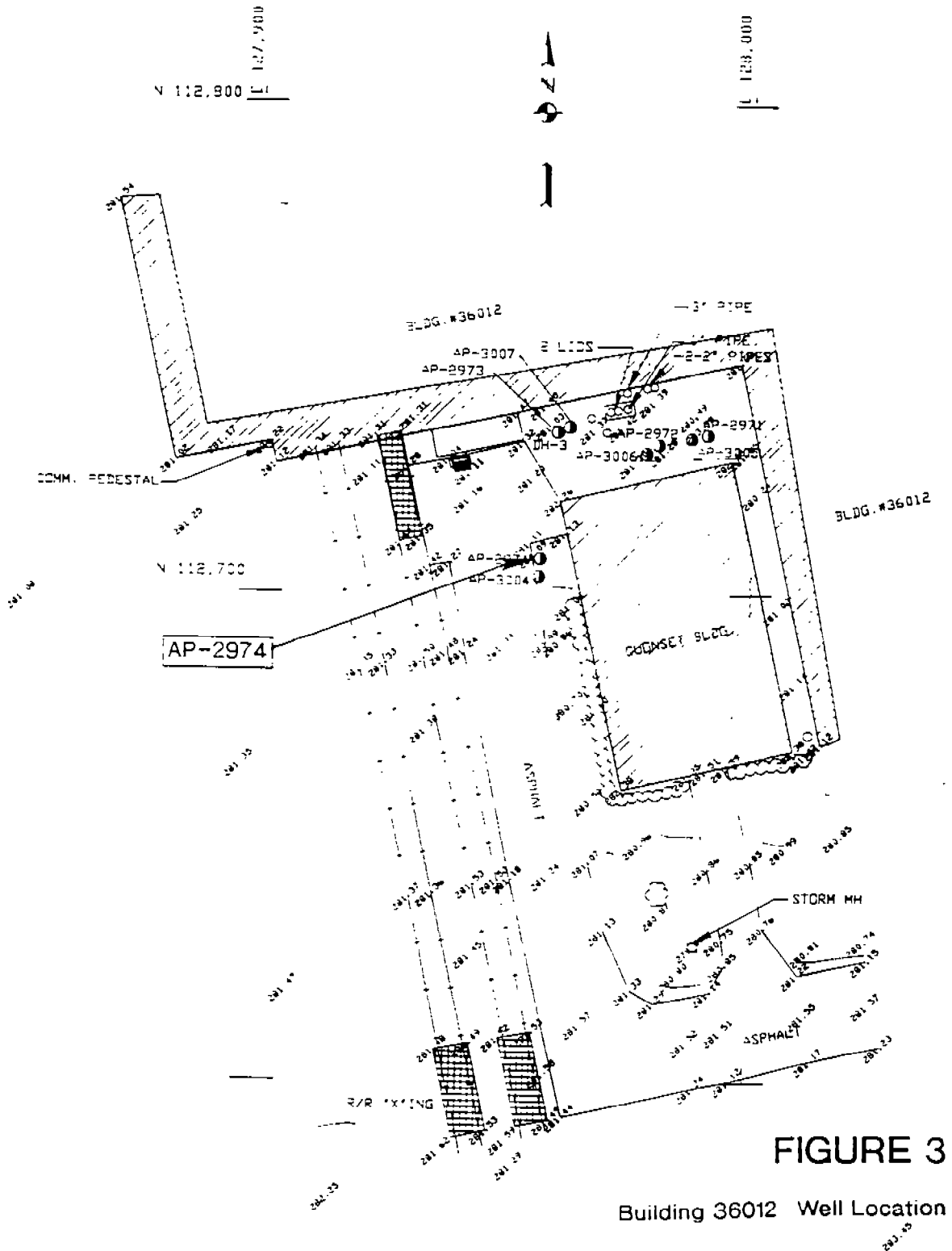


FIGURE 3

Building 36012 Well Location

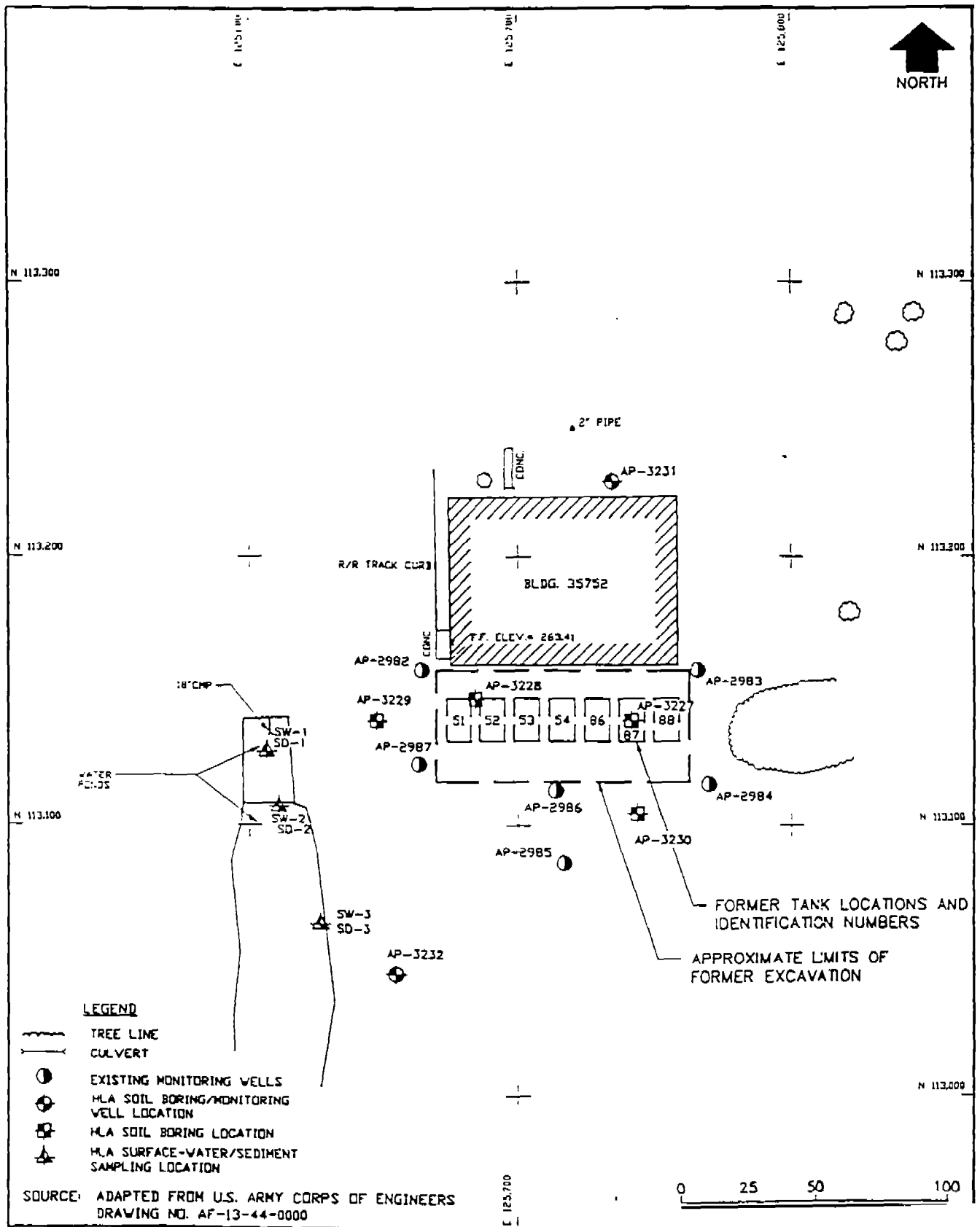


FIGURE 4

Building 35752
Well Locations

APPENDIX A

Field Observations and Sampling Information

Well 1
Fort Richardson Supply Well
15 March 1994

Sampling Point/Equipment: Sample collected from in-line spigot just downline of the pump/wellhead; sampling upline of pump not possible.

Well boring depth 162 ft bgs; screened interval unknown.

Purge Volume: Minimal quantity to purge spigot.

Physical Parameters and Observations at time of Sample Collection

Temperature: 6.6 deg. C
pH: 6.89
Conductivity: 0.567 millimhos/cm
Redox Potential: 119 millivolts
Odor: None detectable
Appearance: Clear, colorless

Sample Number: 94FRGW 04WA

Time of Sampling: 0850-0900 15 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Minimal quantity to purge spigot collected in bucket, discarded on ground outside of well building.

Note: No chlorinator system at Well 1.

Well 3
Fort Richardson Supply Well
15 March 1994

Sampling Point/Equipment: Sample collected from in-line spigot just downline of the pump/wellhead; sampling upline of pump not possible.

Well boring depth 145 ft bgs; screened interval unknown.

Purge Volume: Minimal quantity to purge spigot. Pump was shut down at time of visit; was started and allowed to run for 15 minutes prior to sampling.

Physical Parameters and Observations at time of Sample Collection

Temperature: 6.7 deg. C
pH: 7.07
Conductivity: 0.396 millimhos/cm
Redox Potential: 88 millivolts
Odor: None detectable
Appearance: Clear, colorless

Sample Number: 94FRGW 05WA

Time of Sampling: 0925-0930 15 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Minimal quantity to purge spigot collected in bucket, discarded on ground outside of well building.

Note: There is a chlorinator system at Well 3, but it is downline of the sampling point.

Otter Lake Lodge
Supply Well
1 April 1994

Sampling Point/Equipment: In "basement" of Otter Lake Upper Lodge, at spigot that appears to be upline of the chlorination apparatus. It is possible that the water sample taken from this location may contain some chlorination compound.

Purge Volume: Sink faucet in restroom allowed to run for 15 minutes before sampling to draw water through system; spigot at sampling point flushed for 1 minute to clear lines.

Physical Parameters and Observations at time of Sample Collection

Temperature: 6.2 deg. C
pH: 6.90
Conductivity: 0.215 millimhos/cm
Redox Potential: 57 millivolts
Odor: None detectable
Appearance: Clear and colorless

Sample Number: 94FRGW 42WA

Time of Sampling: 1020-1025 1 April 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Approx. 2 gallons purged from spigot discarded in toilet.

ADFG C
Fishery Supply Well
14 March 1994

Sampling Point/Equipment: Sample collected from spigot installed in 10-inch steel pipe, inside ADFG Well Manifold Building.

Pump Intake Depth: 48 ft bgs.

Purge Volume: Minimal quantity to clear spigot.

Physical Parameters and Observations at time of Sample Collection

Temperature: 2.7 deg. C
pH: 6.98
Conductivity: 0.551 millimhos/cm
Redox Potential: 117 millivolts
Odor: None detectable
Appearance: Clear, colorless

Sample Number: 94FRGW 01WA

Time of Sampling: 0930-0935 14 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Minimal quantity; discharged to floor drain per ADFG permission.

ADFG E
Fishery Supply Well
14 March 1994

Sampling Point/Equipment: Sample collected from spigot installed in 10-inch steel pipe, inside ADFG Well Manifold Building.

Pump Intake Depth: 29 ft bgs.

Purge Volume: Minimal quantity to clear spigot.

Physical Parameters and Observations at time of Sample Collection

Temperature: 1.7 deg. C
pH: 7.26
Conductivity: 0.168 millimhos/cm
Redox Potential: 32 millivolts
Odor: None detectable
Appearance: Clear, colorless

Sample Number: 94FRGW 02WA

Time of Sampling: 0940-0945 14 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Minimal quantity; discharged to floor drain per ADFG permission.

ADFG K
Fishery Supply Well
14 March 1994

Sampling Point/Equipment: Sample collected from spigot installed in 10-inch steel pipe, inside ADFG Well Manifold Building.

Pump Intake Depth: 34 ft bgs.

Purge Volume: Minimal quantity to purge spigot

Physical Parameters and Observations at time of Sample Collection

Temperature: 1.4 deg. C
pH: 6.93
Conductivity: 0.171 millimhos/cm
Redox Potential: 24 millivolts
Odor: None detectable
Appearance: Rusty at first, cleared quickly

Sample Number: 94FRGW 03WA

Time of Sampling: 0955-1000 14 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Minimal quantity; discharged to floor drain per ADFG permission.

NOTE: ADFG employee Paul Smith, who provided access to the manifold building, remarked that the pressure in the Well K feeder pipe was low, and that the water collected may be a mixture of water from Well K and the other wells feeding into the water main at that time.

ADFG 9
Fishery Supply Well
1 April 1994

Sampling Point/Equipment: Sample collected from spigot installed in 10-inch steel pipe, inside a concrete vault southeast of Building 37531.

Well Intake Depth: approx. 120 ft bgs?

Purge Volume: Minimal quantity to purge spigot.

Physical Parameters and Observations at time of Sample Collection

Temperature: 4.5 deg. C
pH: 6.91
Conductivity: 0.125 millimhos/cm
Redox Potential: 84 millivolts
Odor: None detectable
Appearance: Clear, colorless

Sample Number: 94FRGW 43WA

Time of Sampling: 1105-1110 1 April 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Minimal quantity to purge spigot collected in bucket, discarded on ground outside of vault.

Note: Well was shut down on 14 March 1994 when other ADFG wells were sampled. Meter on water main near spigot measured approximately 450 gal/min flow rate. Water was somewhat charged with air, and difficult to sample without bubbles.

Test Well 1 (TW-1)
23 March 1994

Sampling Point/Equipment: 6" diameter casing converted to monitoring well. Well contains 4" diameter submersible pump; 24-inch length of 1-inch Tygon tubing used to direct water flow. Homelight 4400 watt, 240 volt, 8 hp generator used, with adaptor cord needed.

Casing top/water: 27.36 ft
Casing top/bottom: 252.4 ft (from records)

Purge Volume: 360 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 4.1 deg. C
pH: 7.42
Conductivity: 0.250 millimhos/cm
Redox Potential: 0.90 millivolts
Odor: None detectable
Appearance: Clear with dark brown tint at first, becomes colorless after a few minutes

Sample Number: 94FRGW 17WA

Time of Sampling: 1105-1115 23 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Discharged to ground in vicinity of well.

Well A-1
23 March 1994

Sampling Point/Equipment: 6" diameter converted to monitoring well. Well contains 4" diameter submersible pump; 24-inch length of 1-inch Tygon tubing used to direct water flow. Homelight 4400 watt, 240 volt, 8 hp generator used, with adaptor cord needed.

Casing top/water: 35.51 ft
Casing top/bottom: 80.0 ft (from records)

Purge Volume: 180 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.0 deg. C
pH: 7.72
Conductivity: 0.205 millimhos/cm
Redox Potential: 94 millivolts
Odor: None detectable
Appearance: Dark brown at first; clear and colorless at time of sampling

Sample Number: 94FRGW 19WA

Time of Sampling: 1325-1335 23 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Discharged to ground in vicinity of well.

Well A-6
23 March 1994

Sampling Point/Equipment: 6" diameter casing converted to monitoring well. Well contains 4" diameter submersible pump; 24-inch length of 1-inch Tygon tubing used to direct water flow. Homelight 4400 watt, 240 volt, 8 hp generator used, with adaptor cord needed.

Casing top/water: 7.70 ft
Casing top/bottom: 62.3 ft (from records)

Purge Volume: 245 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.0 deg. C
pH: 6.94
Conductivity: 0.136 millimhos/cm
Redox Potential: 88 millivolts
Odor: slight sewage/sulfide odor
Appearance: Very dark-colored and turbid at first, but cleared up in a few minutes

Sample Number: 94FRGW 18WA

Time of Sampling: 1210-1220 23 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Discharged onto ground in vicinity of well.

Well B
25 March 1994

Sampling Point/Equipment: 6" diameter converted to monitoring well. Well contains 4" diameter submersible pump; 24-inch length of 1-inch Tygon tubing used to direct water flow. Homelight 4400 watt, 240 volt, 8 hp generator used, with adaptor cord needed. Well is located within an open concrete shed.

Casing top/water: 98.25 ft
Casing top/bottom: 140 ft (from records)

Purge Volume: 350 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 3.1 deg. C
pH: 7.46
Conductivity: 0.354 millimhos/cm
Redox Potential: 87 millivolts
Odor: None detectable
Appearance: Blackish-brown at first; clear and colorless after 5 minutes.

Sample Number: 94FRGW 25WA

Time of Sampling: 1225-1235 25 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Discharged to ground in vicinity of well; water tended to drain away through hole in floor of concrete shed.

AK-2127
25 March 1994

Sampling Point/Equipment: 6" diameter converted to monitoring well. Well contains 4" diameter submersible pump; 24-inch length of 1-inch Tygon tubing used to direct water flow. Homelight 4400 watt, 240 volt, 8 hp generator used, with adaptor cord needed.

Casing top/water: 79.15 ft
Casing top/bottom: 191 ft (from records)

Purge Volume: 320 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 3.9 deg. C
pH: 7.24
Conductivity: 0.238 millimhos/cm
Redox Potential: 83 millivolts
Odor: None detectable
Appearance: Rust-colored at first; clear and colorless after 10 minutes purging.

Sample Number: 94FRGW 26WA

Time of Sampling: 1010-1020 25 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Discharged to ground in vicinity of well.

AP-3233
Building 987
1 April 1994

Sampling Point/Equipment: 2" diameter flush-mount monitoring well
(requires a 1/2-inch socket wrench to open); reusable bailer.

Casing top/water: 115.38 ft
Casing top/bottom: 125 ft (from records)

Purge Volume: 5 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.4 deg. C
pH: 6.80
Conductivity: 0.312 millimhos/cm
Redox Potential: 2 millivolts
Odor: Faint petroleum odor
Appearance: Fairly turbid at sampling; slight sheen on
water collected.

Sample Number: 94FRGW 44WA

Time of Sampling: 1455-1520 1 April 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Stored in sealed 5-gallon
polyethylene containers, with 35-gallon steel drum as overpack,
in CENPA-EN-G IDW holding facility pending determination of
proper disposal.

AP-3235
Building 987
24 March 1994

Sampling Point/Equipment: 4" diameter flush-mount monitoring well (1/2-inch socket wrench required to open); sampled with reusable bailer.

Casing top/water: 116.45 ft
Casing top/bottom: 128.0 ft (from records)

Purge Volume: 13 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 6.0 deg. C
pH: 7.06
Conductivity: 0.537 millimhos/cm
Redox Potential: 57 millivolts
Odor: distinct petroleum odor
Appearance: Dark sand and silt; still turbid at sampling. Slight sheen on collected water, but no floating product detected by interface probe.

Sample Number: 94FRGW 20WA
-21WA (quality control duplicate)
-22WA (quality assurance duplicate)
Rinsate of Bailer
-23WA
-24WA (quality assurance duplicate)

Time of Sampling: 1345-1430 24 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Stored in sealed 5-gallon polyethylene containers, with 35-gallon steel drum as overpack, in CENPA-EN-G IDW holding facility pending determination of proper disposal.

AP-2982
Building 35-752
18 March 1994

Sampling Point/Equipment: 2" diameter monitoring well;
disposable bailer.

Casing top/water: 17.80 ft
Casing top/bottom: 25.40 ft

Purge Volume: 7 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 3.3 deg. C
pH: 6.25
Conductivity: 0.228 millimhos/cm
Redox Potential: 79 millivolts
Odor: None detectable
Appearance: Slightly turbid with first bailer, then very
turbid, then clears up considerably but still turbid.

Sample Number: 94FRGW 11WA

Time of Sampling: 1030-1035 18 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved
608 PCBs

Disposition of Purge Water: Stored in sealed 5-gallon
polyethylene containers, with 35-gallon steel drum as overpack;
will be disposed of in oil/water separator.

AP-2985
Building 35-752
18 March 1994

Sampling Point/Equipment: 2" diameter monitoring well;
disposable bailer.

Casing top/water: 13.45 ft
Casing top/bottom: 16.34 ft

Purge Volume: 9 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 1.4 deg. C
pH: 6.33
Conductivity: 0.533 millimhos/cm
Redox Potential: 80 millivolts
Odor: None detectable
Appearance: Extremely silty, then becoming much less
turbid.

Sample Number: 94FRGW 13WA
-14WA (QC duplicate, 608 ONLY)
-15WA (QA duplicate, 608 ONLY)

Time of Sampling: 1150-1205 18 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved
608 PCBs

Disposition of Purge Water: Stored in sealed 5-gallon
polyethylene containers, with 35-gallon steel drum as overpack;
will be disposed of in an oil/water separator.

AP-3231
Building 35-752
18 March 1994

Sampling Point/Equipment: 2" diameter monitoring well;
disposable bailer.

Casing top/water: 20.05 ft
Casing top/bottom: 23.55 ft

Purge Volume: 5 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 1.6 deg. C
pH: 6.36
Conductivity: -0.003 millimhos/cm (malfunction)
Redox Potential: 83 millivolts
Odor: None detectable
Appearance: Extremely turbid with silt and sand, still very
turbid upon sampling.

Sample Number: 94FRGW 12WA

Time of Sampling: 1440-1450 18 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved
608 PCBs

Disposition of Purge Water: Stored in sealed 5-gallon
polyethylene containers, with 35-gallon steel drum as overpack,
in CENPA-EN-G IDW holding facility pending determination of
proper disposal.

AP-2974
Fort Richardson Power Plant
16 March 1994

Sampling Point/Equipment: 2" diameter monitoring well; disposable
bailer.

Casing top/water: 18.90 ft
Casing top/bottom: 20.15 ft

Purge Volume: 5 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.6 deg. C
pH: 6.70
Conductivity: 0.292 millimhos/cm
Redox Potential: 11 millivolts
Odor: None detectable
Appearance: Much reddish silt and dark sand at first, still
quite turbid when sampled.

Sample Number: 94FRGW 06WA
-07WA (quality control duplicate)
-08WA (quality assurance duplicate)

Time of Sampling: 1005-1020 15 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved

Disposition of Purge Water: Stored in sealed 5-gallon
polyethylene container, with 35-gallon steel drum as overpack;
will be disposed of in oil/water separator.

AP-3010
Landfill Well
31 March 1994

Sampling Point/Equipment: 4" diameter monitoring well; well contains a 2" diameter submersible pump (Grundfos). Homelight 4400 watt, 240 volt, 8 hp generator used, with Grundfos voltage control box.

Casing top/water: 228.88 ft
Casing top/bottom: 237.8 ft (from records)

Purge Volume: approx. 30 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 4.4 deg. C
pH: 6.79
Conductivity: 0.658 millimhos/cm
Redox Potential: 23 millivolts
Diss. Oxygen: 5.7 ppm
Odor: None detectable
Appearance: Clear and colorless, with periodic sand

Sample Number: 94FRGW 35WA

Time of Sampling: 0920-0930 31 March 1994

Analyses Requested:

- 8260 Volatile Organic Compounds
- 8015 (modified, ADEC Version) Gasoline Range Organics
- 8100 (modified, ADEC Version) Diesel Range Organics
- 23 TAL Metals, total
- 23 TAL Metals, dissolved
- 608 PCBs and Pesticides
- 418.1 Total Petroleum Hydrocarbons
- 415.1 Total Organic Carbon
- 410.4 Chemical Oxygen Demand
- 405.1 Biological Oxygen Demand
- 130.1 Hardness
- 365.2 Phosphate, total
- 350.3 Ammonium Nitrogen
- 353.3 Nitrate/Nitrite
- 310.1 Alkalinity
- 160.1 Total Dissolved Solids
- 325.1 Chloride
- 375.4 Sulfate
- 180.1 Turbidity

Disposition of Purge Water: Containerized in a 35-gallon steel drum with a 55-gallon steel drum as overpack; discharged onto ground in vicinity of well after review of chemical results.

AP-3013
 Landfill Well
 29 March 1994

Sampling Point/Equipment: 4" diameter monitoring well; well contains a 2" diameter submersible pump (Grundfos). Homelight 4400 watt, 240 volt, 8 hp generator used, with Grundfos voltage control box.

Casing top/water: 135.66 ft
 Casing top/bottom: 153.4 ft (from records)

Purge Volume: 35 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 4.6 deg. C
 pH: 6.54
 Conductivity: 0.355 millimhos/cm
 Redox Potential: 44 millivolts
 Diss. Oxygen: 4.9 ppm
 Odor: None detectable
 Appearance: Dark silt at first, clears up within minutes

Sample Number: 94FRGW 32WA
 -33WA (quality control duplicate)
 -34WA (quality assurance duplicate)

Time of Sampling: 1020-1055 29 March 1994

Analyses Requested:

- 8260 Volatile Organic Compounds
- 8015 (modified, ADEC Version) Gasoline Range Organics
- 8100 (modified, ADEC Version) Diesel Range Organics
- 23 TAL Metals, total
- 23 TAL Metals, dissolved
- 608 PCBs and Pesticides
- 418.1 Total Petroleum Hydrocarbons
- 415.1 Total Organic Carbon
- 410.4 Chemical Oxygen Demand
- 405.1 Biological Oxygen Demand
- 130.1 Hardness
- 365.2 Phosphate, total
- 350.3 Ammonium Nitrogen
- 353.3 Nitrate/Nitrite
- 310.1 Alkalinity
- 160.1 Total Dissolved Solids
- 325.1 Chloride
- 375.4 Sulfate
- 180.1 Turbidity

(cont.)

AP-3013
Landfill Well
29 March 1994
(cont.)

Disposition of Purge Water: Containerized in a 35-gallon steel drum with a 55-gallon steel drum as overpack; discharged onto ground in vicinity of well upon review of chemical results.

AP-3014
 Landfill Well
 28 March 1994

Sampling Point/Equipment: 4" diameter monitoring well; well contains a 2" diameter submersible pump (Grundfos). Homelight 4400 watt, 240 volt, 8 hp generator used, with Grundfos voltage control box.

Casing top/water: 19.32 ft
 Casing top/bottom: 34.6 ft (from records)

Purge Volume: 35 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 2.3 deg. C
 pH: 4.8 (malfunction)
 Conductivity: 0.246 millimhos/cm
 Redox Potential: 81 millivolts
 Diss. Oxygen: 1.2 ppm
 Odor: None detectable
 Appearance: Clear, colorless from start of purging

Sample Number: 94FRGW 30WA

Time of Sampling: 1400-1420 28 March 1994

Analyses Requested:

- 8260 Volatile Organic Compounds
- 8015 (modified, ADEC Version) Gasoline Range Organics
- 8100 (modified, ADEC Version) Diesel Range Organics
- 23 TAL Metals, total
- 23 TAL Metals, dissolved
- 608 PCBs and Pesticides
- 418.1 Total Petroleum Hydrocarbons
- 415.1 Total Organic Carbon
- 410.4 Chemical Oxygen Demand
- 405.1 Biological Oxygen Demand
- 130.1 Hardness
- 365.2 Phosphate, total
- 350.3 Ammonium Nitrogen
- 353.3 Nitrate/Nitrite
- 310.1 Alkalinity
- 160.1 Total Dissolved Solids
- 325.1 Chloride
- 375.4 Sulfate
- 180.1 Turbidity

Disposition of Purge Water: Containerized in a 35-gallon steel drum with a 55-gallon steel drum as overpack; discharged onto ground in vicinity of well upon review of chemical results.

AP-3015
Landfill Well
28 March 1994

Sampling Point/Equipment: 4" diameter monitoring well; well contains a 2" diameter submersible pump (Grundfos). Homelight 4400 watt, 240 volt, 8 hp generator used, with Grundfos voltage control box.

Casing top/water: 119.85 ft
Casing top/bottom: 130.0 (from records)

Purge Volume: 30 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.1 deg. C
pH: 6.70
Conductivity: 0.391 millimhos/cm
Redox Potential: 51 millivolts
Diss. Oxygen: 5.6 ppm
Odor: None detectable
Appearance: Clear, colorless

Sample Number: 94FRGW 31WA

Time of Sampling: 1510-1525 28 March 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved
608 PCBs and Pesticides
418.1 Total Petroleum Hydrocarbons
415.1 Total Organic Carbon
410.4 Chemical Oxygen Demand
405.1 Biological Oxygen Demand
130.1 Hardness
365.2 Phosphate, total
350.3 Ammonium Nitrogen
353.3 Nitrate/Nitrite
310.1 Alkalinity
160.1 Total Dissolved Solids
325.1 Chloride
375.4 Sulfate
180.1 Turbidity

Disposition of Purge Water: Containerized in a 35-gallon steel drum with a 55-gallon steel drum as overpack; discharged onto ground in vicinity of well upon review of chemical results.

AP-3221
 Landfill Well
 30 March 1994

Sampling Point/Equipment: 4" diameter monitoring well; well contains a 2" diameter submersible pump (Grundfos). Homelight 4400 watt, 240 volt, 8 hp generator used, with Grundfos voltage control box. Electric connection at well head has a square-shaped connector, and requires a special adaptor cord.

Casing top/water: 154.54 ft
 Casing top/bottom: 180 ft (from records)

Purge Volume: 50 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 6.0 deg. C
 pH: 7.12
 Conductivity: 0.695 millimhos/cm
 Redox Potential: 57 millivolts
 Diss. Oxygen: 2.2 ppm
 Odor: None detectable
 Appearance: Clear at first, then turbid with light-colored silt; still turbid

Sample Number: 94FRGW 36WA

Time of Sampling: 1240-1255 30 March 1994

Analyses Requested:

- 8260 Volatile Organic Compounds
- 8015 (modified, ADEC Version) Gasoline Range Organics
- 8100 (modified, ADEC Version) Diesel Range Organics
- 23 TAL Metals, total
- 23 TAL Metals, dissolved
- 608 PCBs and Pesticides
- 418.1 Total Petroleum Hydrocarbons
- 415.1 Total Organic Carbon
- 410.4 Chemical Oxygen Demand
- 405.1 Biological Oxygen Demand
- 130.1 Hardness
- 365.2 Phosphate, total
- 350.3 Ammonium Nitrogen
- 353.3 Nitrate/Nitrite
- 310.1 Alkalinity
- 160.1 Total Dissolved Solids
- 325.1 Chloride
- 375.4 Sulfate
- 180.1 Turbidity

(cont.)

AP-3221
Landfill Well
30 March 1994
(cont.)

Disposition of Purge Water: Containerized in a 35-gallon steel drum with a 55-gallon steel drum as overpack; will be disposed of at oil/water separator.

FR-1
Landfill Well
31 March 1994

Sampling Point/Equipment: 2" diameter monitoring well; reusable
bailer.

Casing top/water: 134.41 ft
Casing top/bottom: 149.8 ft (from records)

Purge Volume: 7.5 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 4.4 deg. C
pH: 7.20
Conductivity: 0.234 millimhos/cm
Redox Potential: 19 millivolts
Diss. Oxygen: 4.7 ppm
Odor: None detectable
Appearance: Very clear at sampling

Sample Number: 94FRGW 37WA

Time of Sampling: 1130-1140 31 March 1994

Analyses Requested:

- 8260 Volatile Organic Compounds
- 8015 (modified, ADEC Version) Gasoline
Range Organics
- 8100 (modified, ADEC Version) Diesel Range
Organics
- 23 TAL Metals, total
- 23 TAL Metals, dissolved
- 608 PCBs and Pesticides
- 418.1 Total Petroleum Hydrocarbons
- 415.1 Total Organic Carbon
- 410.4 Chemical Oxygen Demand
- 405.1 Biological Oxygen Demand
- 130.1 Hardness
- 365.2 Phosphate, total
- 350.3 Ammonium Nitrogen
- 353.3 Nitrate/Nitrite
- 310.1 Alkalinity
- 160.1 Total Dissolved Solids
- 325.1 Chloride
- 375.4 Sulfate
- 180.1 Turbidity

Disposition of Purge Water: Containerized in a 35-gallon steel
drum with a 55-gallon steel drum as overpack; will be disposed of
in oil/water separator.

FR-2
Landfill Well
3 April 1994

Sampling Point/Equipment: 2" diameter monitoring well; reusable
bailer.

Casing top/water: 147.68 ft
Casing top/bottom: 167.6 ft (from records)

Purge Volume: 9 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 5.1 deg. C
pH: 7.52
Conductivity: 0.403 millimhos/cm
Redox Potential: 8 millivolts
Diss. Oxygen: 3.7 ppm
Odor: None detectable
Appearance: Still turbid at sampling

Sample Number: 94FRGW 39WA

Time of Sampling: 1615-1630 3 April 1994

Analyses Requested:

- 8260 Volatile Organic Compounds
- 8015 (modified, ADEC Version) Gasoline
Range Organics
- 8100 (modified, ADEC Version) Diesel Range
Organics
- 23 TAL Metals, total
- 23 TAL Metals, dissolved
- 608 PCBs and Pesticides
- 418.1 Total Petroleum Hydrocarbons
- 415.1 Total Organic Carbon
- 410.4 Chemical Oxygen Demand
- 405.1 Biological Oxygen Demand
- 130.1 Hardness
- 365.2 Phosphate, total
- 350.3 Ammonium Nitrogen
- 353.3 Nitrate/Nitrite
- 310.1 Alkalinity
- 160.1 Total Dissolved Solids
- 325.1 Chloride
- 375.4 Sulfate
- 180.1 Turbidity

Disposition of Purge Water: Containerized in a 35-gallon steel
drum with a 55-gallon steel drum as overpack; will be disposed of
in an oil/water separator.

FR-3
Landfill Well
3 April 1994

Sampling Point/Equipment: 2" diameter monitoring well; reusable
bailer.

Casing top/water: 147.94 ft
Casing top/bottom: 171.7 ft (from records)

Purge Volume: 11 gallons

Physical Parameters and Observations at time of Sample Collection

Temperature: 3.2 deg. C
pH: 6.85
Conductivity: 0.351 millimhos/cm
Redox Potential: 3 millivolts
Diss. Oxygen: 4.8 ppm
Odor: None detectable
Appearance: Still quite turbid at sampling

Sample Number: 94FRGW 38WA

Time of Sampling: 1200-1220 3 April 1994

Analyses Requested: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total
23 TAL Metals, dissolved
608 PCBs and Pesticides
418.1 Total Petroleum Hydrocarbons
415.1 Total Organic Carbon
410.4 Chemical Oxygen Demand
405.1 Biological Oxygen Demand
130.1 Hardness
365.2 Phosphate, total
350.3 Ammonium Nitrogen
353.3 Nitrate/Nitrite
310.1 Alkalinity
160.1 Total Dissolved Solids
325.1 Chloride
375.4 Sulfate
180.1 Turbidity

Disposition of Purge Water: Containerized in a 35-gallon steel
drum with a 55-gallon steel drum as overpack; in CENPA-EN-G IDW
holding facility pending determination of proper disposal.

Rinsates
3 April 1994
1930 hrs

94FRGW 48WA
-49WA (quality assurance duplicate)

Tygon tubing: 8260 Volatile Organic Compounds
8015 (modified, ADEC Version) Gasoline
Range Organics
8100 (modified, ADEC Version) Diesel Range
Organics
23 TAL Metals, total

Bailer: 608 PCBs and Pesticides
418.1 Total Petroleum Hydrocarbons
410.4 Chemical Oxygen Demand
365.2 Phosphate, total
350.3 Ammonium Nitrogen
353.3 Nitrate/Nitrite
310.1 Alkalinity
160.1 Total Dissolved Solids
325.1 Chloride
375.4 Sulfate

APPENDIX B
Chemical Data Tables

Table 1
Ft. Richardson GW Study
Method 8015
Gasoline Range Organics (GRO)
March, 1994

Page 1 of 6

LOCATION:	ADFG C	ADFG E	ADFG K	ADFG 9	Well 1	Well 3
DATE OF SAMPLING:	3/14/94	3/14/94	3/14/94	4/01/94	3/15/94	3/15/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	01WA	02WA	03WA	43WA	04WA	05WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K163701	K163702	K163703	K203302	K163704	K163705
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 1
Ft. Richardson GW Study
Method 8015
Gasoline Range Organics (GRO)
March, 1994

LOCATION:	TW 1	Well A1	Well A6	AK-2127	Well B	Otter Lake
DATE OF SAMPLING:	3/23/94	3/23/94	3/23/94	3/25/94	3/25/94	4/01/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	17WA	19WA	18WA	26WA	25WA	42WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K184201	K184203	K184202	K184208	K184207	K203301
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 1
Ft. Richardson GW Study
Method 8015
Gasoline Range Organics (GRO)
March, 1994

			QC DUP	QA DUP	
LOCATION:	AP-3233	AP-3235	AP-3235	AP-3235	AP-2982
DATE OF SAMPLING:	4/01/94	3/24/94	3/24/94	3/24/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	44WA	20WA	21WA	22WA	11WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS
LABORATORY SAMPLE #:	K203303	K184204	K184205	190551	K167901
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	2.280	0.490	0.496	0.64	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 1
 Ft. Richardson GW Study
 Method 8015
 Gasoline Range Organics (GRO)
 March, 1994

	AP-2985	AP-3231	AP-2974	QC DUP AP-2974	QA DUP AP-2974
LOCATION:					
DATE OF SAMPLING:	3/18/94	3/18/94	3/16/94	3/16/94	3/16/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	13WA	12WA	06WA	07WA	08WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NET
LABORATORY SAMPLE #:	K167903	K167902	K163706	K163707	190076
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.05)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 1

Ft. Richardson GW Study

Method 8015

Gasoline Range Organics (GRO)

March, 1994

			QC DUP	QA DUP		
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS	CAS
LABORATORY SAMPLE #:	K198602	K192103	K192104	190918	K192101	K192102
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.05)	ND (0.050)	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 1
Ft. Richardson GW Study
Method 8015
Gasoline Range Organics (GRO)
March, 1994

LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:94FRGW-	36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K198601	K198603	K203304	K203305
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
Gasoline Range Organics	ND (0.050)	ND (0.050)	0.530	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 2
Ft. Richardson GW Study
Method 8100
Diesel Range Organics (DRO)
March, 1994

LOCATION:	ADFG C	ADFG E	ADFG K	ADFG 9	Well 1	Well 3
DATE OF SAMPLING:	3/14/94	3/14/94	3/14/94	4/01/94	3/15/94	3/15/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	01WA	02WA	03WA	43WA	04WA	05WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K163701	K163702	K163703	K203302	K163704	K163705
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 2
Ft. Richardson GW Study
Method 8100
Diesel Range Organics (DRO)
March, 1994

Page 2 of 6

LOCATION:	TW 1	Well A1	Well A6	AK-2127	Well B	Otter Lake Lodge
DATE OF SAMPLING:	3/23/94	3/23/94	3/23/94	3/25/94	3/25/94	4/01/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	17WA	19WA	18WA	26WA	25WA	42WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K184201	K184203	K184202	K184208	K184207	K203301
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	0.051 a	ND (0.050)	0.071 a	0.052 a	ND (0.050)	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

a: Quantified as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Table 2
Ft. Richardson GW Study
Method 8100
Diesel Range Organics (DRO)
March, 1994

			QC DUP	QA DUP	
LOCATION:	AP-3233	AP-3235	AP-3235	AP-3235	AP-2982
DATE OF SAMPLING:	4/01/94	3/24/94	3/24/94	3/24/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	44WA	20WA	21WA	22WA	11WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS
LABORATORY SAMPLE #:	K203303	K184204	K184205	190551	K167901
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	13.600	8.390	4.250	5.5	0.508 a

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

a: Quantified as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Table 2
Ft. Richardson GW Study
Method 8100
Diesel Range Organics (DRO)
March, 1994

				QC DUP	QA DUP
LOCATION:	AP-2985	AP-3231	AP-2974	AP-2974	AP-2974
DATE OF SAMPLING:	3/18/94	3/18/94	3/16/94	3/16/94	3/16/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	13WA	12WA	06WA	07WA	08WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NET
LABORATORY SAMPLE #:	K167903	K167902	K163706	K163707	190076
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	0.067 a	0.085 a	0.109 a	0.092 a	ND (0.1)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

a: Quantified as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Table 2
Ft. Richardson GW Study
Method 8100
Diesel Range Organics (DRO)
March, 1994

Page 5 of 6

	AP-3010	AP-3013	QC DUP AP-3013	QA DUP AP-3013	AP-3014	AP-3015
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS	CAS
LABORATORY SAMPLE #:	K198602	K192103	K192104	190918	K192101	K192102
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	ND (0.050)	ND (0.050)	ND (0.050)	ND (0.1)	ND (0.050)	ND (0.050)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 2
Ft. Richardson GW Study
Method 8100
Diesel Range Organics (DRO)
March, 1994

LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:94FRGW-	36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K198601	K198603	K203304	K203305
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L
Diesel Range Organics	0.071	8.060	3.140	4.020

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 3
Ft. Richardson GW Study
Method 8080
Polychlorinated Biphenyl (PCBs)
March, 1994

	AP-2982	AP-3231	AP-2985	QC DUP AP-2985	QA DUP AP-2985
LOCATION:	AP-2982	AP-3231	AP-2985	AP-2985	AP-2985
DATE OF SAMPLING:	3/18/94	3/18/94	3/18/94	3/18/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	11WA	12WA	13WA	14WA	15WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NET
LABORATORY SAMPLE #:	K167901	K167902	K167903	K167904	190158
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
alpha-BHC	NT	NT	NT	NT	NT
beta-BHC	NT	NT	NT	NT	NT
delta-BHC	NT	NT	NT	NT	NT
Heptachlor	NT	NT	NT	NT	NT
Aldrin	NT	NT	NT	NT	NT
gamma-BHC (Lindane)	NT	NT	NT	NT	NT
Heptachlor epoxide	NT	NT	NT	NT	NT
Endosulfan I	NT	NT	NT	NT	NT
Endrin	NT	NT	NT	NT	NT
Endosulfan II	NT	NT	NT	NT	NT
4,4'-DDD	NT	NT	NT	NT	NT
Endrin aldehyde	NT	NT	NT	NT	NT
Endosulfan sulfate	NT	NT	NT	NT	NT
4,4'- DDT	NT	NT	NT	NT	NT
4,4'-DDE	NT	NT	NT	NT	NT
Dieldrin	NT	NT	NT	NT	NT
Methoxychlor	NT	NT	NT	NT	NT
Toxaphene	NT	NT	NT	NT	NT
Chlordane	NT	NT	NT	NT	NT
Aroclor 1016	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.5)
Aroclor 1221	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.5)
Aroclor 1232	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.5)
Aroclor 1242	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.6)
Aroclor 1248	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.5)
Aroclor 1254	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.5)
Aroclor 1260	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.5)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

NT: Not Tested

Table 3
 Ft. Richardson GW Study
 Method 8080
 Polychlorinated Biphenyl (PCBs)
 March, 1994

			QC DUP	QA DUP		
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS	CAS
LABORATORY SAMPLE #:	K198602	K192103	K192104	190918	K192101	K192102
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
alpha-BHC	NT	NT	NT	ND (0.005)	NT	NT
beta-BHC	NT	NT	NT	ND (0.005)	NT	NT
delta-BHC	NT	NT	NT	ND (0.005)	NT	NT
Heptachlor	NT	NT	NT	ND (0.05)	NT	NT
Aldrin	NT	NT	NT	ND (0.02)	NT	NT
gamma-BHC (Lindane)	NT	NT	NT	ND (0.02)	NT	NT
Heptachlor epoxide	NT	NT	NT	ND (0.05)	NT	NT
Endosulfan I	NT	NT	NT	ND (0.05)	NT	NT
Endrin	NT	NT	NT	ND (0.05)	NT	NT
Endosulfan II	NT	NT	NT	ND (0.05)	NT	NT
4,4'-DDD	NT	NT	NT	ND (0.05)	NT	NT
Endrin aldehyde	NT	NT	NT	ND (0.05)	NT	NT
Endosulfan sulfate	NT	NT	NT	ND (0.05)	NT	NT
4,4'- DDT	NT	NT	NT	ND (0.05)	NT	NT
4,4'-DDE	NT	NT	NT	ND (0.05)	NT	NT
Dieldrin	NT	NT	NT	ND (0.05)	NT	NT
Methoxychlor	NT	NT	NT	ND (0.08)	NT	NT
Toxaphene	NT	NT	NT	ND (1.0)	NT	NT
Chlordane	NT	NT	NT	ND (0.4)	NT	NT
Aroclor 1016	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.5)	ND (0.2)	ND (0.2)
Aroclor 1221	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.5)	ND (0.2)	ND (0.2)
Aroclor 1232	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.5)	ND (0.2)	ND (0.2)
Aroclor 1242	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.6)	ND (0.2)	ND (0.2)
Aroclor 1248	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.5)	ND (0.2)	ND (0.2)
Aroclor 1254	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.5)	ND (0.2)	ND (0.2)
Aroclor 1260	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.5)	ND (0.2)	ND (0.2)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

NT: Not Tested

Table 3
Ft. Richardson GW Study
Method 8080
Polychlorinated Biphenyl (PCBs)
March, 1994

LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:94FRGW-	36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K198601	K198603	K203304	K203305
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
alpha-BHC	NT	NT	NT	NT
beta-BHC	NT	NT	NT	NT
delta-BHC	NT	NT	NT	NT
Heptachlor	NT	NT	NT	NT
Aldrin	NT	NT	NT	NT
gamma-BHC (Lindane)	NT	NT	NT	NT
Heptachlor epoxide	NT	NT	NT	NT
Endosulfan I	NT	NT	NT	NT
Endrin	NT	NT	NT	NT
Endosulfan II	NT	NT	NT	NT
4,4'-DDD	NT	NT	NT	NT
Endrin aldehyde	NT	NT	NT	NT
Endosulfan sulfate	NT	NT	NT	NT
4,4'- DDT	NT	NT	NT	NT
4,4'-DDE	NT	NT	NT	NT
Dieldrin	NT	NT	NT	NT
Methoxychlor	NT	NT	NT	NT
Toxaphene	NT	NT	NT	NT
Chlordane	NT	NT	NT	NT
Aroclor 1016	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Aroclor 1221	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Aroclor 1232	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Aroclor 1242	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Aroclor 1248	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Aroclor 1254	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Aroclor 1260	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

NT: Not Tested

Table 4
Ft. Richardson GW Study
23 Metals, Total
March, 1994

Page 1 of 6

LOCATION:	ADFG C	ADFG E	ADFG K	ADFG 9	Well 1	Well 3
DATE OF SAMPLING:	3/14/94	3/14/94	3/14/94	4/01/94	3/15/94	3/15/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	01WA	02WA	03WA	43WA	04WA	05WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K163701	K163702	K163703	K203302	K163704	K163705
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	240
Antimony	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	ND (5)	ND (5)	ND (5)	5	ND (5)	ND (5)
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Calcium	21900	21500	22700	29000	35400	37400
Chromium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Copper	ND (10)	18	ND (10)	ND (10)	30	12
Iron	ND (20)	ND (20)	1120	ND (20)	52	402
Lead	ND (2)	4	2	5	2	3
Magnesium	3560	3490	3690	4890	6020	5600
Manganese	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)
Potassium	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	2120	2020	2160	2440	2470	2670
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (10)	44	12

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 4
Ft. Richardson GW Study
23 Metals, Total
March, 1994

LOCATION:	TW 1	Well A1	Well A6	AK-2127	Well B	Otter Lake
DATE OF SAMPLING:	3/23/94	3/23/94	3/23/94	3/25/94	3/25/94	4/01/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	17WA	19WA	18WA	26WA	25WA	42WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K184201	K184203	K184202	K184208	K184207	K203301
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	274	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Antimony	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	7	6	5	9	7	8
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	7	ND (3)	ND (3)
Calcium	42200	35600	21600	34100	49800	55300
Chromium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Copper	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Iron	1890	246	392	409	315	23
Lead	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Magnesium	7900	5320	3580	8270	16200	7160
Manganese	13	ND (5)	8	8	6	ND (5)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)
Potassium	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	3350	2700	2680	4280	3950	2250
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	101

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 4
Ft. Richardson GW Study
23 Metals, Total
March, 1994

Page 3 of 6

	AP-3233	AP-3235	QC DUP AP-3235	QA DUP AP-3235	AP-2982
LOCATION:	AP-3233	AP-3235	AP-3235	AP-3235	AP-2982
DATE OF SAMPLING:	4/01/94	3/24/94	3/24/94	3/24/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	44WA	20WA	21WA	22WA	11WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS
LABORATORY SAMPLE #:	K203303	K184204	K184205	190551	K167901
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	11900	47500	41200	41000	3660
Antimony	ND (50)	ND (50)	ND (50)	ND (100)	ND (50)
Arsenic	10	19	19	25	ND (5)
Barium	102	346	304	260	30
Beryllium	ND (5)	ND (5)	ND (5)	ND (20)	ND (5)
Cadmium	ND (3)	ND (4)	ND (4)	ND (20)	ND (3)
Calcium	86800	117000	112000	110000	27200
Chromium	24	109	93	100	6
Cobalt	12	39	35	ND (50)	ND (10)
Copper	66	130	114	130	ND (10)
Iron	19700	74700	65000	72000	5380
Lead	17	29	28	32	2
Magnesium	17800	38700	35100	36000	6070
Manganese	2030	2450	2240	2200	814
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	1.0
Nickel	31	145	121	150	ND (20)
Potassium	3600	7000	6200	5000	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (1)	ND (10)
Sodium	4160	6300	5970	5200	7600
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	41	154	135	ND (50)	11
Zinc	52	184	158	170	18

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 4
Ft. Richardson GW Study
23 Metals, Total
March, 1994

Page 4 of 6

	AP-2985	AP-3231	AP-2974	QC DUP AP-2974	QA DUP AP-2974
LOCATION:	AP-2985	AP-3231	AP-2974	AP-2974	AP-2974
DATE OF SAMPLING:	3/18/94	3/18/94	3/16/94	3/16/94	3/16/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	13WA	12WA	06WA	07WA	08WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NET
LABORATORY SAMPLE #:	K167903	K167902	K163706	K163707	190076
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	8750	86900	10500	11300	11000
Antimony	ND (50)	ND (50)	ND (50)	ND (50)	ND (100)
Arsenic	5	46	ND (5)	ND (5)	5
Barium	66	860	102	107	100
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)	ND (20)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)	ND (20)
Calcium	55400	36700	32700	31600	32000
Chromium	12	139	14	18	ND (20)
Cobalt	ND (10)	82	ND (10)	10	ND (50)
Copper	22	323	20	23	30
Iron	10900	126000	14400	16100	16000
Lead	8	54	5	5	6
Magnesium	12100	35700	11800	11900	12000
Manganese	391	4760	479	545	490
Mercury	ND (0.5)	1.3	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	247	ND (20)	ND (20)	ND (50)
Potassium	ND (2000)	6700	ND (2000)	ND (2000)	2100
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)	ND (1)
Sodium	13400	9630	9140	8850	9300
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	23	225	28	30	ND (50)
Zinc	44	404	39	43	ND (50)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 4
Ft. Richardson GW Study
23 Metals, Total
March, 1994

Page 5 of 6

	AP-3010	AP-3013	QC DUP AP-3013	QA DUP AP-3013	AP-3014	AP-3015
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	NET	CAS	NET	NET	NET
LABORATORY SAMPLE #:	K198602	K192103	K192104	190918	K192101	K192102
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	58	197	134	ND (200)	ND (50)	1530
Antimony	ND (50)	ND (50)	ND (50)	ND (100)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	12	-	6	ND (20)	14	23
Beryllium	ND (5)	ND (5)	ND (5)	ND (20)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (20)	ND (3)	ND (3)
Calcium	75300	55500	56000	54000	27800	64500
Chromium	10	9	5	ND (20)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)	ND (10)
Copper	ND (10)	ND (10)	ND (10)	ND (20)	ND (10)	ND (10)
Iron	450	400	233	200	84	2510
Lead	2	2	ND (2)	6	ND (2)	16
Magnesium	26300	8330	8360	8000	9630	9740
Manganese	36	16	8	ND (20)	2030	89
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (50)	ND (20)	ND (20)
Potassium	ND (2000)	ND (2000)	ND (2000)	700	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (50)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (1)	ND (10)	ND (10)
Sodium	3570	3040	3060	3200	5800	3220
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)	ND (10)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 4
Ft. Richardson GW Study
23 Metals, Total
March, 1994

Page 6 of 6

LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:94FRGW-	36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K198601	K198603	K203304	K203305
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Aluminum	15100	2090	2140	37600
Antimony	ND (50)	ND (50)	ND (50)	ND (50)
Arsenic	7	ND (5)	ND (5)	13
Barium	141	22	25	222
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)
Calcium	131000	56400	66800	79300
Chromium	74	7	ND (5)	76
Cobalt	12	ND (10)	ND (10)	26
Copper	32	15	14	71
Iron	<u>24500</u>	<u>3910</u>	<u>3820</u>	<u>59100</u>
Lead	8	3	3	33
Magnesium	27300	8850	10100	28900
Manganese	526	153	270	1280
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	67	ND (20)	ND (20)	81
Potassium	4300	2400	2100	5500
Selenium	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	5080	3110	3240	4290
Thallium	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	48	ND (10)	ND (10)	124
Zinc	<u>66</u>	18	15	<u>1300</u>

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 5
Ft. Richardson GW Study
23 Metals, Dissolved
March, 1994

Page 1 of 6

LOCATION:	ADFG C	ADFG E	ADFG K	ADFG 9	Well 1	Well 3
DATE OF SAMPLING:	3/14/94	3/14/94	3/14/94	4/01/94	3/15/94	3/15/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	01WA	02WA	03WA	43WA	04WA	05WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K163701	K163702	K163703	K203302	K163704	K163705
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Antimony	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	ND (5)	12	ND (5)	ND (5)	ND (5)	ND (5)
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Calcium	21000	21000	22600	27500	34500	37300
Chromium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Copper	ND (10)	16	ND (10)	ND (10)	ND (10)	ND (10)
Iron	ND (20)	ND (20)	22	ND (20)	ND (20)	ND (20)
Lead	2	6	ND (2)	5	ND (2)	ND (2)
Magnesium	3410	3420	3680	4640	5880	5480
Manganese	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)
Potassium	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	2030	2040	2150	2310	2440	2520
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Zinc	10	16	ND (10)	15	17	ND (10)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 5
Ft. Richardson GW Study
23 Metals, Dissolved
March, 1994

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LOCATION:	TW 1	Well A1	Well A6	AK-2127	Well B	Otter Lake
DATE OF SAMPLING:	3/23/94	3/23/94	3/23/94	3/25/94	3/25/94	4/01/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:	94FRGW-17WA	19WA	18WA	26WA	25WA	42WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K184201	K184203	K184202	K184208	K184207	K203301
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Antimony	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	5	5	ND (5)	8	7	7
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)	ND (3)
Calcium	40900	34800	20900	33700	47500	54700
Chromium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Copper	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Iron	ND (20)	ND (20)	52	ND (20)	ND (20)	ND (20)
Lead	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Magnesium	7580	5190	3450	8180	15400	7090
Manganese	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)
Potassium	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	3310	2690	2610	4230	3790	2240
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (10)	ND (10)	94

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 5
Ft. Richardson GW Study
23 Metals, Dissolved
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	AP-3233	AP-3235	QC DUP AP-3235	QA DUP AP-3235	AP-2982
LOCATION:	AP-3233	AP-3235	AP-3235	AP-3235	AP-2982
DATE OF SAMPLING:	4/01/94	3/24/94	3/24/94	3/24/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	44WA	20WA	21WA	22WA	11WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS
LABORATORY SAMPLE #:	K203303	K184204	K184205	190551	K167901
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (200)	ND (50)
Antimony	ND (50)	ND (50)	ND (50)	ND (100)	ND (50)
Arsenic	ND (5)	5	5	ND (5)	ND (5)
Barium	17	51	26	30	ND (5)
Beryllium	ND (5)	ND (5)	ND (5)	ND (20)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (20)	ND (3)
Calcium	80000	91900	93000	86000	26100
Chromium	ND (5)	ND (5)	ND (5)	ND (20)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)
Copper	ND (10)	ND (10)	ND (10)	ND (20)	ND (10)
Iron	1060	478	487	500	108
Lead	ND (2)	ND (2)	ND (2)	6	ND (2)
Magnesium	11500	12200	12200	11000	4700
Manganese	1620	889	883	880	815
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (50)	ND (20)
Potassium	ND (2000)	ND (2000)	ND (2000)	1500	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (1)	ND (10)
Sodium	5160	4350	5260	5100	7280
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 5
Ft. Richardson GW Study
23 Metals, Dissolved
March, 1994

	AP-2985	AP-3231	AP-2974	QC DUP AP-2974	QA DUP AP-2974
LOCATION:	AP-2985	AP-3231	AP-2974	AP-2974	AP-2974
DATE OF SAMPLING:	3/18/94	3/18/94	3/16/94	3/16/94	3/16/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	13WA	12WA	06WA	07WA	08WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NET
LABORATORY SAMPLE #:	K167903	K167902	K163706	K163707	190076
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (50)	ND (200)
Antimony	ND (50)	ND (50)	ND (50)	ND (50)	ND (100)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	26	41	37	35	30
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)	ND (20)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)	ND (20)
Calcium	53400	20800	29800	30400	29000
Chromium	ND (5)	ND (5)	ND (5)	ND (5)	ND (20)
Cobalt	ND (10)	ND (10)	ND (10)	ND (10)	ND (50)
Copper	ND (10)	ND (10)	ND (10)	ND (10)	ND (20)
Iron	ND (20)	ND (20)	ND (20)	ND (20)	ND (100)
Lead	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Magnesium	9400	4160	7910	8130	7300
Manganese	20	ND (5)	ND (5)	ND (5)	ND (20)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (20)	ND (50)
Potassium	ND (2000)	ND (2000)	ND (2000)	ND (2000)	2000
Selenium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)	ND (1)
Sodium	13300	9110	8880	9330	9400
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (10)	ND (50)
Zinc	13	21	13	16	ND (50)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 5
Ft. Richardson GW Study
23 Metals, Dissolved
March, 1994

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	AP-3010	AP-3013	QC DUP AP-3013	QA DUP AP-3013	AP-3014	AP-3015
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS	CAS
LABORATORY SAMPLE #:	K198602	K192103	K192104	190918	K192101	K192102
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (200)	ND (50)	ND (50)
Antimony	ND (50)	ND (50)	ND (50)	ND (100)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Barium	14	ND (5)	5	ND (20)	14	6
Beryllium	ND (5)	ND (5)	ND (5)	ND (20)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (20)	ND (3)	ND (3)
Calcium	78400	55700	57100	49000	28800	63700
Chromium	ND (5)	ND (5)	ND (5)	ND (20)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)	ND (10)
Copper	ND (10)	ND (10)	ND (10)	ND (20)	ND (10)	ND (10)
Iron	33	ND (20)	ND (20)	ND (100)	37	ND (20)
Lead	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Magnesium	26800	8270	8460	7300	9950	9080
Manganese	31	ND (5)	ND (5)	ND (20)	2110	ND (5)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (50)	ND (20)	ND (20)
Potassium	2200	ND (2000)	ND (2000)	1000	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (50)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (1)	ND (10)	ND (10)
Sodium	4400	3910	3870	3400	6040	3900
Thallium	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (50)	ND (10)	ND (10)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 5
Ft. Richardson GW Study
23 Metals, Dissolved
March, 1994

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LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:94FRGW-	36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K198601	K198603	K203304	K203305
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Aluminum	ND (50)	ND (50)	ND (50)	ND (50)
Antimony	ND (50)	ND (50)	ND (50)	ND (50)
Arsenic	ND (5)	ND (5)	ND (5)	ND (5)
Barium	37	8	7	10
Beryllium	ND (5)	ND (5)	ND (5)	ND (5)
Cadmium	ND (3)	ND (3)	ND (3)	ND (3)
Calcium	113000	52500	61500	50700
Chromium	ND (5)	ND (5)	ND (5)	ND (5)
Cobalt	ND (10)	ND (10)	ND (10)	ND (10)
Copper	ND (10)	ND (10)	ND (10)	ND (10)
Iron	39	22	ND (20)	ND (20)
Lead	ND (2)	7	ND (2)	ND (2)
Magnesium	19800	7440	8310	9610
Manganese	17	ND (5)	ND (5)	ND (5)
Mercury	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Nickel	ND (20)	ND (20)	ND (20)	ND (20)
Potassium	2200	2200	ND (2000)	ND (2000)
Selenium	ND (5)	ND (5)	ND (5)	ND (5)
Silver	ND (10)	ND (10)	ND (10)	ND (10)
Sodium	5350	3560	2930	2890
Thallium	ND (5)	ND (5)	ND (5)	ND (5)
Vanadium	ND (10)	ND (10)	ND (10)	ND (10)
Zinc	ND (10)	ND (10)	ND (10)	ND (10)

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

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LOCATION:	ADFG C	ADFG E	ADFG K	ADFG 9	Well 1	Well 3
DATE OF SAMPLING:	3/14/94	3/14/94	3/14/94	4/01/94	3/15/94	3/15/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	01WA	02WA	03WA	43WA	04WA	05WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K1637-1	K1637-2	K1637-3	K2033-2	K1637-4	K1637-5
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1,1-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Hexachlorobutadiene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
2-Hexanone	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Isopropylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
p-Isopropyltoluene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Methylene Chloride	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
4-Methyl-2-pentanone	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Naphthalene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
n-Propylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Styrene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1,2,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Tetrachloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,3-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
1,2,4-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
1,1,1-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichlorofluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,3-Trichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,4-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
1,3,5-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Vinyl Chloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	NR	NR	NR	NR	NR	NR
m- & p-Xylene	NR	NR	NR	NR	NR	NR
Total Xylenes	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Number of Tics:	0	0	0	0	1	1
Total Concentration of Tics:	0	0	0	0	8	6

NET: National Environmental Testing, Santa Rosa, CA.

CAS: Columbia Analytical Service, Kelso, WA.

The value in parenthesis is the Method Reporting Limit (MRL).

b: Analyte concentration is an estimate because this analyte was also found in the method blank.

ND: Not Detected

NR: Not Reported

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

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LOCATION:	TW 1	Well A1	Well A6	Ak-2127	Well B	Otter Lake
DATE OF SAMPLING:	3/23/94	3/23/94	3/23/94	3/25/94	3/25/94	4/01/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	17WA	19WA	18WA	26WA	25WA	42WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K1842-1	K1842-3	K1842-2	K1842-8	K1842-7	K2033-1
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1,1-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Hexachlorobutadiene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
2-Hexanone	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Isopropylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
p-Isopropyltoluene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Methylene Chloride	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
4-Methyl-2-pentanone	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Naphthalene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
n-Propylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Styrene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Tetrachloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,3-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
1,2,4-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
1,1,1-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichlorofluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,3-Trichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,4-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
1,3,5-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Vinyl Chloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	NR	NR	NR	NR	NR	NR
m- & p-Xylene	NR	NR	NR	NR	NR	NR
Total Xylenes	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Number of Tics:	0	1	1	1	1	0
Total Concentration of Tics:	0	4	3	2	3	0

NET: National Environmental Testing, Santa Rosa, CA.

CAS: Columbia Analytical Service, Kelso, WA.

The value in parenthesis is the Method Reporting Limit (MRL).

b: Analyte concentration is an estimate because this analyte was also found in the method blank.

ND: Not Detected

NR: Not Reported

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

			QC DUP	QA DUP	
LOCATION:	AP-3233	AP-3235	AP-3235	AP-3235	AP-2982
DATE OF SAMPLING:	4/01/94	3/24/94	3/24/94	3/24/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	44WA	20WA	21WA	22WA	11WA
TESTING LABORATORY:	CAS	CAS	CAS	NPD	CAS
LABORATORY SAMPLE #:	K2033-3	K1842-4	K1842-5	7242	K1679-1
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	ND (2)	8 b	4 b	ND (10)	10
Benzene	22	4.4	4.0	5.4	4.5
Bromobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)
Bromodichloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromoform	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.1)	ND (0.5)
Bromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)
2-butanone	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)
n-Butylbenzene	ND (2)	ND (2)	ND (2)	0.4 J	ND (2)
sec-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (0.7)	ND (2)
tert-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (0.5)	ND (2)
Carbon Disulfide	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
Carbon Tetrachloride	ND (0.5)	ND (0.5)	2.4	ND (0.6)	ND (0.5)
Chlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)
Chloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.1)	ND (0.5)
Chloroform	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
Chloromethane	ND (0.5)	ND (0.5)	0.8	ND (0.8)	ND (0.5)
2-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (0.5)	ND (2)
4-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (0.4)	ND (2)
1,2-Dibromo-3-chloropropane	ND (2)	ND (2)	ND (2)	ND (1.3)	ND (2)
1,2-Dibromoethane	ND (2)	ND (2)	ND (2)	ND (0.8)	ND (2)
Dibromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
Dibromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)
1,2-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)
1,3-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)
1,4-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)
Dichlorodifluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)
1,1-Dichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	0.6
1,2-Dichloroethane	3.8	2.4	2.4	ND (0.9)	1.2
1,1-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.6)	ND (0.5)
cis-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)
trans-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
1,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)
1,3-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)
2,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.7)	ND (0.5)
cis-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

			QC DUP	QA DUP	
LOCATION:	AP-3233	AP-3235	AP-3235	AP-3235	AP-2982
DATE OF SAMPLING:	4/01/94	3/24/94	3/24/94	3/24/94	3/18/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	44WA	20WA	21WA	22WA	11WA
TESTING LABORATORY:	CAS	CAS	CAS	NPD	CAS
LABORATORY SAMPLE #:	K2033-3	K1842-4	K1842-5	7242	K1679-1
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
1,1-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)
Ethylbenzene	17	0.6	0.7	ND (0.6)	ND (0.6)
Hexachlorobutadiene	ND (2)	ND (2)	ND (2)	ND (1.3)	ND (2)
2-Hexanone	ND (2)	ND (2)	ND (2)	NR	ND (2)
Isopropylbenzene	5	ND (2)	ND (2)	0.3 J	ND (2)
p-Isopropyltoluene	7	ND (2)	ND (2)	0.6 J	ND (2)
Methylene Chloride	ND (1)	ND (1)	ND (1)	ND (3.1)	ND (1)
4-Methyl-2-pentanone	ND (2)	ND (2)	ND (2)	NR	ND (2)
Naphthalene	26	ND (2)	ND (2)	ND (0.9)	ND (2)
n-Propylbenzene	ND (2)	ND (2)	ND (2)	0.3 J	ND (2)
Styrene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)
1,1,1,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)
Tetrachloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)
1,2,3-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (0.7)	ND (2)
1,2,4-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (0.9)	ND (2)
1,1,1-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	5.4
1,1,2-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
Trichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	0.6
Trichlorofluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)
1,2,3-Trichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
1,2,4-Trimethylbenzene	84 d	ND (2)	ND (2)	0.5 J	ND (2)
1,3,5-Trimethylbenzene	61 d	ND (2)	ND (2)	1.4	ND (2)
Toluene	2.1	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)
Vinyl Chloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)
o-Xylene	NR	NR	NR	ND (0.5)	NR
m- & p-Xylene	NR	NR	NR	0.7	NR
Total Xylenes	55	2.3	0.8	NR	ND (0.7)
Number of Tics:	0	0	0	0	0
Total Concentration of Tics:	0	0	0	0	0

NET: National Environmental Testing, Santa Rosa, CA.

CAS: Columbia Analytical Service, Kelso, WA.

The value in parenthesis is the Method Reporting Limit (MRL).

d: Result is from the analysis of a diluted sample, performed on April 14, 1994. Dilution factor: 1:10 times.

b: Analyte concentration is an estimate because this analyte was also found in the method blank.

J: Analytes are an estimated value.

NR: Not Reported

ND: Not Detected

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

				QC DUP	QA DUP
LOCATION:	AP-2985	AP-3231	AP-2974	AP-2974	AP-2974
DATE OF SAMPLING:	3/18/94	3/18/94	3/16/94	3/16/94	3/16/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	13WA *	12WA	06WA	07WA	08WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NPD
LABORATORY SAMPLE #:	K1679-3	K1679-2	K1637-6	K1637-7	7236
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	ND (2)	14	10 b	9 b	ND (10)
Benzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)
Bromobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)
Bromodichloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromoform	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.1)
Bromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)
2-butanone	ND (2)	ND (2)	ND (2)	ND (2)	ND (10)
n-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.7)
sec-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.7)
tert-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.5)
Carbon Disulfide	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
Carbon Tetrachloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	0.4 J
Chlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)
Chloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.1)
Chloroform	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
Chloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
2-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.5)
4-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.4)
1,2-Dibromo-3-chloropropane	ND (2)	ND (2)	ND (2)	ND (2)	ND (1.3)
1,2-Dibromoethane	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.8)
Dibromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
Dibromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)
1,2-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)
1,3-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)
1,4-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)
Dichlorodifluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)
1,1-Dichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)
1,2-Dichloroethane	ND (0.5)	2.5	0.9	0.8	ND (0.9)
1,1-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.6)
cis-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)
trans-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
1,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)
1,3-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)
2,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.7)
cis-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

				QC DUP	QA DUP
LOCATION:	AP-2985	AP-3231	AP-2974	AP-2974	AP-2974
DATE OF SAMPLING:	3/18/94	3/18/94	3/16/94	3/16/94	3/16/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	13WA *	12WA	06WA	07WA	08WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	NPD
LABORATORY SAMPLE #:	K1679-3	K1679-2	K1637-6	K1637-7	7236
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L
1,1-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)
Ethylbenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)
Hexachlorobutadiene	ND (2)	ND (2)	ND (2)	ND (2)	ND (1.3)
2-Hexanone	ND (2)	ND (2)	ND (2)	ND (2)	NR
Isopropylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.6)
p-Isopropyltoluene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.7)
Methylene Chloride	ND (1)	ND (1)	ND (1)	ND (1)	ND (3.1)
4-Methyl-2-pentanone	ND (2)	ND (2)	ND (2)	ND (2)	NR
Naphthalene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.9)
n-Propylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.6)
Styrene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)
1,1,1,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)
Tetrachloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)
1,2,3-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.7)
1,2,4-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.9)
1,1,1-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)
1,1,2-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
Trichloroethene	ND (0.5)	1.4	ND (0.5)	ND (0.5)	0.3 J
Trichlorofluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)
1,2,3-Trichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
1,2,4-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.8)
1,3,5-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)	ND (0.5)
Toluene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)
Vinyl Chloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)
o-Xylene	NR	NR	NR	NR	ND (0.5)
m- & p-Xylene	NR	NR	NR	NR	ND (0.4)
Total Xylenes	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	NR
Number of Tics:	0	0	1	1	NR
Total Concentration of Tics:	0	0	11	6	NR

NET: National Environmental Testing, Santa Rosa, CA.

CAS: Columbia Analytical Service, Kelso, WA.

NPD: North Pacific Division, Corps of Engineers, Troutdale, OR.

The value in parenthesis is the Method Reporting Limit (MRL).

*: Analyses of this sample did not meet CAS QA criteria. No sample remained for reanalysis.

J: Analyte is an estimated value.

b: Result is from the analysis of a diluted sample, performed on April 14, 1994. Dilution factor: 1:10 times.

ND: Not Detected

NR: Not Reported

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

			QC DUP	QA DUP		
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	CAS	CAS	NPD	CAS	CAS
LABORATORY SAMPLE #:	K1986-2	K1921-3	K1921-4	7248	K1921-1	K1921-2
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Acetone	7	3	ND (2)	ND (10)	2	3
Benzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
Bromobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)
Bromodichloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromoform	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.1)	ND (0.5)	ND (0.5)
Bromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)	ND (0.5)
2-butanone	ND (2)	ND (2)	ND (2)	ND (10)	ND (2)	ND (2)
n-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (0.7)	ND (2)	ND (2)
sec-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (0.7)	ND (2)	ND (2)
tert-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (0.5)	ND (2)	ND (2)
Carbon Disulfide	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
Carbon Tetrachloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
Chlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)	ND (0.5)
Chloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.1)	ND (0.5)	ND (0.5)
Chloroform	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
Chloromethane	ND (0.5)	1.0	ND (0.5)	ND (0.8)	1.0	ND (0.5)
2-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (0.5)	ND (2)	ND (2)
4-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (0.4)	ND (2)	ND (2)
1,2-Dibromo-3-chloropropane	ND (2)	ND (2)	ND (2)	ND (1.3)	ND (2)	ND (2)
1,2-Dibromoethane	ND (2)	ND (2)	ND (2)	ND (0.8)	ND (2)	ND (2)
Dibromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
Dibromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)	ND (0.5)
1,2-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)	ND (0.5)
1,3-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
1,4-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
Dichlorodifluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)
1,1-Dichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)	ND (0.5)
1,2-Dichloroethane	ND (0.5)	1.3	ND (0.5)	0.4 J	1.1	0.8
1,1-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (2.6)	ND (0.5)	ND (0.5)
cis-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)	ND (0.5)
trans-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
1,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)
1,3-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
2,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.7)	ND (0.5)	ND (0.5)
cis-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

Page 10 of 12

			QC DUP	QA DUP		
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014	AP-3015
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water	water
FIELD SAMPLE #-94FRGW-	35WA	32WA	33WA	34WA	30WA	31WA
TESTING LABORATORY:	CAS	CAS	CAS	NPD	CAS	CAS
LABORATORY SAMPLE #:	K1986-2	K1921-3	K1921-4	7248	K1921-1	K1921-2
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
1,1-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)
Ethylbenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
Hexachlorobutadiene	ND (2)	ND (2)	ND (2)	ND (1.3)	ND (2)	ND (2)
2-Hexanone	ND (2)	ND (2)	ND (2)	NR	ND (2)	ND (2)
Isopropylbenzene	ND (2)	ND (2)	ND (2)	ND (0.6)	ND (2)	ND (2)
p-Isopropyltoluene	ND (2)	ND (2)	ND (2)	ND (0.7)	ND (2)	ND (2)
Methylene Chloride	ND (1)	ND (1)	ND (1)	ND (3.1)	ND (1)	ND (1)
4-Methyl-2-pentanone	ND (2)	ND (2)	ND (2)	NR	ND (2)	ND (2)
Naphthalene	ND (2)	ND (2)	ND (2)	ND (0.9)	ND (2)	ND (2)
n-Propylbenzene	ND (2)	ND (2)	ND (2)	ND (0.6)	ND (2)	ND (2)
Styrene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
1,1,1,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)	ND (0.5)
Tetrachloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)
1,2,3-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (0.7)	ND (2)	ND (2)
1,2,4-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (0.9)	ND (2)	ND (2)
1,1,1-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.7)	ND (0.5)	ND (0.5)
1,1,2-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
Trichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.6)	ND (0.5)	ND (0.5)
Trichlorofluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.9)	ND (0.5)	ND (0.5)
1,2,3-Trichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
1,2,4-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (0.8)	ND (2)	ND (2)
1,3,5-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (0.5)	ND (2)	ND (2)
Toluene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.5)	ND (0.5)
Vinyl Chloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.8)	ND (0.5)	ND (0.5)
o-Xylene	NR	NR	NR	ND (0.5)	NR	NR
m- & p-Xylene	NR	NR	NR	ND (0.4)	NR	NR
Total Xylenes	ND (0.5)	ND (0.5)	ND (0.5)	NR	ND (0.5)	ND (0.5)
Number of Tics:	0	2	2	NR	1	0
Total Concentration of Tics:	0	6	6	NR	1	0

NET: National Environmental Testing, Santa Rosa, CA.

CAS: Columbia Analytical Service, Kelso, WA.

NPD: North Pacific Division, Corps of Engineers, Troutdale, OR.

The value in parenthesis is the Method Reporting Limit (MRL).

J: Analyte is an estimated value.

ND: Not Detected

NR: Not Reported

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:	94FRGW-36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K1986-1	K1986-3	K2033-5	K2033-4
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
Acetone	4	2	2	3 b
Benzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromodichloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromoform	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
2-butanone	ND (2)	ND (2)	ND (2)	ND (2)
n-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
sec-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
tert-Butylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
Carbon Disulfide	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Carbon Tetrachloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chloroform	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
2-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (2)
4-Chlorotoluene	ND (2)	ND (2)	ND (2)	ND (2)
1,2-Dibromo-3-chloropropane	ND (2)	ND (2)	ND (2)	ND (2)
1,2-Dibromoethane	ND (2)	ND (2)	ND (2)	ND (2)
Dibromochloromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Dibromomethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,3-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,4-Dichlorobenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Dichlorodifluoromethane	2.9	ND (0.5)	ND (0.5)	3.8
1,1-Dichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
cis-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,2-Dichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,3-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
2,2-Dichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
cis-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)

Table 6
Ft. Richardson GW Study
Volatile Organics Analysis (VOA)
Method 8260
March, 1994

LOCATION:	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water
FIELD SAMPLE #:	94FRGW-36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K1986-1	K1986-3	K2033-5	K2033-4
CONCENTRATION UNITS:	ug/L	ug/L	ug/L	ug/L
1,1-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Hexachlorobutadiene	ND (2)	ND (2)	ND (2)	ND (2)
2-Hexanone	ND (2)	ND (2)	ND (2)	ND (2)
Isopropylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
p-Isopropyltoluene	ND (2)	ND (2)	ND (2)	ND (2)
Methylene Chloride	ND (1)	ND (1)	ND (1)	ND (1)
4-Methyl-2-pentanone	ND (2)	ND (2)	ND (2)	ND (2)
Naphthalene	ND (2)	ND (2)	ND (2)	ND (2)
n-Propylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
Styrene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Tetrachloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,3-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)
1,2,4-Trichlorobenzene	ND (2)	ND (2)	ND (2)	ND (2)
1,1,1-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2-Trichloroethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichloroethene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichlorofluoromethane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,3-Trichloropropane	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2,4-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
1,3,5-Trimethylbenzene	ND (2)	ND (2)	ND (2)	ND (2)
Toluene	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Vinyl Chloride	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
o-Xylene	NR	NR	NR	NR
m- & p-Xylene	NR	NR	NR	NR
Total Xylenes	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Number of Tics:	3	0	8	4
Total Concentration of Tics:	22	0	193	6

NET: National Environmental Testing, Santa Rosa, CA.

CAS: Columbia Analytical Service, Kelso, WA.

The value in parenthesis is the Method Reporting Limit (MRL).

ND: Not Detected

b: Analyte concentration is an estimate because this analyte was also found in the method blank.

NR: Not Reported

Table 7
Ft. Richardson GW Study
Landfill Parameters
March, 1994

	AP-3010	AP-3013	QC DUP AP-3013	QA DUP AP-3013	AP-3014
LOCATION:	AP-3010	AP-3013	AP-3013	AP-3013	AP-3014
DATE OF SAMPLING:	3/31/94	3/29/94	3/29/94	3/29/94	3/28/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	35WA	32WA	33WA	34WA	30WA
TESTING LABORATORY:	CAS	CAS	CAS	NET	CAS
LABORATORY SAMPLE #:	K941986-002	K941921-003	K941921-004	190918	K941921-001
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity as CaCO ₃	289	141	139	150	96
Ammonia as Nitrogen	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	0.07
Chemical Oxygen Demand (COD)	ND (5)	ND (5)	ND (5)	ND (10)	12
Chloride	1.9	7.9	8.6	7.1	4.2
Nitrate + Nitrite as Nitrogen	0.3	0.8	0.9	0.70	ND (0.2)
Phosphorus, Total	ND (0.01)	0.03	0.01	0.04	ND (0.01)
Solids, Total Dissolved (TDS)	308	196	195	210	141
Sulfate	13	18	18	19	19
Total Organic Carbon (TOC)	0.6	ND (0.5)	ND (0.5)	ND (1.0)	1.4
Total Recoverable Petroleum Hydrocarbons (TRPH)	ND (0.2)	ND (0.2)	ND (0.2)	ND (1.0)	ND (0.2)
Hardness, as CaCO ₃	306	173	177	168	113
BOD	LT 1.0	1.0	1.0	NT	LT 1.0
Turbidity (NTU)	3.5	2.4	1.1	NT	0.21

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

CTE: Commercial Testing and Engineering, Anchorage, AK. Turbidity and BOD performed by Commercial Testing and Engineering. The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

LT: Less Than

Turbidity (NTU): Turbidity is measured in Nephelometric Turbidity Units.

NT: Not Tested

BOD: Biological Oxygen Demand

Table 7
Ft. Richardson GW Study
Landfill Parameters
March, 1994

LOCATION:	AP-3015	AP-3221	FR-1	FR-2	FR-3
DATE OF SAMPLING:	3/28/94	3/30/94	3/31/94	4/03/94	4/03/94
TYPE OF SAMPLE:	water	water	water	water	water
FIELD SAMPLE #:94FRGW-	31WA	36WA	37WA	39WA	38WA
TESTING LABORATORY:	CAS	CAS	CAS	CAS	CAS
LABORATORY SAMPLE #:	K941921-002	K941986-001	K941986-003	K942033-005	K942033-004
CONCENTRATION UNITS:	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity as CaCO ₃	155	333	139	176	173
Ammonia as Nitrogen	ND (0.05)	0.06	ND (0.05)	ND (0.05)	ND (0.05)
Chemical Oxygen Demand (COD)	ND (5)	13	54	40	101
Chloride	11	3.1	6.9	8.3	3.1
Nitrate + Nitrite as Nitrogen	1.3	0.5	0.9	1.0	0.5
Phosphorus, Total	0.07	1.6	0.20	0.06	1.7
Solids, Total Dissolved (TDS)	231	377	200	226	191
Sulfate	18	15	16	17	11
Total Organic Carbon (TOC)	ND (0.5)	ND (0.5)	10.8	2.7	5.6
Total Recoverable Petroleum Hydrocarbons (TRPH)	ND (0.2)	ND (0.2)	8.3	3.7	1.4
Hardness, as CaCO ₃	197	363	162	188	166
BOD	LT 1.0	LT 1.0	16	10	18
Turbidity (NTU)	13	125	375	9.4	600

CAS: Columbia Analytical Services, Kelso, WA.

NET: National Environmental Testing, Santa Rosa, CA.

CTE: Commercial Testing and Engineering, Anchorage, AK. Turbidity and BOD performed by Commercial Testing and Engineering
The value in parentheses is the method reporting limit (MRL).

ND: Not Detected

Turbidity (NTU): Turbidity is measured in Nephelometric Turbidity Units.

LT: Less Than

BOD: Biological Oxygen Demand

APPENDIX C
Quality Assurance Report



DEPARTMENT OF THE ARMY
 NORTH PACIFIC DIVISION LABORATORY
 CORPS OF ENGINEERS
 1491 N.W. GRAHAM AVENUE
 TROUTDALE, OREGON 97060-9503

CENPD-PE-GE-L (1110-1-8100c)

6 Jun 94

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

SUBJECT: W.O. 94-251, Results of Chemical Analysis

Project: FT. RICHARDSON GROUNDWATER STUDY - SPRING 1994
 Intended Use: Site Evaluation
 Source of Material: Reference Chain of Custody Records
 Submitted by: CENPA-EN-G-MI
 Date Sampled: 13 Mar - 3 Apr 94 Date Received: 18 Mar - 6 Apr 94
 Method of Test or Specification: Reference Enclosure 1
 Reference: a) DD Form 448, currently being processed
b) Original report numbers K941637A, K941679A and
K941986A from Columbia Analytical Services (CAS), Inc.
and original report numbers 94.1328, 94.1354, 94.1384,
94.1401 and 94.1432 from Commercial Testing &
Engineering (CT&E), Co. which were directly submitted
to your office by the respective laboratories.
c) Original report numbers 94.01152 from NET Pacific
directly sent to your office by the laboratory.

1. Enclosed are results of analyses and quality assurance data for environmental samples collected from the above site. Included are:

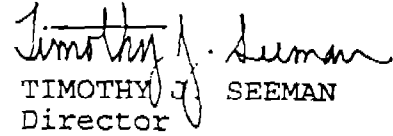
- a. Enclosure 1, Chemical Quality Assurance Report.
- b. Enclosure 2, Original report numbers K941842A, K941921A and K942033A and copies of report numbers K941637A, K941679A and K941986A from CAS, Inc., with diskettes and facsimile addendums and amendments.
- c. Enclosure 3, Original report numbers 94.01133, 94.01256, 94.01320, 94.01377 and copy of report number 94.01152 with diskettes from NET Pacific, Inc.
- d. Enclosure 4, Original report number 425, with diskette from U.S. Army Corps of Engineers North Pacific Division Laboratory.
- e. Enclosure 5, Original CENPD-PE-GE-L facsimile requests, Sample Cooler Receipt forms and HTRW Discrepancy Notification forms.

2. If you have any questions or comments regarding the Chemical Quality Assurance Report, please contact Dr. Ajmal M. Ilias at (503) 665-4166.

CENPD-PE-GE-L (1110-1-3100c)
SUBJECT: W.O. 94-251, Results of Chemical Analysis

3. This completes all work requested for this project.

Enclosures


TIMOTHY J. SEEMAN
Director

Copy Furnished: CENPD-PE-GE
CEMRD-ED-EC
CEMP-RT

MFR: Up to 0.084, 8.36, 131, 113 and 377 ppm of targeted volatile organics (VOCs), petroleum hydrocarbons, total/dissolved metals and non-metallics were detected, respectively, in the water samples. The project laboratory's data are acceptable except for the data of analytes detected in the method, trip and rinsate blanks. 20 out of 23 project and QA data comparisons agree. Complete copy in office files.

CENPD-PE-GE-L (94-251)

6 Jun 94

CHEMICAL QUALITY ASSURANCE REPORT

FT. RICHARDSON GROUND WATER STUDY - SPRING 1994

1. SUMMARY:

a. Up to 0.084, 8.36, 131, 113 and 377 ppm of targeted volatile organics (VOCs), petroleum hydrocarbons, total metals, dissolved metals and inorganics were detected, respectively, in the water samples. The project laboratory's data are acceptable based on acceptable internal quality control (QC) data, blind duplicate and quality assurance (QA) data agreements except for the data of analytes detected in the project laboratory's method blanks, trip and rinsate blanks.

b. The project and QA data comparisons are shown in Tables II through VI. All data agree except three out of thirty-two data comparisons which are; data of 2-butanone (Table II-b-1), total xylenes (Table V-1) and total phosphorus (Table VI-8). See item 9 of this report for details.

2. BACKGROUND: The samples were collected on March 13 through 18, 23 through 25, 27 through 31 and April 1 through 3, 1994. The samples were received by the analytical laboratories on March 18, 19, 21, 22, 28, 29, 31; April 1, 2, 5 and 6, 1994.

3. OBJECTIVES:

a. Twenty-six water samples, four blind duplicates, two rinsate blanks and six trip blanks were collected from various locations to determine the extent of the chemical contamination on the site.

b. Four QA water samples, two rinsate blanks and four trip blanks were submitted to evaluate the project laboratories' data.

4. PROJECT ORGANIZATION:

a. The samples were collected by North Pacific Division/Alaska District staff.

b. The project samples were analyzed by Columbia Analytical Services (CAS), Inc., Kelso, Washington and Commercial Testing & Engineering (CT&E), Co. Anchorage, Alaska.

c. The QA samples were analyzed by NET Pacific, Inc., Santa Rosa, California and U.S. Army Corps of Engineers North Pacific Division Laboratory (CENPD-PE-GE-L), Troutdale, Oregon.

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5. ANALYTICAL REFERENCES:

<u>Number</u>	<u>Title</u>	<u>Date</u>
a. SW-846, Third Edition	Test Method for Evaluating Solid Waste	7/92
b. GRO, DRO	State of Alaska Interim TPH Methods	2/93
c. EPA 600/4-79-020	Method for the Chemical Analysis of Water and Wastes	3/83
d. Hardness (SM 18 2340B)	Standard Methods for the Examination of Water and Wastewater, 18th Edition	1992

6. PROJECT LABORATORIES' DATA:

a. Columbia Analytical Services (CAS), Inc.: Up to 82 ppb of 2-butanone, 16 ppb of acetone and 84 ppb of seventeen other targeted volatiles were detected in the water samples. It is notable that ten out of the seventeen targeted volatiles were present, at their highest concentrations in sample 94FRGW-44WA. Excluding the VOC data of sample -44WA, the remaining volatiles ranged from detection to 5.4 ppb. Up to 2.28, 8.39 and 8.3 ppm of gasoline range organics (GRO), diesel range organics (DRO) and total recoverable petroleum hydrocarbons (TRPH) were detected, respectively. Up to 131, 126, 86.9, 4.76 and 1.30 ppm of total alkali/alkaline earth metals, iron, aluminum, manganese and zinc, respectively, were found in a majority of the water samples. Up to 323 ppb of nine other total metals were detected. It is notable that eight of the nine highest total metal concentrations were found in sample 94FRGW-12WA and mercury was detected in two samples, 94FRGW-11WA and -12WA. Up to 113, 1.06 and 2.11 ppm of the dissolved metals alkali/alkaline earths, iron and manganese, respectively, were found in the water samples. Up to 94 ppb of four other dissolved metals were detected. Up to 377, 363, 333, 101, 11, 19, 1.3 and 0.07 ppm of total dissolved solids (TDS), hardness, total alkalinity, chemical oxygen demand (COD), chloride, sulfate, nitrate/nitrite as nitrogen and ammonia as nitrogen were found, respectively, in the water samples. The following targeted analytes were not detected in any sample: polychlorinated biphenyls (PCBs); total and dissolved antimony, beryllium, selenium and silver; dissolved aluminum, cadmium, chromium, cobalt, mercury, nickel, thallium and vanadium. Organochlorine pesticides were not analyzed by the project laboratory as requested on the chain of custody records due to laboratory oversight.

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b. Commercial Testing & Engineering (CT&E), Co.: Biological oxygen demand (BOD) ranged from detection through 18 ppm and turbidity ranged from 0.21 to 600 NTU in the project samples.

7. EVALUATION OF THE PROJECT LABORATORIES' DATA:

a. Surrogate Recoveries: Three surrogates, similar to (but not the same) the targeted analytes of interest, were used in the analysis of volatile organics (VOC) by EPA Method 8260. One surrogate was used in the following analyses: PCBs by EPA 8080, GRO and DRO of Alaska Department of Environmental Conservation (ADEC). All surrogate recoveries were within EPA or ADEC method required or laboratory established (LE) quality control (QC) limits and are acceptable with the following exceptions. One (bromofluorobenzene - BFB) out of three VOC surrogate recoveries in sample 94FRGW-20WA and its blind duplicate, -21WA, was above EPA QC limits. The laboratory noted matrix interference by non-targeted analytes as the cause of the out-of-control recoveries. Based on the high levels of GRO and DRO found in the samples (see Table V), hydrocarbon matrix interference is plausible. Therefore, based on the high BFB surrogate recovery, the VOC data of analytes associated with this surrogate (which in these samples are ethylbenzene and total xylenes) should be considered high estimates. One out of three VOC MS/MSD surrogates was outside of EPA QC limits for matrix spike sample -20WA of report K941842A. The out-of-control recoveries are attributable to the matrix interference as noted above.

b. Matrix Spike (MS), Matrix Spike Duplicate (MSD) and Laboratory Control (LC) Recoveries: All recoveries were within EPA or ADEC method required QC limits and are acceptable with the following exceptions. The PCB LC recovery, referenced in reports K941921A and K941986A, was marginally below LE QC limits. The PCB data of these reports are accepted based on acceptable MS/MSD recoveries. The GRO MS recovery of report K941842A was below the LE QC limits of 70 to 140 percent. The GRO data of samples -20WA and -21WA are accepted based on acceptable LC recoveries. The DRO LC recovery of report K941679A was slightly below LE QC limits. No DRO MS/MSD results were submitted with this report due to required reanalysis of the samples (see item 7-e). Based on the low LC recovery, the DRO data of this report should be considered low estimates. One out of two DRO LC recoveries in report K941921A was marginally below ADEC QC limits. The DRO data of this report are accepted based on the remaining acceptable LC recovery and an acceptable MS recovery. The MS recovery of dissolved selenium in report K941842A and total selenium in report K941986A were below EPA QC limits at 70 percent. Based on low MS recoveries and the

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lack of submitted total metals QC in report K941842A, selenium data could not be completely evaluated. Low levels of total and dissolved selenium in report K941842A and total selenium in report K941986A might not have been detected, if present. The BOD control samples of CT&E reports 94.1354, 94.1384 and 94.1401 were below LE QC limits. The control recoveries, reported over consecutive days, exhibited gradually lower results which indicate that the BOD quality control standard (QCS) had undergone degradation. Based on acceptable method blanks, seed blanks and duplicate results, the BOD data of the above mentioned reports are accepted.

c. Laboratory Duplicates: All relative percent differences (RPDs) were within EPA or ADEC method required QC limits and are acceptable with the following exceptions. One out of five VOC RPDs in report K941637A was slightly above EPA QC limits. The VOC data are accepted based on the remaining four acceptable RPD results. One out of two DRO RPDs in report K941921A was slightly above ADEC QC limits. The data are accepted based on the remaining acceptable RPD data. No DRO RPD results were submitted in report K941679A. The precision of the DRO data could not be determined and the DRO data of samples -11WA, -12WA and -13WA should be considered with caution. The RPDs of total chromium, potassium, iron in reports K941921A, K941986A and K942033A, respectively, were above EPA QC limits. As the data of these metals were within a factor of three to their detection limits, and therefore RPD results are not considered significant for the purposes of data evaluation. The RPD of nitrate/nitrite was above EPA QC limits in report K941986A but was not considered significant as RPD was calculated within a factor of three to the detection limit.

d. Project Blind Duplicate Results: The project blind duplicate data are shown in Tables III through VI; all data agree.

e. Laboratory Method Blanks: All laboratory method blanks were free of targeted analytes with the following exceptions. Up to 5 ppb of acetone was detected in six out of eleven VOC method blanks, acetone data up to 50 ppb should be considered with caution. The project laboratory noted in the case narrative of report K941679A that the initial DRO method blank was contaminated. A re-extraction and reanalysis of the DRO method blank and affected samples yielded no detectable method blank contamination and are acceptable. The laboratory case narrative of report K941842A noted the DRO method blank contamination. The laboratory went on the state that the positive DRO results of this report "may have been influenced by the same contamination found in the method blank." As the laboratory reported no detectable DRO in the method blank (see page 010) and no DRO method blank chromatograms were submitted, the effect of the DRO contamination on the project samples of this report could not be

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determined. The DRO data of samples -17WA, -18WA, 23WA and -26WA should be considered due to laboratory contamination, as these DRO results were reported at or near the detection limit. The DRO data of samples -20WA and -21WA are accepted, as the DRO data are approximately eighty times the DRO detection limit.

f. Trip Blank Results: The trip blank data are shown in Tables I-a through I-e. The presence of up to 12 ppb of acetone, 62 ppb of 2-butanone and 2 ppb of methylene chloride in the VOC method blanks should be considered due to either contaminated deionized water used to prepare the trip blanks or laboratory contamination. The presence of 1,2-dichloroethane in the project trip blank sample -16WA (see Table I-e) is possibly due to low level cross-contamination during sample shipment or storage.

g. Rinsate Blank Results: The rinsate blank data are shown in Tables II-a and II-b. All data agree with each other and are comparable. The presence of chloroform, acetone and 2-butanone in the VOC rinsate blanks of Tables II-a-1 and II-b-1 should be considered due either to contaminated deionized water used to prepare the rinsate blanks or laboratory contamination. The presence of DRO in Table II-a-3 is attributable to laboratory contamination (see item 7-e). The presence of detectable GRO and DRO in Tables II-b-3 and II-b-4, respectively, indicate that incomplete decontamination procedures were utilized during the sampling event. The GRO and DRO data of CAS report K942033A should be viewed with caution based on the positive GRO and DRO rinsate results noted above. Low concentrations of total metals detected in Tables II-a-4 and II-b-6 and non-metals in Table II-b-7 are not be considered significant as detected analytes were close to the limits.

h. Sample Holding Times and Detection Limits: All met project or method requirements with the following exception. The VOC holding time of sample -11WA (re-analysis) was exceeded by four days due to an initial internal quality control failure. The VOC data of the reanalyzed sample are acceptable based on proper preservation of the sample during storage and acceptable internal QC data. The project laboratory reported a 0.1 ppb detection limit for PCBs in report K941679A. This detection limit did not meet the project requested PCB detection limit of 0.02 ppb. As stated in the remarks section of the COC records of this report "Please obtain lowest detection limits feasible for PCBs (< 0.02 ppb, if possible). Two liters provided for Method 608." At the request of the North Pacific Division Laboratory (NPD), the project laboratory is currently reviewing their sample log-in records to determine if the additional remarks related to PCB detection limits were noted during sample log-in.

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i. Miscellaneous Information: The case narrative of CAS report K941679A stated that two VOC samples, 94FRGW-11WA and -13WA, were affected by a internal quality control failure. Reanalysis of sample -11WA was performed with acceptable results (see item 7-f). No additional sample remained for the reanalysis of -13WA and the laboratory recommends that the results associated with sample 94FRGW-13WA be considered high estimates. Since no targeted volatiles were detected in this sample, the project data quality are not adversely affected by the laboratory's high estimate qualification. No total metals internal QC data was submitted in CAS reports K941637A, K941679A and K941842A. No dissolved metals internal QC data was submitted in CAS report K942033A. The dissolved or total metals data was used for data evaluation in lieu to the appropriate QC data.

j. Chain of Custody Records: All chain of custody (COC) records and sample cooler receipt (SCR) forms met U.S. Army Corps of Engineers (USACE) ER 1110-1-263 guidelines with the following exceptions. The COC records submitted with each sample cooler were not properly annotated with footnotes to clearly indicate the exact analytical methods required for the requested analyses (see item 10-a for details). The organochlorine pesticides portion of the EPA 8080 analysis, (see CAS report K941679A), was improperly deleted from the COC record. The "and Pesticides" wording of item 6 was crossed out but not initialed and dated, as required by ER 1110-1-263 guidelines. Total hardness was omitted from the project laboratory's COC record of CAS report K942033A for rinsate blank sample -48WA. Since this analysis was requested on the QA laboratory's COC record of NET Pacific report number 94.01377 (for rinsate sample -49WA), no data comparison of total hardness was possible (see Table II-b-7).

k. Sample Cooler Receipt Forms: Minor sample container labeling discrepancies were noted in the SCRs of CAS reports K941679A, K941986A and K942033A. Five out of 24 sample cooler temperatures, as measured by CAS Laboratory, were above the ER 111-1-263 preservation requirement of 4 degrees Celsius. The temperatures of these five coolers ranged from 4.7 to 6.2 degrees Celsius. As the laboratory did not note which specific coolers/samples had the elevated temperatures, the effect on the data quality, if any, could not be determined. The CT&E SCR of report 94.1432 reported a sample cooler temperature of 9.0 degrees Celsius indicating insufficient cooling preservation during sample shipment. The BOD and turbidity data of this report should be viewed with caution due to improper sample preservation during shipment.

k. Overall Evaluation of the Project Laboratory's Data: All data are acceptable except for the data of analytes detected in the laboratory method, trip and rinsate blanks. In addition, the DRO data

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of samples -17WA, -18WA, 23WA and -26WA in report K941842A should be considered due to laboratory contamination based on the laboratory's case narrative summary of the contamination problem. The ethylbenzene and total xylenes data of samples 94FRGW-20WA and -21WA should be considered high estimates based on the high BFB surrogate recoveries. Low levels of total and dissolved selenium in report K941842A and total selenium in report K941986A might not have been detected if present based on low MS recoveries. The DRO data of report K941679A should be viewed with caution based on an out-of-control LC recovery and a lack of submitted QC results. The BOD and turbidity data of CT&E report 94.1432 should be viewed with caution due to improper sample preservation during shipment. Discrepancies were noted between the requested suit of analysis and completed analyses of pesticides/PCBs due delinquencies in the completing of the chain of custody records.

8. EVALUATION OF THE QA LABORATORIES' DATA:

a. Surrogate Recoveries: Surrogate recoveries of all applicable methods were within EPA, ADEC method required or LE QC limits and are acceptable. One (tetrachloro-meta-xylene) of two organochlorine pesticide/PCB surrogates noted as being below the EPA advisory QC limits. The pesticide/PCB data are acceptable based on the one remaining acceptable recovery (per method requirement).

b. MS, MSD and LC Recoveries: The MS/MSD, batched MS/MSD and LC recoveries of all methods were within EPA, ADEC or LE QC limits and are acceptable with the following exceptions. The MS and MSD recoveries of total arsenic and total selenium in NET report 94.01256 were below EPA QC limits. The data of total arsenic should be considered low estimates and low levels of selenium may not have been detected if present in these samples. One out of two MS/MSD recoveries of total iron in NET Pacific reports 94.01133 and 94.01256 were marginally above EPA QC limits. The iron data of these reports are accepted based on the remaining acceptable matrix spike recovery. The MS recovery of total silver, referenced in NET reports 94.01256, 94.01320 and 94.01377, was below EPA QC limits. The silver data of these reports are accepted based on the acceptable MSD recovery. The LC recovery of dissolved arsenic, referenced in NET reports 94.01133 and 94.01256, was slightly below EPA QC limits, data are accepted. The batched MS/MSD recoveries of chloride in NET report 94.01377 were not reportable due to matrix interference (per laboratory case narrative reported). The chloride data of this report should be considered questionable. The batched MS/MSD recoveries of sulfate in report 94.01377 were not considered significant as the original sample concentration was greater than four times the spike amount.

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c. RPD Results: One (from MS/MSD analysis) out of two total silver RPDs, referenced in NET reports 94.01256, 94.01320 and 94.01377, was above EPA QC limits due to a low MS recovery. One (from MS/MSD analysis) of two total silver RPDs in NET report 94.01133 was slightly above EPA QC limits. The RPD of total iron (from MS/MSD) in NET report 94.01133 was above EPA QC limits due to a high MSD recovery. In all of the above cases, the data are accepted based on the remaining acceptable RPD results. The batched laboratory duplicate RPD of total iron and total potassium in NET Pacific report 94.01133 were above EPA QC limits. As the data of the comparisons are within a factor of five to their respective detection limits, the RPD results should not be considered significant at this level of detection. The laboratory duplicate RPD of total lead, referenced in NET report 94.01256, 94.01320 and 94.01377, was above EPA QC limits at 85.7. The total lead data of these reports are questionable and at best should be considered estimates.

d. Laboratory Method Blanks, Trip and Rinsate Blanks: All method blanks were free of targeted analytes except 6 ppb of lead was detected in the laboratory dissolved lead method blank of NET Pacific report 94.01133. As no dissolved lead was detected in any sample, the data are not adversely affected. The trip blank data are shown in Table I-a through I-d. Up to three VOCs were detected below their detection limits in the trip blank samples. The analytes other than chloroform and methylene chloride are probably due to cross contamination encountered during sample shipment and storage. The rinsate blank data are shown in Tables II-a and II-b. 0.4, 5 and 1.2 ppb of chloroform, arsenic and silver, respectively, were detected at close to or below detection limits in the QA rinsate of Table II-a and are not considered significant at his level of detection. Four VOCs ranging from 0.2 through 1.7 ppb, 1.5 ppb of silver and 0.02 ppm of total phosphorus were detected at close to or below detection limits in the QA rinsate of Table II-b. The presence of theses analytes are not considered significant at his level of detection. 0.5 ppb of toluene, 1.0 ppb of 4-isopropyltoluene and 1000 ppb of GRO were also found in the QA rinsate of Table II-b due, in part, to suspected field cross contamination.

e. Detection Limits, Holding Times, Continuing Calibration Verification (CCV), COC Records and SCR Forms: All met method or project requirements and are acceptable with the following exceptions. Numerous sample labeling deficiencies were documented in the NPDL SCR forms. Air bubbles were present in all GRO sample containers of -08WA and -10WA. The GRO data of these samples may have been compromised prior to analysis. Sample containers of EPA 8260 and GRO were received for sample -41WA. The other sample containers needed for the COC requested analyses were missing from the sample cooler.

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As this sample was identified as a trip blank, the data quality was not adversely affected. The sample container for hardness (sample - 49WA) was missing from the sample cooler.

f. Overall Evaluation of the QA Laboratories' Data: All data are acceptable except for the data of analytes found in the laboratory, trip and rinsate blanks which should be viewed with caution. The lead data are questionable and should be considered estimates. The total arsenic and selenium data in NET Pacific report 94.01256 are questionable based on low MS/MSD recoveries. The accuracy of the chloride data in NET Pacific report 94.01377 could not be determined due to the out-of-control batched MS and MSD recoveries reported.

9. **COMPARISON OF PROJECT AND QA LABORATORIES' DATA**: The project and QA data comparisons are shown in Tables II through VI. All data agree with each other with three exceptions. (a) Data of 2-butanone (Table II-b-1). The project data of 2-butanone should be considered due to either contaminated deionized water used to prepare the rinsate blanks or laboratory contamination. The QA data of 2-butanone are accepted based on acceptable internal QC data. (b) Data of total xylenes (Table V-1). The project blind duplicate data of total xylenes should be considered high estimates based on the high BFB surrogate recoveries noted for these samples. The QA data of total xylenes are accepted based on acceptable internal QC data. (c) Data of total phosphorus (Table VI-8). As the total phosphorus data of project sample 94FRGW-33WA was detected at the detection limit, the data discrepancy are not considered significant at this level of detection. The total phosphorus project and QA data are acceptable based on acceptable internal QC data.

10. **PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN**:

a. The organochlorine pesticide portion of the EPA 8080 analysis was not submitted in CAS reports K941921A and K942033A. The COC records method section indicated analysis "608 PCBs" while footnoted instructions in the remarks section of the COC indicated analysis of PCBs and pesticides, which the laboratory over looked. The laboratory's case narrative of report K942033A noted that these additional remarks were inadvertently overlooked by laboratory personnel during sample receipt and therefore only the PCB portion of the EPA 8080 analysis was assigned. By facsimile, (request dated 26 May 94) NPD L asked the laboratory to qualify the PCBs (only) analysis for samples of report K941921A. In a telephone conversation the laboratory said that the same oversight occurred as stated in report K942033A. Recommend that the COC records submitted to the laboratories be properly annotated with footnotes that clearly indicate the analytical methods required for the requested analyses.

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- b. No internal QC data pertaining to the total metals analysis was submitted in CAS reports K941637A, K941679A and K941842A. The dissolved metals QC data was used in the evaluation of the total metals data of these reports. No internal QC data of dissolved metals was submitted for CAS report K942033A. The total metals internal QC data was used in the evaluation of the dissolved metals data of this report.
- c. No DRO laboratory method blanks were submitted in any CAS reports. The significance of the laboratory reported method blank contamination of report K941842A could not be completely evaluated. Recommend that all QC related fuel chromatograms be submitted with each report.
- d. The project data of total hardness was omitted from CAS report K941986A. At the request of NPDL, the laboratory submitted the data as an addendum on 31 May 94.
- e. Based on an apparent blind duplicate data discrepancy between the VOC samples 94FRGW-20WA and -21WA, the project laboratory was requested by NPDL on 2 Jun 94 to review the VOC results. Due to a typographical error the benzene and 1,2-dichloroethane data of sample -21WA was in error. The amended VOC results have been included in this report (Table V-1) and are enclosed as a facsimile addendum.
- f. Acetone method blank contamination was suspected in VOC method blanks of CAS reports K941637A, K941842A and K942033A. At the request of NPDL, the laboratory reviewed the VOC data of these reports and confirmed the presence of acetone in the selected method blanks. The amended results have been included in this report and are enclosed as facsimile addendums.
- g. The acetone data of sample 94FRGW-16WA in report K941679A was not flagged as being attributed to method blank contamination. The BFB surrogate of matrix spike sample -20WA was incorrectly flagged as above EPA QC limits in report K941842A.
- h. Out-of-control MS, LC and RPD data was not properly flagged in NET Pacific reports 94.01133, 94.01256, 94.01320 and 94.01377. At the request of NPDL, the laboratory is currently amending the above mentioned reports.

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PROJECT AND QA TRIP BLANK RESULTS

Table I-a

Ft. Richardson
 Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

Date:	Project Lab	Detection	QA Lab	Detection
<u>Analytes Detected</u>	<u>09WA</u>	<u>Limits</u>	<u>010WA</u>	<u>Limits</u>
Acetone	3 B	2	ND	10.
Chloroform	ND	0.5	0.3 J	0.8
1,2-Dichloroethane	ND	0.5	0.4 J	0.9
Toluene	ND	0.5	0.3 J	0.4

B = Found in method blank
 J = Estimated concentration
 ND = None detected

TRIP BLANKS

SUMMARY: The presence of acetone in the project trip blank should be considered due to laboratory contamination. The presence of 1,2-dichloroethane and toluene in the QA trip blank are possibly due to low level cross-contamination encountered during sample shipment or storage. The data of analytes found below their detection limits should not be considered significant at this level of detection. The detected chloroform in the QA trip blank is probably due to contaminated deionized water used as has been seen in numerous past projects.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

Date:	Project Lab	Detection	QA Lab	Detection
<u>Analytes Detected</u>	<u>09WA</u>	<u>Limits</u>	<u>010WA</u>	<u>Limits</u>
GRO	ND	50	ND	50

SUMMARY: The absence of targeted fuel hydrocarbons in the project and QA trip blanks indicate that no cross-contamination occurred during sample shipment, storage or analysis.

TRIP BLANKS

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PROJECT AND QA TRIP BLANK RESULTS

Table I-b

Ft. Richardson
 Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

	Project Lab	Detection	QA Lab	Detection
Date:	3/23/94		3/23/94	
<u>Analytes Detected</u>	<u>027WA</u>	<u>Limits</u>	<u>028WA</u>	<u>Limits</u>
Acetone	6 B	2	ND	10.
2-Butanone	62	2	ND	10.
Methylene Chloride	2	1	2.1 J	3.1

B = Found in method blank
 J = Estimated concentration
 ND = None detected

TRIP BLANKS

SUMMARY: The presence of acetone and 2-butanone in the project trip blank and methylene chloride in the project and QA trip blanks should be considered due either to contaminated deionized water used to prepare the trip blanks or laboratory contamination. The QA data of methylene chloride, which was found below the detection limit, should not be considered significant at this level of detection.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

	Project Lab	Detection	QA Lab	Detection
Date:	3/23/94		3/23/94	
<u>Analytes Detected</u>	<u>027WA</u>	<u>Limits</u>	<u>028WA</u>	<u>Limits</u>
GRO	ND	50	ND	50

SUMMARY: The absence of targeted fuel hydrocarbons in the project and QA trip blanks indicate that no cross-contamination occurred during sample shipment, storage or analysis.

TRIP
BLANKS

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PROJECT AND QA TRIP BLANK RESULTS

Table I-c

Ft. Richardson

Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

Date:	Project Lab	Detection	QA Lab	Detection
<u>Analytes Detected</u>	<u>040WA</u>	<u>Limits</u>	<u>041WA</u>	<u>Limits</u>
Acetone	2	2	ND	10.
2-Butanone	2	2	ND	10.
Chloroform	ND	0.5	0.4 J	0.8

J = Estimated concentration
 ND = None detected

TRIP

SUMMARY: The presence of acetone and 2-butanone in the project trip blank and chloroform in the QA trip blank should be considered due to either to contaminated deionized water used to prepare the trip blanks or laboratory contamination. The QA data of chloroform, which was found below the detection limit, is not considered significant at this level of detection.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

Date:	Project Lab	Detection	QA Lab	Detection
<u>Analytes Detected</u>	<u>040WA</u>	<u>Limits</u>	<u>041WA</u>	<u>Limits</u>
GRO	ND	50	ND	50

SUMMARY: The absence of targeted fuel hydrocarbons in the project and QA trip blanks indicate that no cross-contamination occurred during sample shipment, storage or analysis.

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PROJECT AND QA TRIP BLANK RESULTS

Table I-d

Ft. Richardson

Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

Date:	Project Lab	Detection	QA Lab	Detection
<u>Analytes Detected</u>	<u>046WA</u>	<u>Limits</u>	<u>047WA</u>	<u>Limits</u>
Acetone	7	2	ND	10.
2-Butanone	5	2	ND	10.
Methylene Chloride	ND	1	2.0 J	3.1
1,2-Dichloroethane	ND	0.5	0.4 J	0.9
Toluene	ND	0.5	0.2 J	0.4

J = Estimated concentration
 ND = None detected

SUMMARY: The presence of acetone and 2-butanone in the project trip blank and methylene chloride in the QA trip blank should be considered due to either contaminated deionized water used to prepare the trip blanks or laboratory contamination. The presence of 1,2-dichloroethane and toluene in the QA trip blank are possibly due to low level cross-contamination during sample shipment or storage. The analytes found below their detection limits are not considered significant at this level of detection.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

Date:	Project Lab	Detection	QA Lab	Detection
<u>Analytes Detected</u>	<u>046WA</u>	<u>Limits</u>	<u>047WA</u>	<u>Limits</u>
GRO	ND	50	ND	50

SUMMARY: The absence of targeted fuel hydrocarbons in the project and QA trip blanks indicate that no cross-contamination occurred during sample shipment, storage or analysis.

CENPD-PE-GE-L (94-251)

PROJECT TRIP BLANK RESULTS

Table I-e

Ft. Richardson
 Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc.

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

Date:	3/15/94	3/27/94	Detection
<u>Analytes Detected</u>	<u>016WA</u>	<u>045WA</u>	<u>Limits</u>
Acetone	12 B	ND	2
1,2-Dichloroethane	0.7	ND	0.5

B = Found in method blank

ND = None detected

SUMMARY: The presence of acetone in the project trip blank is considered due to laboratory contamination. The presence of 1,2-dichloroethane in the project trip blank (-16WA) is possibly due to low level cross-contamination encountered during sample shipment or storage.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)

Date:	3/15/94	3/27/94	Detection
<u>Analytes Detected</u>	<u>016WA</u>	<u>045WA</u>	<u>Limits</u>
GRO	ND	ND	50

SUMMARY: The absence of targeted fuel hydrocarbons in the project trip blanks indicate that no cross-contamination occurred during sample shipment, storage or analysis.

CENPD-PE-GE-L (94-251)

COMPARISON OF PROJECT AND QA RINSATE RESULTS

Table II-a

Ft. Richardson

Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

<u>Analytes</u> <u>Detected</u>	<u>Project Lab</u> <u>23WA</u>	<u>Detection</u> <u>Limits</u>	<u>QA Lab</u> <u>24WA</u>	<u>Detection</u> <u>Limits</u>
Chloroform	0.5	0.5	0.4 J	0.8

J = Estimated concentration

SUMMARY: The project and QA rinsate data agree within a factor of two to each other for all targeted analytes. The presence of chloroform is considered due to contaminated deionized water used to prepare the rinsate blanks. The absence of other targeted analytes indicate that complete decontamination procedures were utilized during sampling.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

<u>Analytes</u> <u>Detected</u>	<u>Project Lab</u> <u>23WA</u>	<u>Detection</u> <u>Limits</u>	<u>QA Lab</u> <u>24WA</u>	<u>Detection</u> <u>Limits</u>
GRO	ND	50	ND	50

ND = None detected

SUMMARY: The project and QA rinsate data agree with each other. The absence of GRO indicates that complete decontamination procedures were utilized during sampling.

CENPD-PE-GE-L (94-251)
Table II-a cont.

3. Method: Diesel Range Organics (ADEC 8100 mod.) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab 23WA</u>	<u>Detection Limits</u>	<u>QA Lab 24WA</u>	<u>Detection Limits</u>
DRO	53	50	ND	100

SUMMARY: The project and QA rinsate data agree with each other. The presence of DRO in the project rinsate blank should be considered due to laboratory contamination, as stated in the case narrative of CAS report K941842A (see item 7-e for details). The absence of DRO in the QA rinsate indicate that complete decontamination procedures were utilized during sampling.

4. Method: Total Metals (EPA 6010,7000 Series) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab 23WA</u>	<u>Detection Limits</u>	<u>QA Lab 24WA</u>	<u>Detection Limits</u>
Aluminum	ND	50	ND	200
Antimony	ND	50	ND	100
Arsenic	ND	5	5	5
Barium	ND	5	ND	20
Beryllium	ND	5	ND	20
Cadmium	ND	3	ND	20
Calcium	ND	50	ND	500
Chromium	ND	5	ND	20
Cobalt	ND	10	ND	50
Copper	ND	10	ND	20
Iron	22	20	ND	100
Lead	ND	2	ND	2
Magnesium	14	10	ND	500
Manganese	ND	5	ND	20
Mercury	ND	0.5	ND	0.5
Nickel	ND	20	ND	50
Potassium	ND	2000	ND	500
Selenium	ND	5	ND	5
Silver	ND	10	1.2	1
Sodium	ND	100	ND	500
Thallium	ND	5	ND	5
Vanadium	ND	10	ND	50
Zinc	ND	10	ND	50

SUMMARY: The project and QA rinsate data agree within a factor of two to each other or their detection limits. The presence of analytes at or near their detection limits are not considered significant at this level of detection.

CENPD-PE-GE-L (94-251)

COMPARISON OF PROJECT AND QA RINSATE RESULTS

Table II-b

Ft. Richardson
 Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

<u>Analytes</u> <u>Detected</u>	<u>Project Lab</u> <u>48WA</u>	<u>Detection</u> <u>Limits</u>	<u>QA Lab</u> <u>49WA</u>	<u>Detection</u> <u>Limits</u>
Acetone	19	2	ND	10.
2-Butanone	82	2	ND	10.
Methylene Chloride	ND	1	1.7 J	3.1
Tetrachloroethene	ND	0.5	0.2 J	0.7
1,1,1-Trichloroethane	ND	0.5	0.3 J	0.7
Trichloroethene	ND	0.5	0.5 J	0.6
Toluene	ND	0.5	0.5	0.4
4-Isopropyltoluene	ND	2	1.0	0.7

J = Estimated concentration

ND = None detected

SUMMARY: The project and QA rinsate data agree within a factor of three to each other or their detection limits except for the data of 2-butanone. The presence of acetone and 2-butanone in the project rinsate blank should be considered due to either contaminated deionized water used to prepare the rinsate blanks or laboratory contamination. The QA data of 2-butanone are accepted based on acceptable internal QC data. The presence of the aromatic volatiles (toluene and 4-Isopropyltoluene) could possibly due to incomplete decontamination procedures, as up to 84 ppb of nine aromatic volatiles (AVOs) were detected in the associated sample 94FRGW-44WA. The data of the four QA analytes found below their detection limits are not considered significant at this level of detection.

Table II-b cont.

2. Project Method: Polychlorinated Biphenyls (EPA 8080)
 QA Method: Organochlorine Pesticides/PCBs (608) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

<u>Analytes Detected</u>	<u>Project Lab 48WA</u>	<u>Detection Limits</u>	<u>QA Lab 49WA</u>	<u>Detection Limits</u>
Pesticides	NS		ND	0.005-1.0
Aroclor 1016	ND	0.2	ND	0.5
Aroclor 1221	ND	0.2	ND	0.5
Aroclor 1232	ND	0.2	ND	0.5
Aroclor 1242	ND	0.2	ND	0.6
Aroclor 1248	ND	0.2	ND	0.5
Aroclor 1254	ND	0.2	ND	0.5
Aroclor 1260	ND	0.2	ND	0.5

NS = Data not submitted by laboratory. Requested on chain of custody records

SUMMARY: The project and QA rinsate data agree with each other for all PCBs. The absence of targeted analytes in the rinsate blanks indicates that complete decontamination procedures were utilized during sampling.

3. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab 48WA</u>	<u>Detection Limits</u>	<u>QA Lab 49WA</u>	<u>Detection Limits</u>
GRO	1450	50	1000	50

SUMMARY: The project and QA rinsate data agree within a factor of two to each other. The presence of GRO indicates that incomplete decontamination procedures were utilized during sampling.

4. Method: Diesel Range Organics (ADEC 3100 mod.) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab 48WA</u>	<u>Detection Limits</u>	<u>QA Lab 49WA</u>	<u>Detection Limits</u>
DRO	278	50	ND	100

SUMMARY: The project and QA rinsate data agree within a factor of three to each other or their detection limits. The presence of targeted DRO in the project rinsate blank indicates that incomplete decontamination procedures were utilized during sampling.

CENFD-PE-GE-2 94-1511
Table II-b cont.

Total Recoverable				
5. Method: <u>Petroleum Hydrocarbons (EPA 418.1)</u> Units: <u>mg/L (ppm)</u>				
<u>Analytes Detected</u>	<u>Project Lab 48WA</u>	<u>Detection Limits</u>	<u>QA Lab 49WA</u>	<u>Detection Limits</u>
TRPH	ND	0.2	ND	1.0

SUMMARY: The project and QA rinsate data agree with each other. The absence of targeted hydrocarbons indicate that complete decontamination procedures were utilized during sampling.

6. Method: <u>Total Metals (6010,7000 Series)</u> Units: <u>ug/L (ppb)</u>				
<u>Analytes Detected</u>	<u>Project Lab 48WA</u>	<u>Detection Limits</u>	<u>QA Lab 49WA</u>	<u>Detection Limits</u>
Aluminum	ND	50	ND	200
Antimony	ND	50	ND	100
Arsenic	ND	5	ND	5
Barium	ND	5	ND	20
Beryllium	ND	5	ND	20
Cadmium	ND	3	ND	20
Calcium	57	50	ND	500
Chromium	ND	5	ND	20
Cobalt	ND	10	ND	50
Copper	ND	10	ND	20
Iron	33	20	ND	100
Lead	ND	2	ND	2
Magnesium	23	10	ND	500
Manganese	ND	5	ND	20
Mercury	ND	0.5	ND	0.5
Nickel	ND	20	ND	50
Potassium	ND	2000	ND	500
Selenium	ND	5	ND	5
Silver	ND	10	1.5	1
Sodium	123	100	ND	500
Thallium	ND	5	ND	5
Vanadium	ND	10	ND	50
Zinc	ND	10	ND	50

SUMMARY: The project and QA rinsate data agree with each other. The presence of targeted analytes at or near their detection limits are not considered significant at this level of detection.

Table II-b cont.

7. Method: Inorganic Parameters EPA 100-400 Series Units: mg/L (ppm)

<u>Analytes Detected</u>	<u>Project Lab 48WA</u>	<u>Detection Limits</u>	<u>QA Lab 49WA</u>	<u>Detection Limits</u>
Total Alkalinity	ND	20	ND	10
Ammonia				
as Nitrogen	ND	0.05	ND	0.05
Nitrate/Nitrite				
as Nitrogen	ND	0.2	ND	0.03
Chloride	0.2	0.2	ND	1.0
Sulfate	0.2	0.2	ND	1.0
Total Phosphorus	ND	0.01	0.02	0.02
Chemical Oxygen				
Demand	ND	5	ND	10
Hardness*	NR		ND	5.0
Total Dissolved				
Solids	ND	5	ND	10

* = Method 2340B, SM 18th edition

NR = Not requested on chain of custody records

SUMMARY: The project and QA rinsate data agree within a factor of two to each other or their detection limits for all targeted analytes. The presence of targeted analytes at their detection limits are not considered significant at this level of detection.

COMPARISON OF PROJECT AND QA RESULTS

Table III

Ft. Richardson

Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

Analytes <u>Detected</u>	Project Lab		Detection <u>Limits</u>	QA Lab	Detection <u>Limits</u>
	<u>06WA</u>	<u>07WA</u>		<u>08WA</u>	
Acetone	10 B	9 B	2	ND	10.
1,2-Dichloroethane	0.9	0.8	0.5	ND	0.9
Carbon Tetrachloride	ND	ND	0.5	0.4 J	0.6
Trichloroethene	ND	ND	0.5	0.3 J	0.6

B = Found in method blank
 J = Estimated concentration
 ND = None detected

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits for all targeted analytes and are comparable.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

Analytes <u>Detected</u>	Project Lab		Detection <u>Limits</u>	QA Lab	Detection <u>Limits</u>
	<u>06WA</u>	<u>07WA</u>		<u>08WA</u>	
GRO	ND	ND	50	ND	50

SUMMARY: The project blind duplicate and QA data agree with each other and are comparable.

3. Method: Diesel Range Organics (ADEC 8100 mod.) Units: ug/L (ppb)

Analytes <u>Detected</u>	Project Lab		Detection <u>Limits</u>	QA Lab	Detection <u>Limits</u>
	<u>06WA</u>	<u>07WA</u>		<u>08WA</u>	
DRO	109	92	50	ND	100

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

Table III cont.

4. Method: Total Metals EPA 6010, 7000 Series Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	
	<u>06WA</u>	<u>07WA</u>		<u>08WA</u>	<u>Detection Limits</u>
Aluminum	10,500	11,300	50	11,000	200
Antimony	ND	ND	50	ND	100
Arsenic	ND	ND	5	5	5
Barium	102	107	5	100	20
Beryllium	ND	ND	5	ND	20
Cadmium	ND	ND	3	ND	20
Calcium	32,700	31,600	50	32,000	500
Chromium	14	18	5	ND	20
Cobalt	ND	10	10	ND	50
Copper	20	23	10	30	20
Iron	14,400	16,100	20	16,000	100
Lead	5	5	2	6	2
Magnesium	11,800	11,900	10	12,000	500
Manganese	479	545	5	490	20
Mercury	ND	ND	0.5	ND	0.5
Nickel	ND	ND	20	ND	50
Potassium	ND	ND	2000	2100	500
Selenium	ND	ND	5	ND	5
Silver	ND	ND	10	ND	1
Sodium	9140	8850	100	9300	500
Thallium	ND	ND	5	ND	5
Vanadium	28	30	10	ND	50
Zinc	39	43	10	ND	50

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

Table III cont.

5. Method: Dissolved Metals (EPA 6010, 7000 Series) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	
	<u>06WA</u>	<u>07WA</u>		<u>08WA</u>	<u>Detection Limits</u>
Aluminum	ND	ND	50	ND	200
Antimony	ND	ND	50	ND	100
Arsenic	ND	ND	5	ND	5
Barium	37	35	5	30	20
Beryllium	ND	ND	5	ND	20
Cadmium	ND	ND	3	ND	20
Calcium	29,800	30,400	50	29,000	500
Chromium	ND	ND	5	ND	20
Cobalt	ND	ND	10	ND	50
Copper	ND	ND	10	ND	20
Iron	ND	ND	20	ND	100
Lead	ND	ND	2	ND	2
Magnesium	7910	8130	10	7300	500
Manganese	ND	ND	5	ND	20
Mercury	ND	ND	0.5	ND	0.5
Nickel	ND	ND	20	ND	50
Potassium	ND	ND	2000	2000	500
Selenium	ND	ND	5	ND	5
Silver	ND	ND	10	ND	1
Sodium	8880	9330	100	9400	500
Thallium	ND	ND	5	ND	5
Vanadium	ND	ND	10	ND	50
Zinc	13	16	10	ND	50

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

COMPARISON OF PROJECT AND QA RESULTS

Table IV

Ft. Richardson

Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.
 Method: Polychlorinated Biphenyls (EPA 8080) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	<u>Detection Limits</u>
	<u>13WA</u>	<u>14WA</u>		<u>15WA</u>	
Aroclor 1016	ND	ND	0.1	ND	0.5
Aroclor 1221	ND	ND	0.1	ND	0.5
Aroclor 1232	ND	ND	0.1	ND	0.5
Aroclor 1242	ND	ND	0.1	ND	0.6
Aroclor 1248	ND	ND	0.1	ND	0.5
Aroclor 1254	ND	ND	0.1	ND	0.5
Aroclor 1260	ND	ND	0.1	ND	0.5

ND = None detected

SUMMARY: The project blind duplicate and QA data agree with each other and are comparable.

COMPARISON OF PROJECT AND QA RESULTS

Table V

Ft. Richardson
 Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	
	<u>20WA</u>	<u>21WA</u>		<u>22WA</u>	<u>Limits</u>
Acetone	8 B	4 B	2	ND	10.
Benzene	4.4	4.0	0.5	5.4	0.6
Ethylbenzene	0.6	0.7	0.5	ND	0.6
Total Xylenes	2.3	0.8	0.5	0.7*	0.4
n-Butylbenzene	ND	ND	2	0.4 J	0.7
1,2,4-Trimethylbenzene	ND	ND	2	0.5 J	0.8
1,3,5-Trimethylbenzene	ND	ND	2	1.4	0.5
n-Propylbenzene	ND	ND	2	0.3 J	0.6
Isopropylbenzene	ND	ND	2	0.3 J	0.6
4-Isopropyltoluene	ND	ND	2	0.6 J	0.7
1,2-Dichloroethane	2.4	2.4	0.5	ND	0.9
Carbon Tetrachloride	ND	ND	0.5	ND	0.6
Chloromethane	ND	0.8	0.5	ND	0.8

B = Found in method blank
 J = Estimated concentration
 * = Sum of o- and m&p-xylene isomers
 ND = None detected

SUMMARY: The project blind duplicate and QA data agree within a factor of three to each other or their detection limits for all targeted analytes except for the data of total xylenes. The project data of total xylenes are considered high estimates based on the high surrogate recoveries noted for these samples. The QA data of total xylenes are accepted based on acceptable internal QC data.

2. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	
	<u>20WA</u>	<u>21WA</u>		<u>22WA</u>	<u>Limits</u>
GRO	490	496	50	640	50

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

Table V cont.

3. Method: Diesel Range Organics (ADEC 8100 mod.) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	<u>Detection Limits</u>
	<u>20WA</u>	<u>21WA</u>		<u>22WA</u>	
DRO	8390	4250	50	5500	500

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

4. Method: Total Metals (EPA 6010,7000 Series) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	<u>Detection Limits</u>
	<u>20WA</u>	<u>21WA</u>		<u>22WA</u>	
Aluminum	47,500	41,200	50	41,000	200
Antimony	ND	ND	50	ND	100
Arsenic	19	19	5	25	5
Barium	346	304	5	260	20
Beryllium	ND	ND	5	ND	20
Cadmium	4	4	3	ND	20
Calcium	117,000	112,000	50	110,000	500
Chromium	109	93	5	100	20
Cobalt	39	35	10	ND	50
Copper	130	114	10	130	20
Iron	74,700	65,000	20	72,000	100
Lead	29	28	2	32	2
Magnesium	38,700	35,100	10	36,000	500
Manganese	2450	2240	5	2200	20
Mercury	ND	ND	0.5	ND	0.5
Nickel	145	121	20	150	50
Potassium	7000	6200	2000	5000	500
Selenium	ND	ND	5	ND	5
Silver	ND	ND	10	ND	1
Sodium	6300	5970	100	5200	500
Thallium	ND	ND	5	ND	5
Vanadium	154	135	10	130	50
Zinc	184	158	10	170	50

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

Table V cont.

5. Method: Dissolved Metals (EPA 6010,7000 Series) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project 20WA</u>	<u>Lab 21WA</u>	<u>Detection Limits</u>	<u>QA Lab 22WA</u>	<u>Detection Limits</u>
Aluminum	ND	ND	50	ND	200
Antimony	ND	ND	50	ND	100
Arsenic	5	5	5	ND	5
Barium	51	26	5	30	20
Beryllium	ND	ND	5	ND	20
Cadmium	ND	ND	3	ND	20
Calcium	91,900	93,000	50	86,000	500
Chromium	ND	ND	5	ND	20
Cobalt	ND	ND	10	ND	50
Copper	ND	ND	10	ND	20
Iron	478	487	20	500	100
Lead	ND	ND	2	6	2
Magnesium	12,200	12,200	10	11,000	500
Manganese	889	883	5	880	20
Mercury	ND	ND	0.5	ND	0.5
Nickel	ND	ND	20	ND	50
Potassium	ND	ND	2000	1500	500
Selenium	ND	ND	5	ND	5
Silver	ND	ND	10	ND	1
Sodium	4350	5260	100	5100	500
Thallium	ND	ND	5	ND	5
Vanadium	ND	ND	10	ND	50
Zinc	ND	ND	10	ND	50

SUMMARY: The project blind duplicate and QA data agree within a factor of three to each other or their detection limits and are comparable.

CENPD-PE-GE-L 94-2511

COMPARISON OF PROJECT AND QA RESULTS

Table VI

Ft. Richardson
 Project: Groundwater Spring 94 Matrix: Water Prefix: 94FRGW-
 Project Laboratory: CAS, Inc. QA Laboratory: CENPD-PE-GE-L

1. Method: Volatile Organic Compounds (EPA 8260) Units: ug/L (ppb)

Analytes <u>Detected</u>	Project Lab		Detection <u>Limits</u>	QA Lab	Detection <u>Limits</u>
	<u>32WA</u>	<u>33WA</u>		<u>34WA</u>	
Acetone	3	ND	2	ND	10.
Chloromethane	1.0	ND	0.5	ND	0.8
1,2-Dichloroethane	1.3	ND	0.5	0.4 J	0.9

J = Estimated concentration
 ND = None detected

SUMMARY: The project blind duplicate and QA data agree within a factor of three to each other or their detection limits for all targeted analytes and are comparable except for the data of 1,2-dichloroethane. Since the QA data of 1,2-dichloroethane was quantitated below the detection limit, the data should be considered an estimate. The project data of 1,2-dichloroethane are accepted based on acceptable internal QC data and blind duplicate agreement. The data comparison at close to or below detection limits are not considered significant.

2. Project Method: Polychlorinated Biphenyls (EPA 8080)
 QA Method: Organochlorine Pesticides/PCBs (EPA 608) Units: ug/L (ppb)
 Project Laboratory: CAS, Inc. QA Laboratory: NET Pacific, Inc.

Analytes <u>Detected</u>	Project Lab		Detection <u>Limits</u>	QA Lab	Detection <u>Limits</u>
	<u>32WA</u>	<u>33WA</u>		<u>34WA</u>	
Pesticides	NS	NS		ND	0.005-1.0
Aroclor 1016	ND	ND	0.2	ND	0.5
Aroclor 1221	ND	ND	0.2	ND	0.5
Aroclor 1232	ND	ND	0.2	ND	0.5
Aroclor 1242	ND	ND	0.2	ND	0.6
Aroclor 1248	ND	ND	0.2	ND	0.5
Aroclor 1254	ND	ND	0.2	ND	0.5
Aroclor 1260	ND	ND	0.2	ND	0.5

NS = Data not submitted by laboratory. Requested on chain of custody records

SUMMARY: The project blind duplicate and QA data of PCBs agree with each other and are comparable. The QA data of pesticides are acceptable and may be used for the project evaluation, if applicable.

Table VI cont.

3. Method: Gasoline Range Organics (ADEC 8015 mod.) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection</u>	<u>QA Lab</u>	<u>Detection</u>
	<u>32WA</u>	<u>33WA</u>	<u>Limits</u>	<u>34WA</u>	<u>Limits</u>
GRO	ND	ND	50	ND	50

SUMMARY: The project blind duplicate and QA data agree with each other and are comparable.

4. Method: Diesel Range Organics (ADEC 8100 mod.) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection</u>	<u>QA Lab</u>	<u>Detection</u>
	<u>32WA</u>	<u>33WA</u>	<u>Limits</u>	<u>34WA</u>	<u>Limits</u>
DRO	ND	ND	50	ND	100

SUMMARY: The project blind duplicate and QA data agree with each other and are comparable.

5. Method: Petroleum Hydrocarbons (EPA 418.1) Units: mg/L (ppm)
Total Recoverable

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection</u>	<u>QA Lab</u>	<u>Detection</u>
	<u>32WA</u>	<u>33WA</u>	<u>Limits</u>	<u>34WA</u>	<u>Limits</u>
TRPH	ND	ND	0.2	ND	1.0

SUMMARY: The project blind duplicate and QA data agree with each other and are comparable.

CENPD-PE-GE-L (94-251)
Table VI cont.

6. Method: Total Metals (EPA 6010,7000 Series) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project Lab</u>		<u>Detection Limits</u>	<u>QA Lab</u>	<u>Detection Limits</u>
	<u>32WA</u>	<u>33WA</u>		<u>34WA</u>	
Aluminum	197	134	50	ND	200
Antimony	ND	ND	50	ND	100
Arsenic	ND	ND	5	ND	5
Barium	7	6	5	ND	20
Beryllium	ND	ND	5	ND	20
Cadmium	ND	ND	3	ND	20
Calcium	55,500	56,000	50	54,000	500
Chromium	9	5	5	ND	20
Cobalt	ND	ND	10	ND	50
Copper	ND	ND	10	ND	20
Iron	400	233	20	200	100
Lead	2	ND	2	6	2
Magnesium	8330	8360	10	8000	500
Manganese	16	8	5	ND	20
Mercury	ND	ND	0.5	ND	0.5
Nickel	ND	ND	20	ND	50
Potassium	ND	ND	2000	700	500
Selenium	ND	ND	5	ND	5
Silver	ND	ND	10	ND	1
Sodium	3040	3060	100	3200	500
Thallium	ND	ND	5	ND	5
Vanadium	ND	ND	10	ND	50
Zinc	ND	ND	10	ND	50

SUMMARY: The project blind duplicate and QA data agree within a factor of three to each other or their detection limits and are comparable.

CENPD-PE-GE-L (94-251)
Table VI cont.

7. Method: Dissolved Metals (EPA 6010, 7000 Series) Units: ug/L (ppb)

<u>Analytes Detected</u>	<u>Project 32WA</u>	<u>Lab 33WA</u>	<u>Detection Limits</u>	<u>QA Lab 34WA</u>	<u>Detection Limits</u>
Aluminum	ND	ND	50	ND	200
Antimony	ND	ND	50	ND	100
Arsenic	ND	5	5	ND	5
Barium	ND	ND	5	ND	20
Beryllium	ND	ND	5	ND	20
Cadmium	ND	ND	3	ND	20
Calcium	55,700	57,100	50	49,000	500
Chromium	ND	ND	5	ND	20
Cobalt	ND	ND	10	ND	50
Copper	ND	ND	10	ND	20
Iron	ND	ND	20	ND	100
Lead	ND	ND	2	ND	2
Magnesium	8270	8460	10	7300	500
Manganese	ND	ND	5	ND	20
Mercury	ND	ND	0.5	ND	0.5
Nickel	ND	ND	20	ND	50
Potassium	ND	ND	2000	1000	500
Selenium	ND	ND	5	ND	5
Silver	ND	ND	10	ND	1
Sodium	3910	3870	100	3400	500
Thallium	ND	ND	5	ND	5
Vanadium	ND	ND	10	ND	50
Zinc	ND	ND	10	ND	50

SUMMARY: The project blind duplicate and QA data agree within a factor of two to each other or their detection limits and are comparable.

CENPD-PE-GE-L (94-251)
Table VI cont.

8. Method: Inorganic Parameters (EPA 100-400 Series) Units: mg/L (ppm)

<u>Analytes Detected</u>	<u>Project Lab 32WA</u>	<u>Lab 33WA</u>	<u>Detection Limits</u>	<u>QA Lab 34WA</u>	<u>Detection Limits</u>
Total Alkalinity	141	139	20	150	10
Total Organic Carbon	ND	ND	0.5	ND	1.0
Ammonia as Nitrogen	ND	ND	0.05	ND	0.05
Nitrate/Nitrite as Nitrogen	0.8	0.9	0.2	0.70	0.03
Chloride	7.9	8.6	0.2	7.1	1.0
Sulfate	18	18	0.2	19	1.0
Total Phosphorus	0.03	0.01	0.01	0.04	0.02
Chemical Oxygen Demand	ND	ND	5	ND	10
Hardness*	173	177	0.2	168	5.0
Total Dissolved Solids	196	195	5	210	10

* = Method 2340B, SM 18th edition

SUMMARY: The project blind duplicate and QA data agree within a factor of three to each other and are comparable except for the data of total phosphorus. As the total phosphorus data of project sample -33WA was detected at the detection limit, the data discrepancy should not be considered significant at this level of detection. The project and QA data are acceptable based on acceptable internal QC data.

9. Method: Biological Oxygen Demand (EPA 405.1) Units: mg/L (ppm)
Project Laboratory: Commercial Testing and Engineering, Co.

<u>Analytes Detected</u>	<u>Project Lab 32WA</u>	<u>Lab 33WA</u>	<u>Detection Limits</u>	<u>QA Lab 34WA</u>	<u>Detection Limits</u>
BOD	1.0	1.0	1.0	NR	

NR = Not requested on chain of custody records

SUMMARY: The project blind duplicate data agree with each other and are comparable.

CENPD-PE-GE-L (94-251)
Table VI cont.

10. Method: Turbidity (EPA 180.1) Units: NTU

<u>Analytes</u> <u>Detected</u>	<u>Project Lab</u> <u>32WA</u>	<u>Lab</u> <u>33WA</u>	<u>Detection</u> <u>Limits</u>	<u>QA Lab</u> <u>34WA</u>	<u>Detection</u> <u>Limits</u>
Turbidity	2.4	1.1	0.10	NR	

SUMMARY: The project blind duplicate data agree within a factor of three to each other and are comparable.